
CHAPTER 8

CARING

FOR YOUR PRINTER

Subjects we'll cover in Chapter 8 include—

- **Cleaning the printer;**
- **Changing the ribbon;**
- **Replacing the print head.**

As any good mechanic will tell you, dust and heat are the biggest enemies of any mechanism. And your printer is no exception. The best maintenance is *preventive maintenance*, so the first step in keeping your printer healthy and happy is to make sure it's in a clean, dust-free location. The range of temperature should be comfortable for both you and your computer/printer system. (Please refer to Chapter 1 for more tips on locating your printer.)

CLEANING THE PRINTER

Another important rule for keeping your printer young and healthy is to clean it regularly—inside and out. Just use a damp towel every week or so (you can moisten the towel with alcohol for stubborn dirt, *but* be careful not to get any alcohol on the printer mechanism).

Use a soft brush to remove dust and lint from inside the printer, but be very careful not to bend or injure any electronic parts or wiring. It doesn't take much to do expensive damage, so don't fuss where you're not supposed to—besides periodic cleaning, the only other maintenance you'll have to do will be changing the ribbon cartridge, or the print head.

REPLACING THE RIBBON

This printer uses an “endless” ribbon cartridge, which means that the inked ribbon inside is recycled automatically. Eventually, though, printing will become too faint to read easily and you’ll want to change the ribbon.

By far the most convenient way to change the ribbon is to simply replace the whole cartridge (see Chapter 1 for details). After all, the reason for using a cartridge is so that you can make the change easily and quickly. But if for some reason you enjoy taking the time to mess with dirty ribbons, read on.

Follow this procedure to remove the old ribbon and insert the new one in the original cartridge (not recommended for people with ten thumbs!).

1. First, obtain from your dealer the correct type of ribbon “sub-cassette” (not the spool-type ribbons used with some other printers).
2. Grasp both ends of the ribbon cartridge and pull the cartridge up and out of the printer. (Refer to Chapter 1 for illustrations of installing the refilled ribbon cartridge.)
3. Unhook the six tabs of the cartridge cover carefully (Figure 8-1).

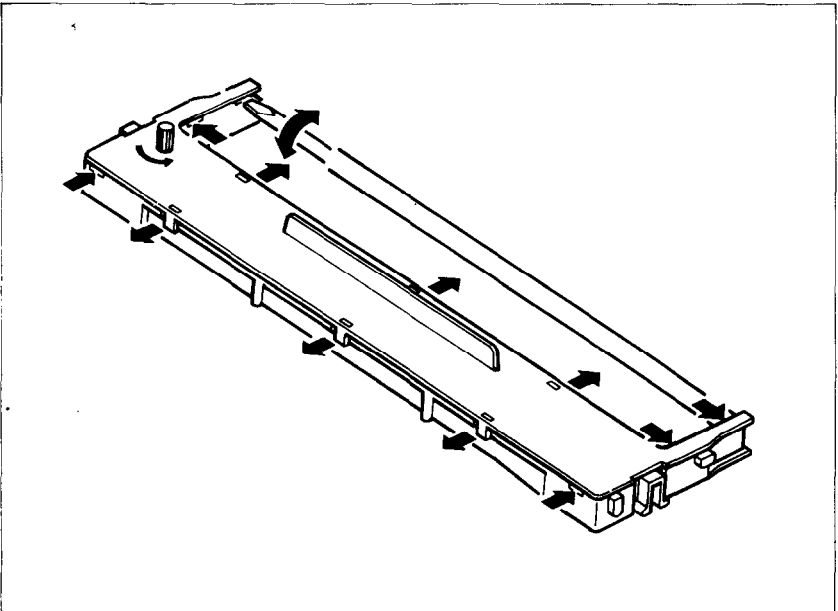


Figure 8-1. Use a screwdriver to pry open the cartridge.

4. Using a screwdriver with a thin blade, pry open the cartridge cover. Figure 8-1 shows the numerous slots for inserting a screwdriver.
5. Press hard against the end of the idler gear holder to make a space between the holder and the ribbon drive gear, and remove the old ribbon and holder. See Figure 8-2.

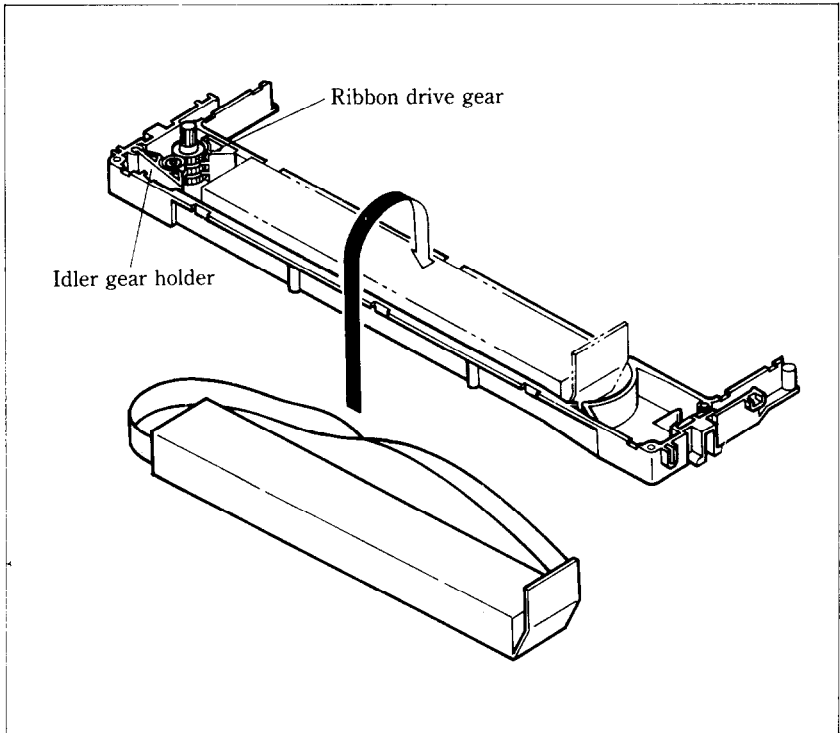


Figure 8-2. Replace the ribbon sub-cassette.

6. Clean the inside of the cartridge, the area around the cartridge, and the ribbon drive gear and vicinity.
7. Take the new ribbon and holder out of the wrapper, remove the adhesive tape on the joint, and place the ribbon holder into the cassette as shown in Figure 8-2.
8. Pull out the ribbon and thread it as shown in Figure 8-3. It's easy for the ribbon to get twisted along its path, so be careful.

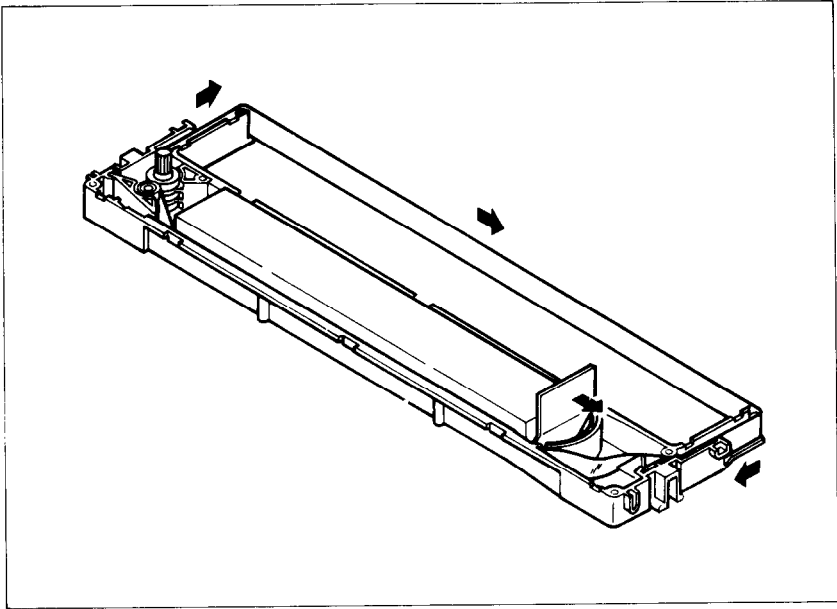


Figure 8-3. Make sure that the ribbon is not twisted when you thread it through its path.

9. Firmly pull the idler gear towards you and guide the ribbon between the idler gear and the ribbon drive gear.
10. Remove the top and the bottom of the ribbon holder.
11. Replace the ribbon cartridge top cover.
12. Now you're almost finished! Remount the cartridge to the printer. Notice that five replacements is the maximum, after which you should buy a completely new cartridge.

REPLACING THE PRINT HEAD

The dot matrix print head has a remarkably long life. It will print perhaps 100,000,000 characters before you have to replace it. You'll know when that time comes when printing is too faint even after you replace the ribbon cartridge.

Warning: The print head gets hot during operation, so let it cool off before you touch it.

To replace the print head, start by turning off the Power switch and unplugging the power cord. Then follow this procedure:

1. Remove the printer cover and the ribbon cartridge.
2. Remove the connector cover on the printer frame.

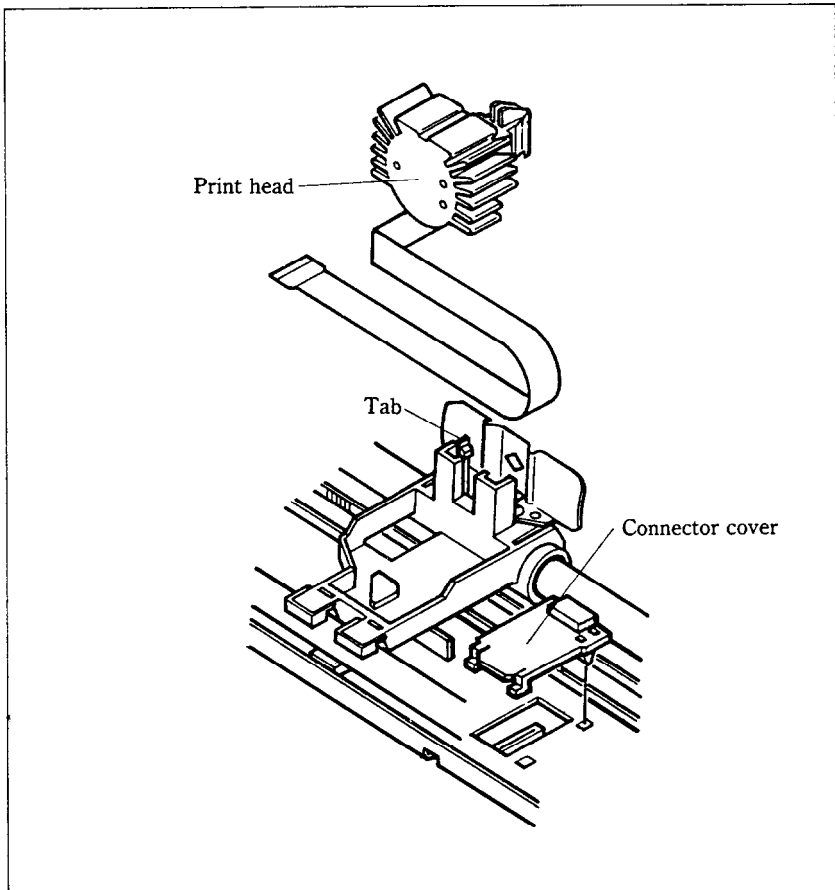
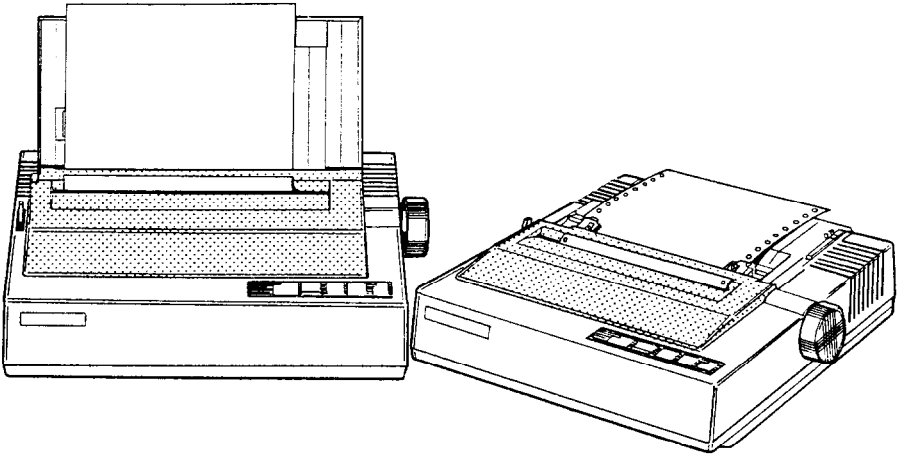


Figure 8-4. Replacement of the print head is simple.

3. Remove the tab fastening the print head.
4. Holding the print head and the head cable board securely, unplug the head cable.
5. Connect the cable of a new print head to the head cable board and fasten it reversing the above procedures.

Be absolutely sure that the connection between the print head and the cable is secure. A loose cable will cause you problems later.

MEMO



Appendix

MEMO

APPENDIX A

DIP SWITCH SETTINGS

A dual-in-line set of switches (collectively called a [one] DIP switch) controls some of the functions of the printer. The DIP switch actually contains several individual switches. This printer has one DIP switch with 10 individual switches in it, and one DIP switch with 6 individual switches. Figure A-1 is a drawing of a typical DIP switch.

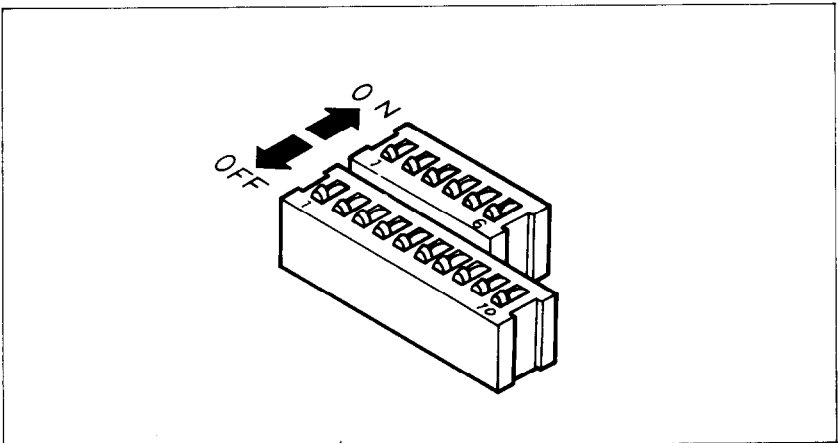


Figure A-1. The DIP switch is several small switches in one package.

All two DIP switches are readily accessible from the top. They are located in the compartment with the print head, and can be seen by opening the printer cover. To set one of the switches, use a ball-point pen to move the switch lever gently. The on position is towards the back of the printer, and off is towards the front.

Never change the settings of any of the DIP switches when the power is turned on. Turn off both the printer and your computer to change the settings.

The individual switches on DIP switch 1 are called 1-1

through 1-10; those on switch 2 are 2-1 through 2-6.

Table A-1 summarizes the functions of DIP switches 1 and 2.

Table A-1
DIP switch settings

Switch	ON	OFF
Switch 1		
1-1	11" page length	12" page length
1-2	Draft characters	NLQ characters
1-3	Print "normal zero"	Print "slash zero"
1-4	No bottom margin	Set bottom margin to 1 inch
1-5	Paper-out detected	Paper-out not detected
1-6	Set Standard mode	Set IBM mode
1-7	Character set #1	Character set #2
1-8	LF must be from host	Auto LF with CR
1-9	(Not used)	
1-10	(Not used)	
Switch 2		
2-1	Ignore download characters	Enable download characters
2-2	International character set selection—see Table A-2	
2-3		
2-4		
2-5	(Not used)	
2-6	(Not used)	

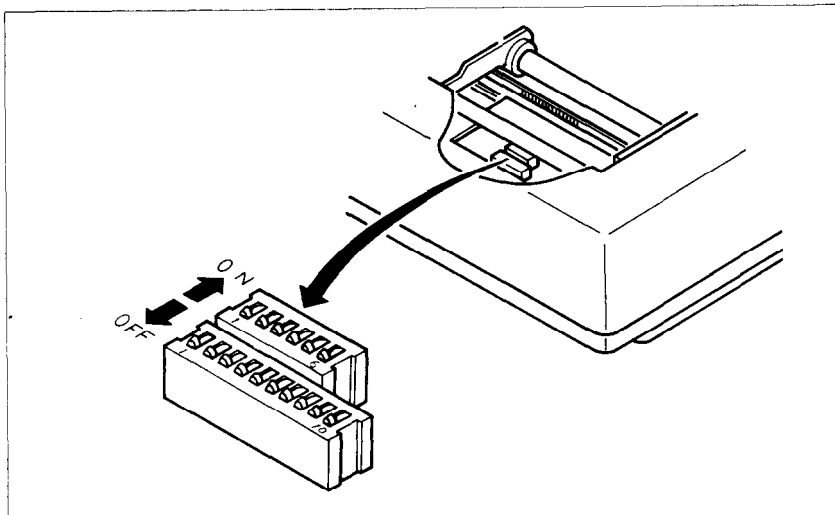


Figure A-2. The DIP switches are located under the printer cover.

SWITCH FUNCTIONS

Switch Functions

- 1-1 This switch sets the default page length. When the switch is on, the page length is set to 11 inches. When the switch is off, the page length is set to 12 inches. This switch is set on at the factory.
- 1-2 This switch selects the default character style. If this switch is on the default character style is normal draft characters. If this switch is off the default character style is Near Letter Quality (NLQ) characters. This switch is set on at the factory.
- 1-3 This switch tells the printer how to print zeroes. When the switch is on the printer prints the normal zero; when it is off the slash zero (which is often used in draft mode to prevent any possible confusion with the letter "O"). 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 the 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 disables the paper-out detector. If the switch is on, the printer will signal the computer when it runs out of paper and will stop printing. If the switch is off, the printer will ignore the paper-out detector and will continue printing. This switch is set on at the factory.
- 1-6 This switch selects the active control codes. Turn this switch on to use the "Standard" mode. Turn this switch off to use the "IBM" compatible mode. This switch is set on at the factory.
- 1-7 This switch selects the default character set. 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 switch 1-6 is set on, this switch have no effect. This switch is set on at the factory.
- 1-8 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.

- 2-1 This switch controls the RAM condition. When this switch is on, the download character definitions are ignored and the RAM is used as the print buffer. When this switch is off, the download character definitions are enable to use and the print buffer is set to one line buffer. This switch is set on at the factory.
- 2-2~2-4 These three switches determine the default international character set, leaving the Japanese, Norwegian, and the second Danish, 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
2-2	ON	OFF	ON	OFF	ON	OFF	ON	OFF
2-3	ON	ON	OFF	OFF	ON	ON	OFF	OFF
2-4	ON	ON	ON	ON	OFF	OFF	OFF	OFF

APPENDIX B

ASCII CODES AND CONVERSION CHART

Standard ASCII Codes			Control	Character set	
Decimal	Hex.	Binary	Character	Set1	Set2
0	00	0000 0000	Ctrl-@		
1	01	0000 0001	Ctrl-A		
2	02	0000 0010	Ctrl-B		
3	03	0000 0011	Ctrl-C		♥ ♥ ♥
4	04	0000 0100	Ctrl-D		♦ ♦ ♦
5	05	0000 0101	Ctrl-E		♣ ♣ ♣
6	06	0000 0110	Ctrl-F		♠ ♠ ♠
7	07	0000 0111	Ctrl-G	BEL	BEL
8	08	0000 1000	Ctrl-H	BS	BS
9	09	0000 1001	Ctrl-I	HT	HT
10	0A	0000 1010	Ctrl-J	LF	LF
11	0B	0000 1011	Ctrl-K	VT	VT
12	0C	0000 1100	Ctrl-L	FF	FF
13	0D	0000 1101	Ctrl-M	CR	CR
14	0E	0000 1110	Ctrl-N	SO	SO
15	0F	0000 1111	Ctrl-O	SI	SI
16	10	0001 0000	Ctrl-P		
17	11	0001 0001	Ctrl-Q	DC1	DC1
18	12	0001 0010	Ctrl-R	DC2	DC2
19	13	0001 0011	Ctrl-S	DC3	DC3
20	14	0001 0100	Ctrl-T	DC4	DC4
21	15	0001 0101	Ctrl-U		
22	16	0001 0110	Ctrl-V		␣ ␣ ␣
23	17	0001 0111	Ctrl-W		␣ ␣ ␣
24	18	0001 1000	Ctrl-X	CAN	CAN
25	19	0001 1001	Ctrl-Y	EM	EM
26	1A	0001 1010	Ctrl-Z		→ ÷ →
27	1B	0001 1011		ESC	ESC
28	1C	0001 1100			
29	1D	0001 1101			
30	1E	0001 1110			
31	1F	0001 1111			
32	20	0010 0000		Space	Space

Decimal	Standard ASCII Codes		Character set					
	Hexadecimal	Binary	Set1			Set2		
33	21	0010 0001	!	!	/	!	!	/
34	22	0010 0010	"	"	//	"	"	//
35	23	0010 0011	#	#	##	#	#	##
36	24	0010 0100	\$	\$	\$\$	\$	\$	\$\$
37	25	0010 0101	%	%	%%	%	%	%%
38	26	0010 0110	&	&	&&	&	&	&&
39	27	0010 0111	'	'	'	'	'	'
40	28	0010 1000	((((((
41	29	0010 1001))))))
42	2A	0010 1010	*	*	**	*	*	**
43	2B	0010 1011	+	+	++	+	+	++
44	2C	0010 1100	,	,	,	,	,	,
45	2D	0010 1101	-	-	-	-	-	-
46	2E	0010 1110	.	.	.	.	.	.
47	2F	0010 1111	/	/	/	/	/	/
48	30	0011 0000	0	0	0	0	0	0
49	31	0011 0001	1	1	1	1	1	1
50	32	0011 0010	2	2	2	2	2	2
51	33	0011 0011	3	3	3	3	3	3
52	34	0011 0100	4	4	4	4	4	4
53	35	0011 0101	5	5	5	5	5	5
54	36	0011 0110	6	6	6	6	6	6
55	37	0011 0111	7	7	7	7	7	7
56	38	0011 1000	8	8	8	8	8	8
57	39	0011 1001	9	9	9	9	9	9
58	3A	0011 1010	:	:	:	:	:	:
59	3B	0011 1011	;	;	;	;	;	;
60	3C	0011 1100	<	<	<	<	<	<
61	3D	0011 1101	=	=	=	=	=	=
62	3E	0011 1110	>	>	>	>	>	>
63	3F	0011 1111	?	?	?	?	?	?
64	40	0100 0000	@	@	@	@	@	@
65	41	0100 0001	A	A	A	A	A	A
66	42	0100 0010	B	B	B	B	B	B
67	43	0100 0011	C	C	C	C	C	C
68	44	0100 0100	D	D	D	D	D	D
69	45	0100 0101	E	E	E	E	E	E
70	46	0100 0110	F	F	F	F	F	F
71	47	0100 0111	G	G	G	G	G	G
72	48	0100 1000	H	H	H	H	H	H
73	49	0100 1001	I	I	I	I	I	I
74	4A	0100 1010	J	J	J	J	J	J
75	4B	0100 1011	K	K	K	K	K	K
76	4C	0100 1100	L	L	L	L	L	L

Standard ASCII Codes			Character set					
Decimal	Hexadecimal	Binary	Set1			Set2		
77	4D	0100 1101	M	M	M	M	M	M
78	4E	0100 1110	N	N	N	N	N	N
79	4F	0100 1111	O	O	O	O	O	O
80	50	0101 0000	P	P	P	P	P	P
81	51	0101 0001	Q	Q	Q	Q	Q	Q
82	52	0101 0010	R	R	R	R	R	R
83	53	0101 0011	S	S	S	S	S	S
84	54	0101 0100	T	T	T	T	T	T
85	55	0101 0101	U	U	U	U	U	U
86	56	0101 0110	V	V	V	V	V	V
87	57	0101 0111	W	W	W	W	W	W
88	58	0101 1000	X	X	X	X	X	X
89	59	0101 1001	Y	Y	Y	Y	Y	Y
90	5A	0101 1010	Z	Z	Z	Z	Z	Z
91	5B	0101 1011	[[[[[[
92	5C	0101 1100	\	\	\	\	\	\
93	5D	0101 1101]]]]]]
94	5E	0101 1110	^	^	^	^	^	^
95	5F	0101 1111	~	~	~	~	~	~
96	60	0110 0000	a	a	a	a	a	a
97	61	0110 0001	b	b	b	b	b	b
98	62	0110 0010	c	c	c	c	c	c
99	63	0110 0011	d	d	d	d	d	d
100	64	0110 0100	e	e	e	e	e	e
101	65	0110 0101	f	f	f	f	f	f
102	66	0110 0110	g	g	g	g	g	g
103	67	0110 0111	h	h	h	h	h	h
104	68	0110 1000	i	i	i	i	i	i
105	69	0110 1001	j	j	j	j	j	j
106	6A	0110 1010	k	k	k	k	k	k
107	6B	0110 1011	l	l	l	l	l	l
108	6C	0110 1100	m	m	m	m	m	m
109	6D	0110 1101	n	n	n	n	n	n
110	6E	0110 1110	o	o	o	o	o	o
111	6F	0110 1111	p	p	p	p	p	p
112	70	0111 0000	q	q	q	q	q	q
113	71	0111 0001	r	r	r	r	r	r
114	72	0111 0010	s	s	s	s	s	s
115	73	0111 0011	t	t	t	t	t	t
116	74	0111 0100	u	u	u	u	u	u
117	75	0111 0101	v	v	v	v	v	v
118	76	0111 0110	w	w	w	w	w	w
119	77	0111 0111	x	x	x	x	x	x
120	78	0111 1000						

Standard ASCII Codes			Character set					
Decimal	Hexadecimal	Binary	Set1			Set2		
121	79	0111 1001	y	Y	ŷ	ÿ	ÿ	ÿ
122	7A	0111 1010	z	Z	ẏ	z	z	z
123	7B	0111 1011	{	{	{	{	{	{
124	7C	0111 1100	|	|	|	|	|	|
125	7D	0111 1101	}	}	}	}	}	}
126	7E	0111 1110	~	~	~	~	~	~
127	7F	0111 1111	DEL			DEL		
128	80	1000 0000				Ç	Ç	Ç
129	81	1000 0001				ü	ü	ü
130	82	1000 0010				é	é	é
131	83	1000 0011				â	â	â
132	84	1000 0100				ä	ä	ä
133	85	1000 0101				à	à	à
134	86	1000 0110				ã	ã	ã
135	87	1000 0111	BEL			ç	ç	ç
136	88	1000 1000	BS			ê	ê	ê
137	89	1000 1001	HT			ë	ë	ë
138	8A	1000 1010	LF			è	è	è
139	8B	1000 1011	VT			ï	ï	ï
140	8C	1000 1100	FF			î	î	î
141	8D	1000 1101	CR			ì	ì	ì
142	8E	1000 1110	SO			Ä	Ä	Ä
143	8F	1000 1111	SI			Å	Å	Å
144	90	1001 0000				É	É	É
145	91	1001 0001	DC1			æ	æ	æ
146	92	1001 0010	DC2			Æ	Æ	Æ
147	93	1001 0011	DC3			ô	ô	ô
148	94	1001 0100	DC4			ö	ö	ö
149	95	1001 0101				ò	ò	ò
150	96	1001 0110				û	û	û
151	97	1001 0111				ù	ù	ù
152	98	1001 1000	CAN			ý	ý	ý
153	99	1001 1001	EM			ö	ö	ö
154	9A	1001 1010				U	U	U
155	9B	1001 1011	ESC			ç	ç	ç
156	9C	1001 1100				£	£	£
157	9D	1001 1101				¥	¥	¥
158	9E	1001 1110				℞	℞	℞
159	9F	1001 1111				ƒ	ƒ	ƒ
160	A0	1010 0000	á	á	á	á	á	á
161	A1	1010 0001	í	í	í	í	í	í
162	A2	1010 0010	ó	ó	ó	ó	ó	ó
163	A3	1010 0011	ú	ú	ú	ú	ú	ú
164	A4	1010 0100	ñ	ñ	ñ	ñ	ñ	ñ

Standard ASCII Codes			Character set					
Decimal	Hexadecimal	Binary	Set1			Set2		
			165	A5	1010 0101	N	2	2
166	A6	1010 0110	a	2	2	a	2	2
167	A7	1010 0111	o	o	o	o	o	o
168	A8	1010 1000	z	z	z	z	z	z
169	A9	1010 1001	l	l	l	l	l	l
170	AA	1010 1010	l	l	l	l	l	l
171	AB	1010 1011	z	z	z	z	z	z
172	AC	1010 1100	z	z	z	z	z	z
173	AD	1010 1101	:	:	:	:	:	:
174	AE	1010 1110	<<	<	<<	<<	<	<<
175	AF	1010 1111	>>	>	>>	>>	>	>>
176	B0	1011 0000	||||	||||	||||	||||	||||	||||
177	B1	1011 0001	||||	||||	||||	||||	||||	||||
178	B2	1011 0010	||||	||||	||||	||||	||||	||||
179	B3	1011 0011	|	|	|	|	|	|
180	B4	1011 0100	|	|	|	|	|	|
181	B5	1011 0101	|	|	|	|	|	|
182	B6	1011 0110	||	||	||	||	||	||
183	B7	1011 0111	||	||	||	||	||	||
184	B8	1011 1000	||	||	||	||	||	||
185	B9	1011 1001	||	||	||	||	||	||
186	BA	1011 1010	||	||	||	||	||	||
187	BB	1011 1011	||	||	||	||	||	||
188	BC	1011 1100	||	||	||	||	||	||
189	BD	1011 1101	||	||	||	||	||	||
190	BE	1011 1110	||	||	||	||	||	||
191	BF	1011 1111	||	||	||	||	||	||
192	C0	1100 0000	L	L	L	L	L	L
193	C1	1100 0001	l	l	l	l	l	l
194	C2	1100 0010	T	T	T	T	T	T
195	C3	1100 0011	T	T	T	T	T	T
196	C4	1100 0100	-	-	-	-	-	-
197	C5	1100 0101	+	+	+	+	+	+
198	C6	1100 0110	+	+	+	+	+	+
199	C7	1100 0111	+	+	+	+	+	+
200	C8	1100 1000	||	||	||	||	||	||
201	C9	1100 1001	||	||	||	||	||	||
202	CA	1100 1010	||	||	||	||	||	||

Standard ASCII Codes			Character set					
Decimal	Hexadecimal	Binary	Set 1			Set 2		
203	CB	1100 1011	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ
204	CC	1100 1100	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ
205	CD	1100 1101	=	=	=	=	=	=
206	CE	1100 1110	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ
207	CF	1100 1111	±	±	±	±	±	±
208	D0	1101 0000	ll	ll	ll	ll	ll	ll
209	D1	1101 0001	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ
210	D2	1101 0010	π	π	π	π	π	π
211	D3	1101 0011	ll	ll	ll	ll	ll	ll
212	D4	1101 0100	l	l	l	l	l	l
213	D5	1101 0101	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ
214	D6	1101 0110	π	π	π	π	π	π
215	D7	1101 0111	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ
216	D8	1101 1000	±	±	±	±	±	±
217	D9	1101 1001	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ
218	DA	1101 1010	Γ	Γ	Γ	Γ	Γ	Γ
219	DB	1101 1011	■	■	■	■	■	■
220	DC	1101 1100	■	■	■	■	■	■
221	DD	1101 1101	■	■	■	■	■	■
222	DE	1101 1110	■	■	■	■	■	■
223	DF	1101 1111	■	■	■	■	■	■
224	E0	1110 0000	α	α	α	α	α	α
225	E1	1110 0001	β	β	β	β	β	β
226	E2	1110 0010	Γ	Γ	Γ	Γ	Γ	Γ
227	E3	1110 0011	π	π	π	π	π	π
228	E4	1110 0100	Σ	Σ	Σ	Σ	Σ	Σ
229	E5	1110 0101	σ	σ	σ	σ	σ	σ
230	E6	1110 0110	μ	μ	μ	μ	μ	μ
231	E7	1110 0111	τ	τ	τ	τ	τ	τ
232	E8	1110 1000	Φ	Φ	Φ	Φ	Φ	Φ
233	E9	1110 1001	Θ	Θ	Θ	Θ	Θ	Θ
234	EA	1110 1010	Ω	Ω	Ω	Ω	Ω	Ω
235	EB	1110 1011	δ	δ	δ	δ	δ	δ
236	EC	1110 1100	ø	ø	ø	ø	ø	ø
237	ED	1110 1101	Ø	Ø	Ø	Ø	Ø	Ø
238	EE	1110 1110	€	€	€	€	€	€
239	EF	1110 1111	∩	∩	∩	∩	∩	∩
240	F0	1111 0000	=	=	=	=	=	=
241	F1	1111 0001	±	±	±	±	±	±

Standard ASCII Codes			Character set					
Decimal	Hexadecimal	Binary	Set1			Set2		
242	F 2	1111 0010	∟	≧	≨	∟	≧	≨
243	F 3	1111 0011	∟	≧	≨	∟	≧	≨
244	F 4	1111 0100	∟	∟	∟	∟	∟	∟
245	F 5	1111 0101	∟	∟	∟	∟	∟	∟
246	F 6	1111 0110	+	≧	≨	+	≧	≨
247	F 7	1111 0111	∟	∟	∟	∟	∟	∟
248	F 8	1111 1000	○	○	○	○	○	○
249	F 9	1111 1001	·	·	·	·	·	·
250	F A	1111 1010	-	-	-	-	-	-
251	F B	1111 1011	√	√	√	√	√	√
252	F C	1111 1100	0	0	0	0	0	0
253	F D	1111 1101	2	2	2	2	2	2
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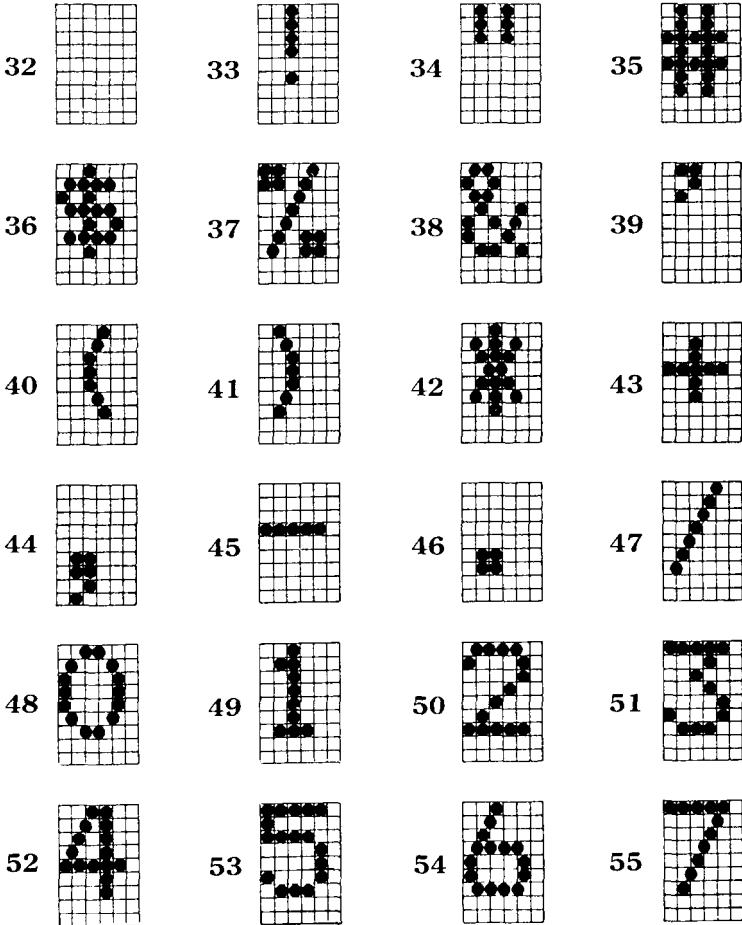
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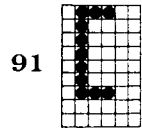
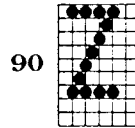
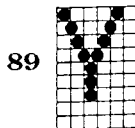
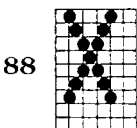
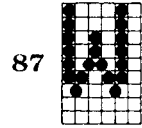
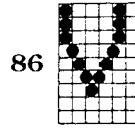
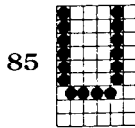
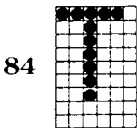
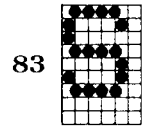
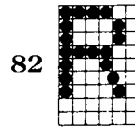
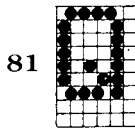
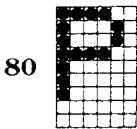
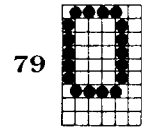
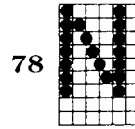
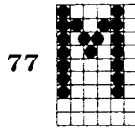
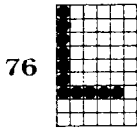
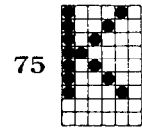
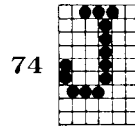
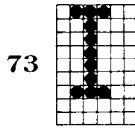
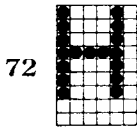
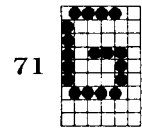
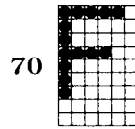
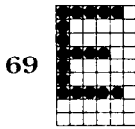
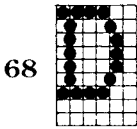
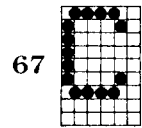
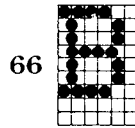
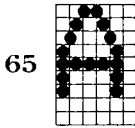
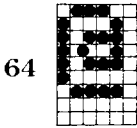
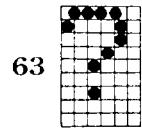
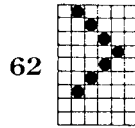
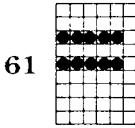
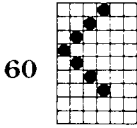
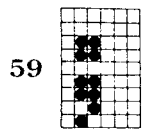
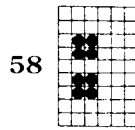
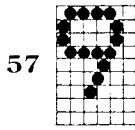
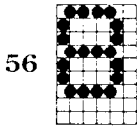
APPENDIX C

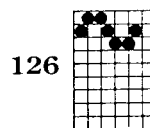
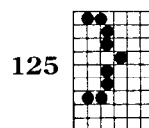
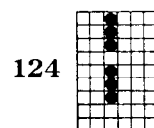
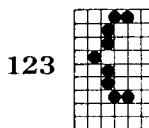
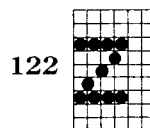
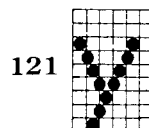
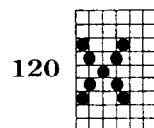
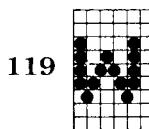
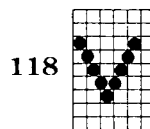
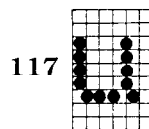
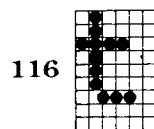
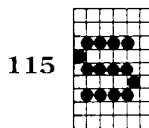
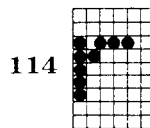
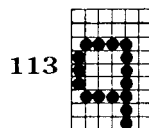
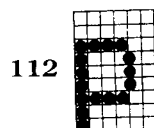
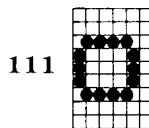
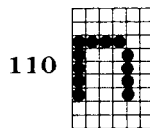
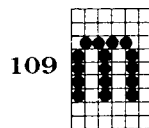
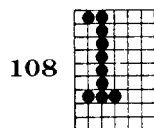
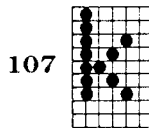
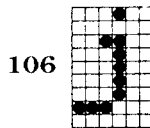
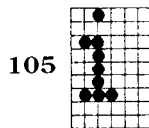
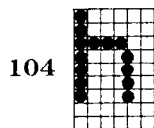
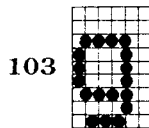
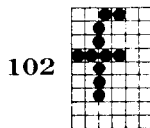
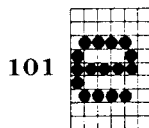
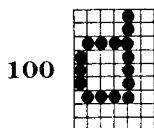
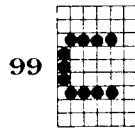
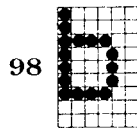
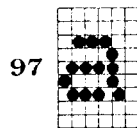
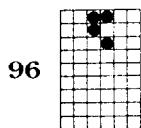
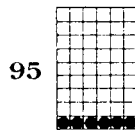
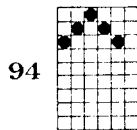
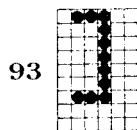
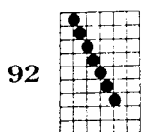
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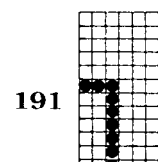
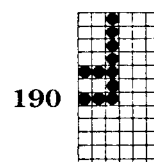
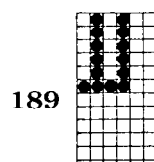
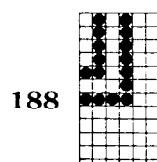
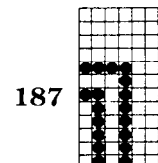
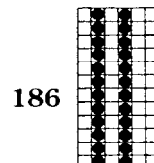
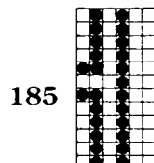
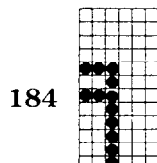
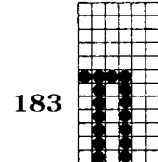
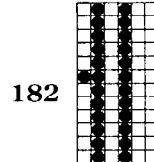
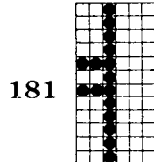
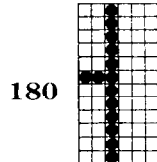
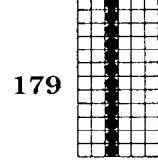
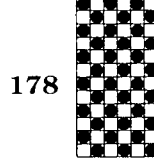
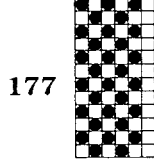
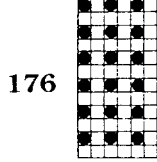
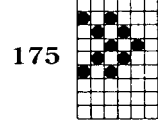
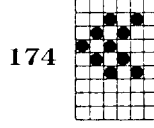
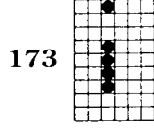
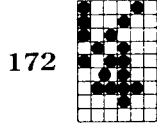
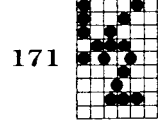
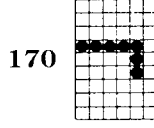
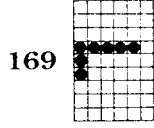
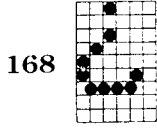
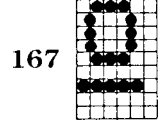
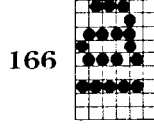
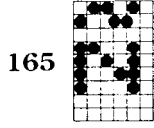
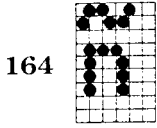
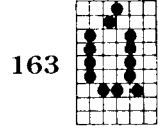
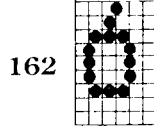
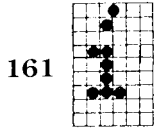
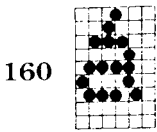
ROMAN CHARACTERS

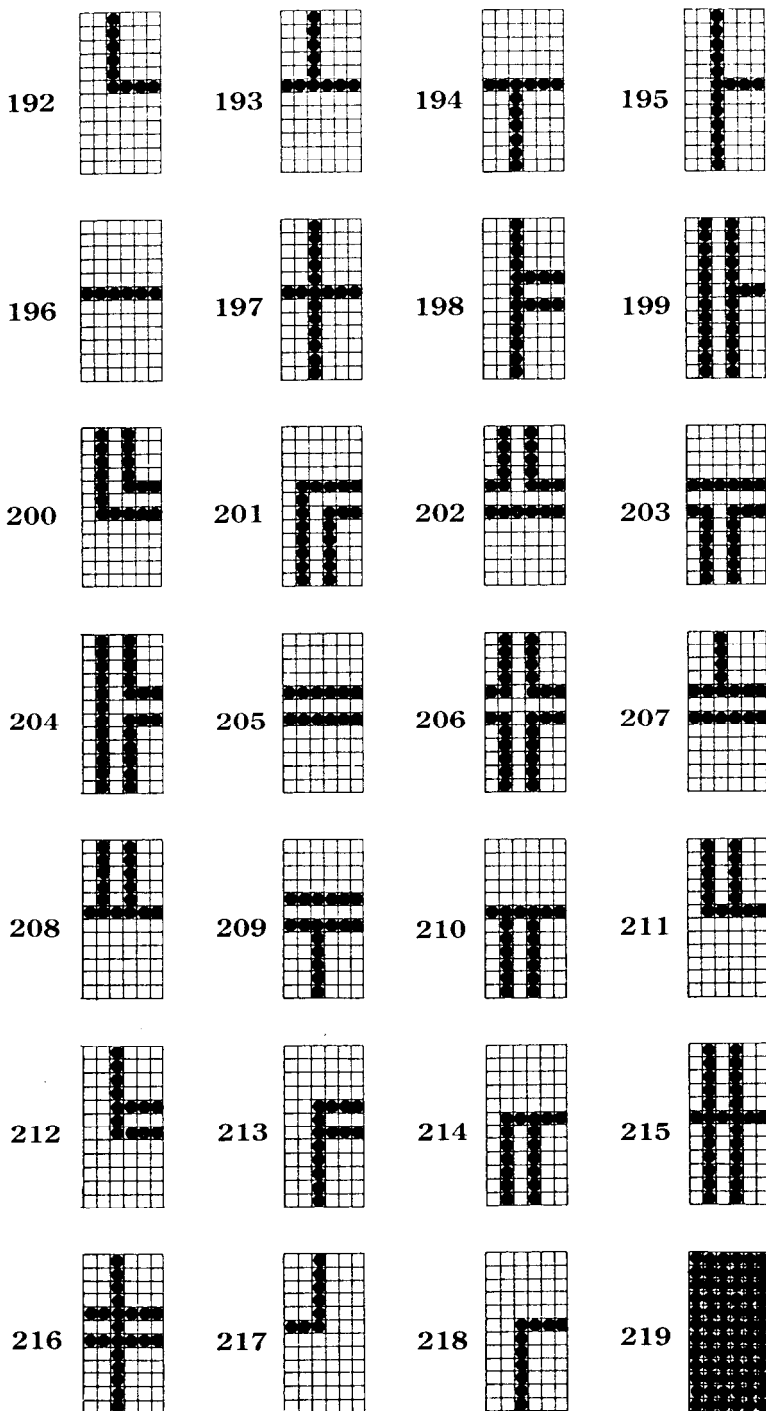
■ Standard characters (Set #1 and Set #2)

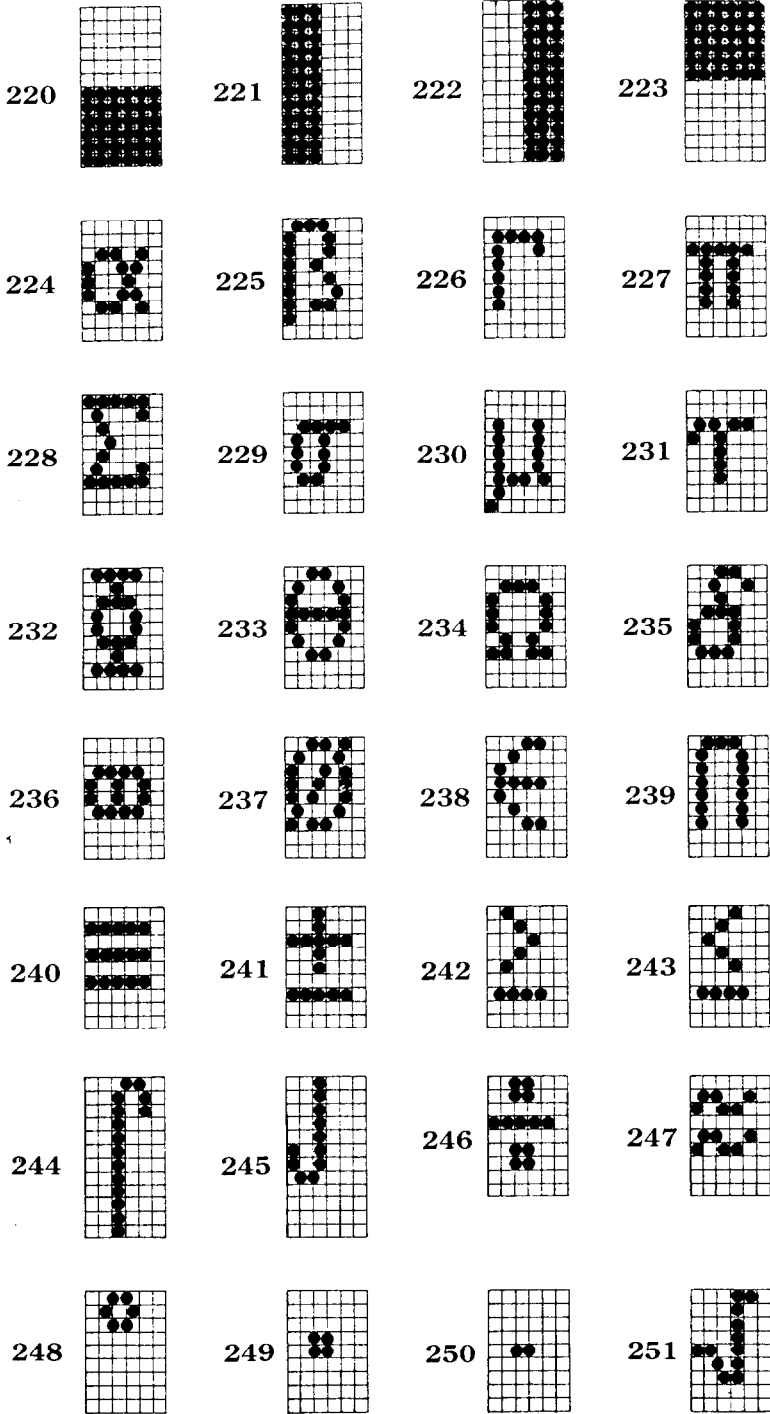


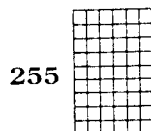
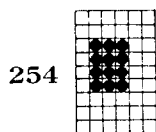
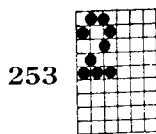
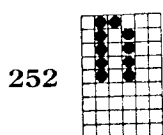




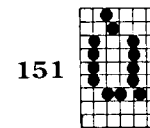
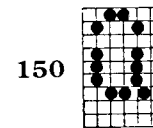
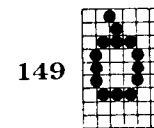
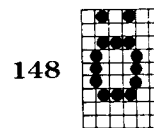
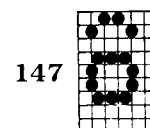
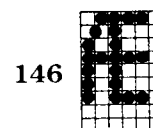
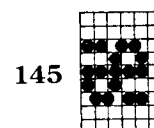
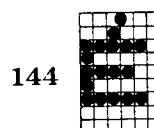
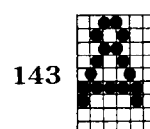
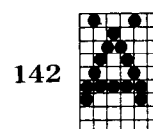
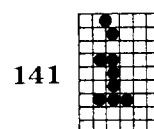
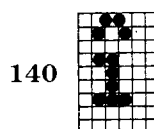
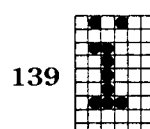
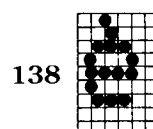
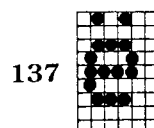
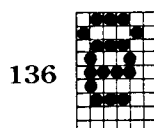
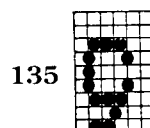
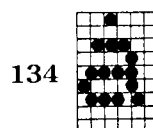
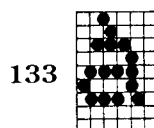
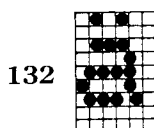
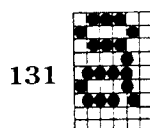
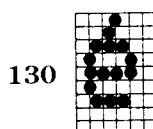
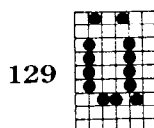
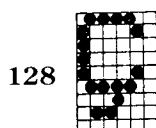
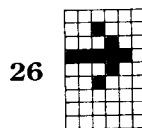
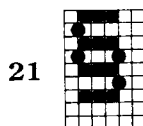
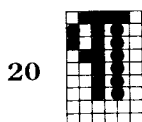
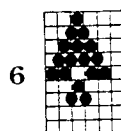
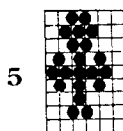
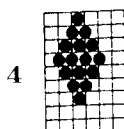
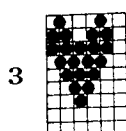








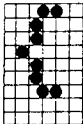
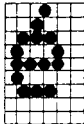
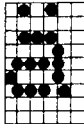
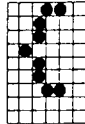
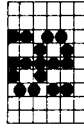
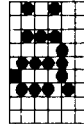

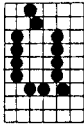
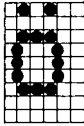
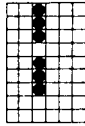
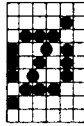
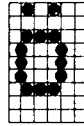
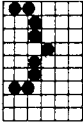
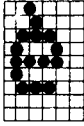
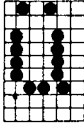
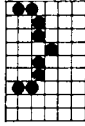
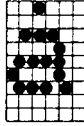
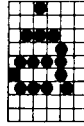
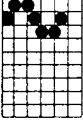
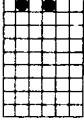
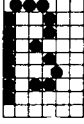
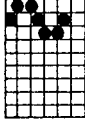
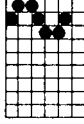
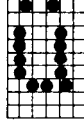
■ Special characters (Character Set #2 only)

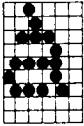
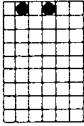
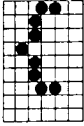
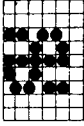
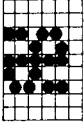
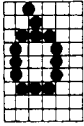
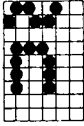
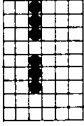
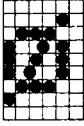
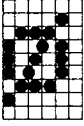
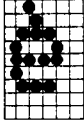
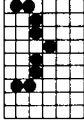
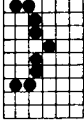
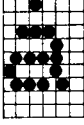
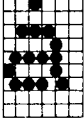
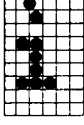
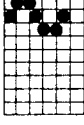
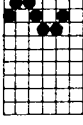
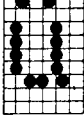
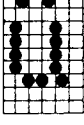


■ International characters

	U.S.A.	France	Germany	England	Denmark	Sweden
35						
36						
64						
91						
92						
93						
94						
96						

	Italy	Spain	Japan	Norway	Denmark(II)
35					
36					
64					
91					
92					
93					
94					
96					

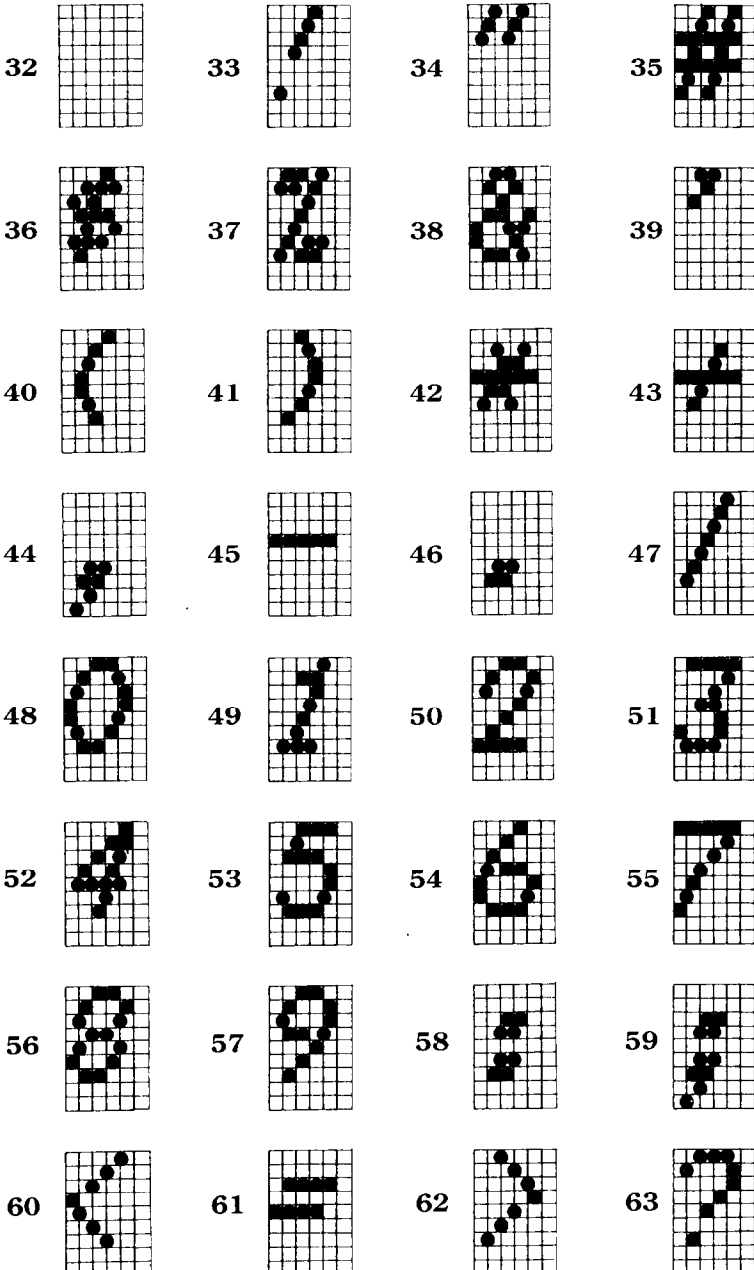
	U.S.A.	France	Germany	England	Denmark	Sweden
123						
124						
125						
126						

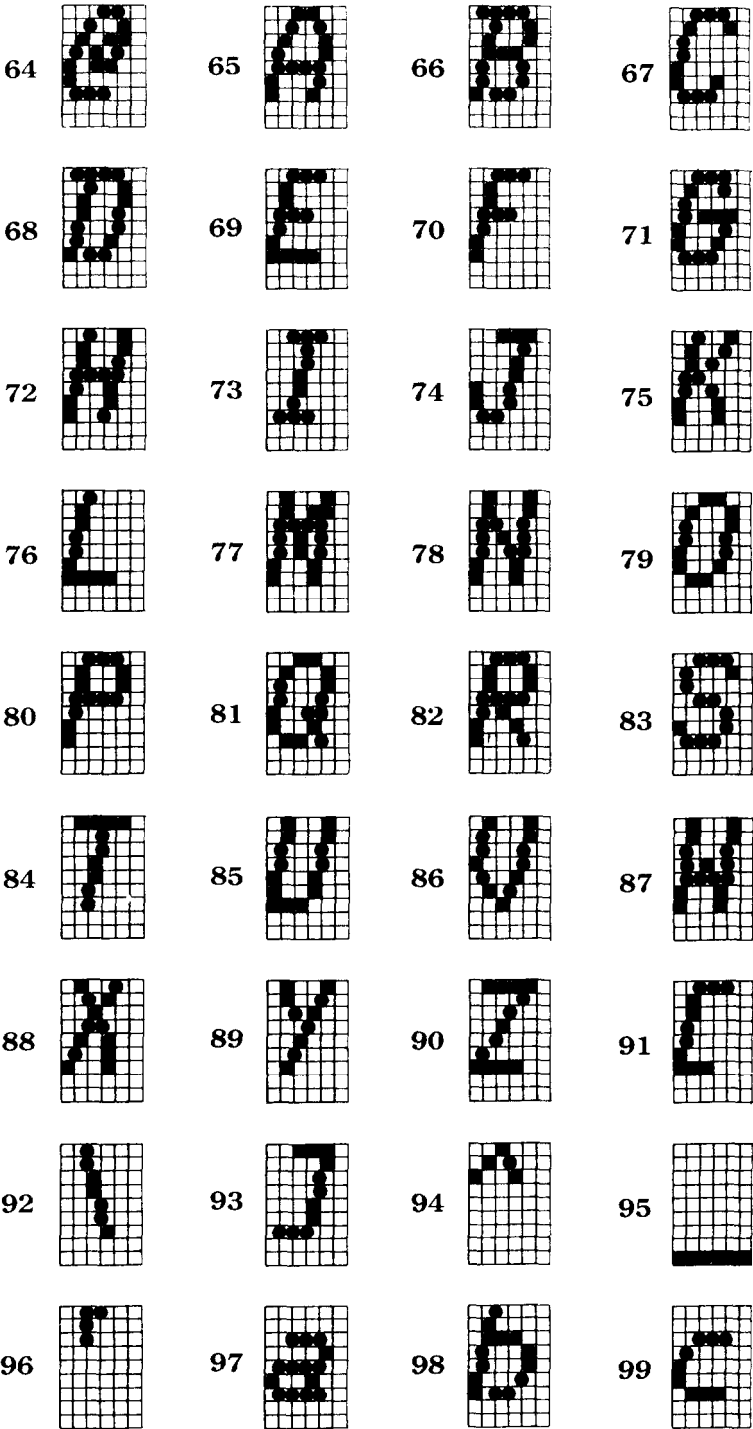
	Italy	Spain	Japan	Norway	Denmark(II)
123					
124					
125					
126					

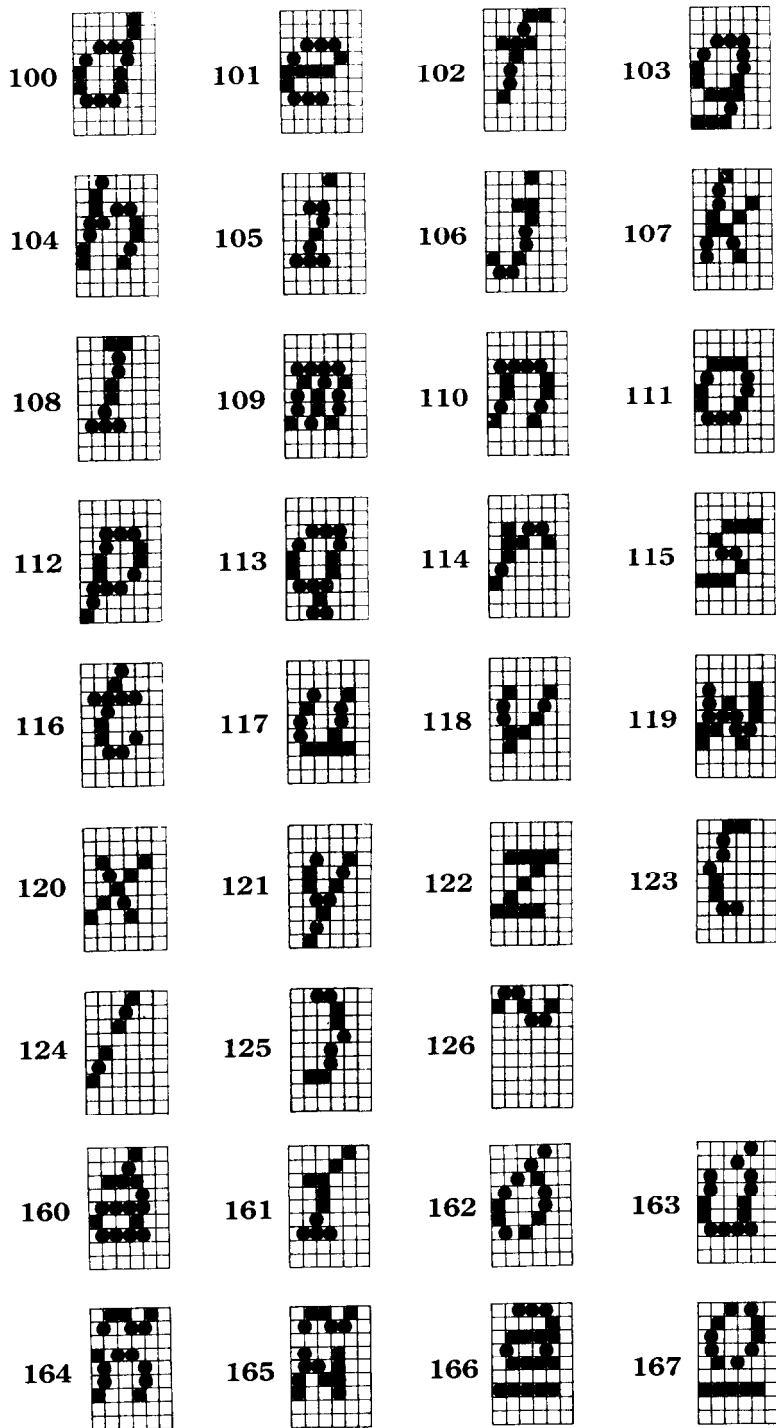
ITALIC CHARACTERS

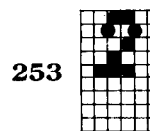
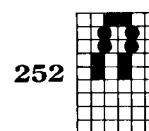
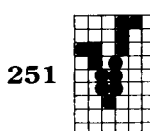
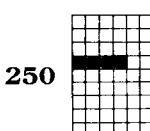
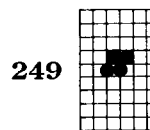
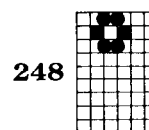
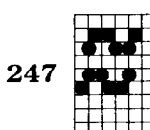
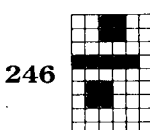
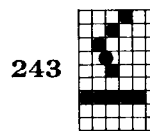
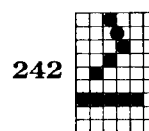
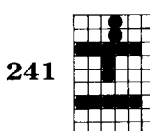
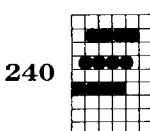
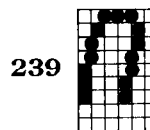
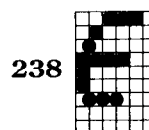
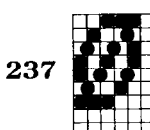
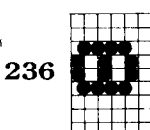
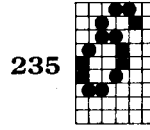
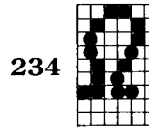
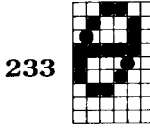
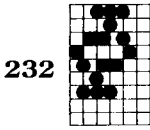
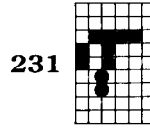
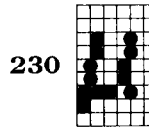
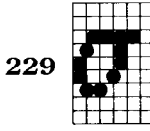
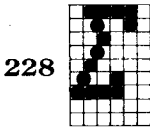
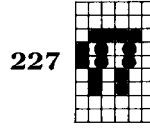
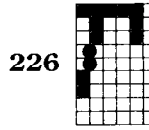
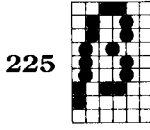
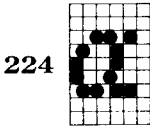
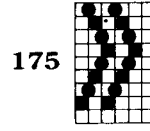
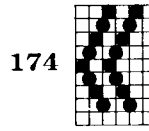
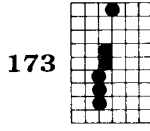
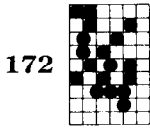
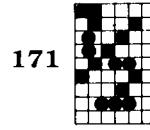
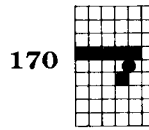
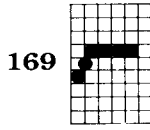
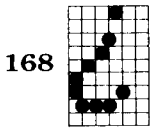
■ Standard characters (Set #1 and Set #2)

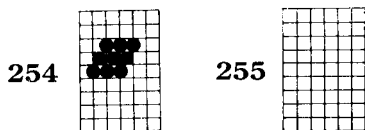
(Note: The block graphics characters are the same as those of the roman characters.)



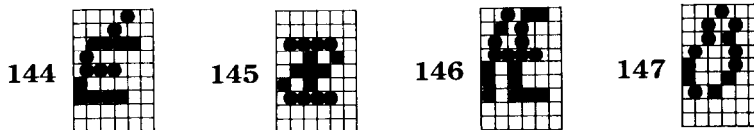
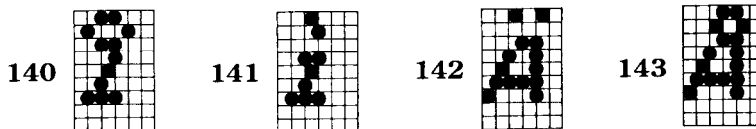
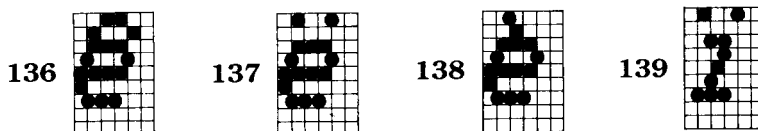
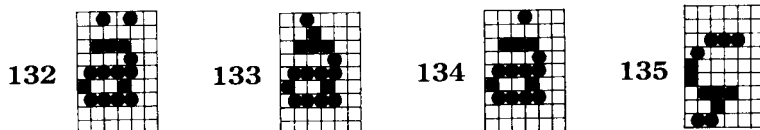
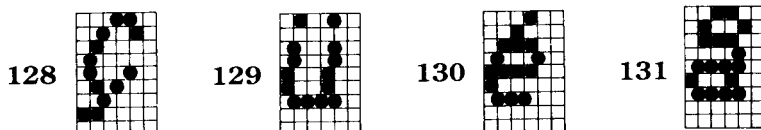
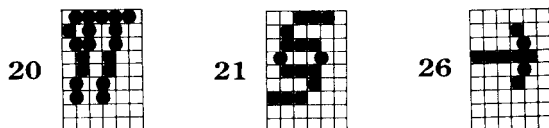
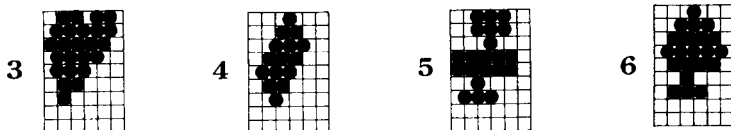


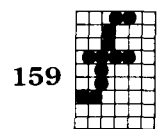
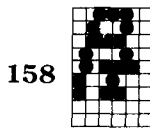
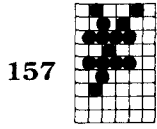
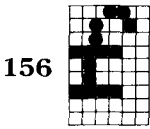
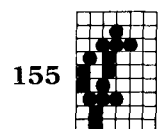
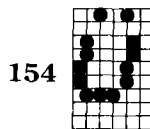
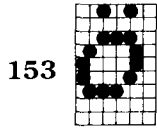
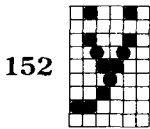
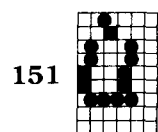
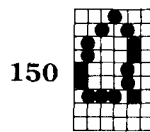
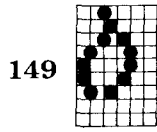
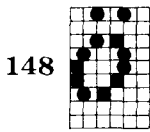






■ Special characters (Set #2 only)

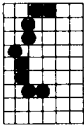
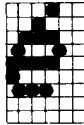

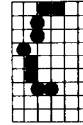
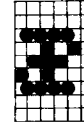

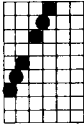
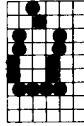
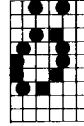

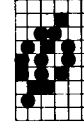
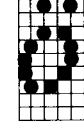
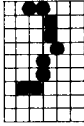
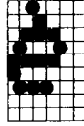
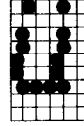
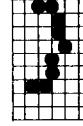












■ International characters

	U.S.A.	France	Germany	England	Denmark	Sweden
35						
36						
64						
91						
92						
93						
94						
96						

	Italy	Spain	Japan	Norway	Denmark(II)
35					
36					
64					
91					
92					
93					
94					
96					

	U.S.A.	France	Germany	England	Denmark	Sweden
123						
124						
125						
126						

	Italy	Spain	Japan	Norway	Denmark(II)
123					
124					
125					
126					

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.
CODE	Control code mnemonic
(decimal ASCII)	ASCII decimal equivalent
(hex ASCII)	Hexadecimal equivalent
REMARKS	Briefly describes how the command is used.
SEE	Tells where 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.**

CODE	<ESC>	“4”
(decimal ASCII)	27	52
(hex ASCII)	1B	34

REMARKS This command causes draft characters to be printed in italics until italic printing is cancelled.

SEE Chapter 3

PURPOSE **Cancels italic characters.**

CODE	<ESC>	“5”
(decimal ASCII)	27	53
(hex ASCII)	1B	35

REMARKS This command causes the printer to cancel the italic printing and select instead the standard roman characters.

SEE Chapter 3

PURPOSE **Selects an international character set.**

CODE	⟨ESC⟩	“R”	<i>n</i>
(decimal ASCII)	27	82	<i>n</i>
(hex ASCII)	1B	52	<i>n</i>

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

<i>n</i>	Character set	<i>n</i>	Character set
0	U.S.A	6	Italy
1	France	7	Spain
2	Germany	8	Japan
3	England	9	Norway
4	Denmark I	10	Denmark II
5	Sweden		

You can select a particular international character set, except Japan, Norway, and Denmark type II, as a power-on default by adjusting the settings of DIP switches 2-2, 2-3, and 2-4.

SEE Chapter 5

PURPOSE **Selects character set #2.**

CODE	⟨ESC⟩	“6”
(decimal ASCII)	27	54
(hex ASCII)	1B	36

REMARKS This command selects the character set #2 when the DIP switch 1-6 is set off. You can select character set #2 as the power-on default by turning DIP switch 1-7 off.

SEE Chapter 5

PURPOSE **Selects character set #1.**

CODE	<ESC>	“7”
(decimal ASCII)	27	55
(hex ASCII)	1B	37

REMARKS This command causes the printer to cancel character set #2 and selects instead character set #1 when the DIP switch 1-6 is set off. You can select character set #1 as the power-on default by turning DIP switch 1-7 on.

SEE Chapter 5

PURPOSE **Selects NLQ characters.**

CODE	<ESC>	“x”	1
(decimal ASCII)	27	120	1
(hex ASCII)	1B	78	01

REMARKS This command causes the printer to print near letter quality (NLQ) characters until NLQ mode is cancelled. NLQ mode cannot be used with any other special printing functions except underlining, expanded printing, and big character printing. This command is ignored when the “Panel” mode is selected at the power-on.

Note: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 3

PURPOSE	Cancels NLQ characters.		
CODE	<ESC>	“x”	0
(decimal ASCII)	27	120	0
(hex ASCII)	1B	78	00
REMARKS	This command cancels NLQ printing and returns the printer to the draft mode. This command is ignored when the “Panel” mode is selected at the power-on. Note: The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.		
SEE	Chapter 3		

■ Font pitch controls

PURPOSE	Sets the print pitch to pica.		
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. This command is ignored when the “Panel” mode is selected at the power-on.		
SEE	Chapter 3		

PURPOSE	Sets the print pitch to elite.		
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 (NLQ characters are not printed in elite pitch). This command is ignored when the “Panel” mode is selected at the power-on.		
SEE	Chapter 3		

PURPOSE **Sets the printer to condensed print.**

CODE ⟨SI⟩
(decimal ASCII) 15
(hex ASCII) 0F

REMARKS This command causes printing to be done in condensed pitch with 136 characters per line for pica condensed, and 160 characters per line for elite condensed (NLQ characters are not printed in condensed pitch). You can select the pica condensed pitch with the control panel, but you cannot select the elite condensed pitch manually. This command is ignored when the "Panel" mode is selected at the power-on.

SEE Chapter 3

PURPOSE **Sets the printer to condensed print.**

CODE ⟨ESC⟩ ⟨SI⟩
(decimal ASCII) 27 15
(hex ASCII) 1B 0F

REMARKS Same as ⟨SI⟩, above.

SEE Chapter 3

PURPOSE **Cancels the condensed print.**

CODE ⟨DC2⟩
(decimal ASCII) 18
(hex ASCII) 12

REMARKS This command cancels the condensed printing and returns the printer to the normal print pitch. This command is ignored when the "Panel" mode is selected at the power-on.

SEE Chapter 3

PURPOSE	Sets the printer to expanded print.		
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 normally (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 3		
PURPOSE	 Cancels the expanded print.		
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 3		
PURPOSE	Sets the printer to expanded print for the remainder of the current line.		
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 also cancelled with ⟨DC4⟩.		
SEE	Chapter 3		

PURPOSE Sets the printer to expanded print for the remainder of the current line.

CODE	⟨ESC⟩	⟨SO⟩
(decimal ASCII)	27	14
(hex ASCII)	1B	0E

REMARKS Same as ⟨SO⟩, above.

SEE Chapter 3

PURPOSE Cancels one line expanded print.

CODE	⟨DC4⟩
(decimal ASCII)	20
(hex ASCII)	14

REMARKS This command cancels one line expanded print set with ⟨SO⟩ or ⟨ESC⟩ ⟨SO⟩.

SEE Chapter 3

PURPOSE Sets the printer to proportional print.

CODE	⟨ESC⟩	“p”	1
(decimal ASCII)	27	112	1
(hex ASCII)	1B	70	01

REMARKS This command causes draft characters to be printed with proportional spacing until proportional printing is cancelled.

Note: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 3

PURPOSE	 Cancels proportional print.		
CODE	<ESC>	“p”	0
(decimal ASCII)	27	112	0
(hex ASCII)	1B	70	00
REMARKS	This command cancels the proportional printing and returns to the “fixed pitch” printing. Note: The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.		
SEE	Chapter 3		

■ Special print modes.

PURPOSE	 Sets the master print mode.		
CODE	<ESC>	“!”	<i>n</i>
(decimal ASCII)	27	33	<i>n</i>
(hex ASCII)	1B	21	<i>n</i>
REMARKS	This is a powerful command that allows the user to set several printing characteristics at one time: print pitch, condensed print, expanded print, emphasizing, boldface, underlining, and any combination of these as determined by <i>n</i> , a number from 0 to 255. (See Table 3-10 for details.)		
SEE	Chapter 3		

PURPOSE	 Selects emphasized printing.	
CODE	<ESC>	“E”
(decimal ASCII)	27	69
(hex ASCII)	1B	45
REMARKS	This command causes characters to be emphasized until emphasized printing is cancelled.	
SEE	Chapter 3	

PURPOSE **Cancels emphasized printing.**

CODE <ESC> “F”
(decimal ASCII) 27 70
(hex ASCII) 1B 46

REMARKS This command cancels emphasized printing.

SEE Chapter 3

PURPOSE **Selects boldface printing.**

CODE <ESC> “G”
(decimal ASCII) 27 71
(hex ASCII) 1B 47

REMARKS This command causes characters to be printed in boldface until boldface is cancelled. Boldface cannot be used with superscripts or subscripts. This command is ignored when the “Panel” mode is selected at the power-on.

SEE Chapter 3

PURPOSE **Cancels boldface printing.**

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. This command is ignored when the “Panel” mode is selected at the power-on.

SEE Chapter 3

PURPOSE	Selects underlining.		
CODE	<ESC>	“—”	1
(decimal ASCII)	27	45	1
(hex ASCII)	1B	2D	01
REMARKS	This command underlines the following characters until underlining is cancelled. Note: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.		
SEE	Chapter 3		
PURPOSE	 Cancels underlining.		
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 3		
PURPOSE	Selects superscripts.		
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 superscripting is cancelled. Superscripts are printed from left to right only and in boldface. Superscripts cannot be used with NLQ printing. Note: The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.		
SEE	Chapter 3		

PURPOSE**Selects subscripts.**

CODE	<ESC>	“S”	1
(decimal ASCII)	27	83	1
(hex ASCII)	1B	53	01

REMARKS

This command lowers the following characters and prints as subscripts until subscripting is cancelled. All conditions described for superscripts also apply to subscripts.

Note: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE

Chapter 3

PURPOSE**Cancel a superscript or subscript.**

CODE	<ESC>	“T”
(decimal ASCII)	27	84
(hex ASCII)	1B	54

REMARKS

This command stops printing of superscripts or subscripts and sets normal printing. It also cancels uni-directional printing and boldface, which are set automatically for superscripts and subscripts.

SEE

Chapter 3

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

PURPOSE **Advances the paper one line (line feed).**

CODE	⟨LF⟩
(decimal ASCII)	10
(hex ASCII)	0A

REMARKS The actual distance by the line feed is set through various codes which can be sent (see below). When DIP switch 1-8 is "off" a line feed is automatically generated whenever the printer receives a carriage return.

SEE Chapter 4

PURPOSE **Reverses the paper one line.**

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 which can be sent (see below).

SEE Chapter 4

PURPOSE **Sets line spacing to 1/8 inch.**

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.

SEE Chapter 4

PURPOSE **Sets line spacing to 7/72 inch.**

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 7/72 inch.

SEE Chapter 4

PURPOSE **Sets line spacing to $n/216$ inch.**

CODE	⟨ESC⟩	“3”	<i>n</i>
(decimal ASCII)	27	51	<i>n</i>
(hex ASCII)	1B	33	<i>n</i>

REMARKS This command sets the actual distance the paper advances or reverses during all subsequent line feeds to $n/216$ inch. The value of *n* must be between 1 and 255.

SEE Chapter 4

PURPOSE **Sets or defines line spacing to $n/72$ inch.**

CODE	⟨ESC⟩	“A”	<i>n</i>
(decimal ASCII)	27	65	<i>n</i>
(hex ASCII)	1B	41	<i>n</i>

REMARKS This command works in two different functions depending on the setting of DIP switch 1-6. When the DIP switch 1-6 is set off, this command defines the actual distance the paper advances 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.

When the DIP switch 1-6 is set on, this command sets the actual distance the paper advances during all subsequent line feeds to $n/72$ inch immediately. The value of *n* must be between 1 and 255.

SEE Chapter 4

PURPOSE **Sets line spacing to $n/72$ inch, or Use ⟨ESC⟩“A” definition.**

CODE	⟨ESC⟩	“2”
(decimal ASCII)	27	50
(hex ASCII)	1B	32

REMARKS This command works in two different functions depending on the setting of DIP switch 1-6. When the DIP switch 1-6 is set off, 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. When the DIP switch 1-6 is set on, this command sets the actual distance the paper advances during all subsequent line feeds to 1/6 inch.

SEE Chapter 4

PURPOSE **Sends a one-time paper feed of $n/216$ inch.**

CODE	⟨ESC⟩	“j”	<i>n</i>
(decimal ASCII)	27	74	<i>n</i>
(hex ASCII)	1B	4A	<i>n</i>

REMARKS This command causes the printer to advance the paper $n/216$ inch. 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 1 and 255.

SEE Chapter 4

PURPOSE **Sends a one-time reverse feed of $n/216$ inch.**

CODE	⟨ESC⟩	“j”	<i>n</i>
(decimal ASCII)	27	106	<i>n</i>
(hex ASCII)	1B	6A	<i>n</i>

REMARKS This command causes the printer to reverse the paper $n/216$ inch. 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 1 and 255.

SEE Chapter 4

■ Form feed and related commands

PURPOSE **Advances the paper to the top of the next page (form feed).**

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 DIP switch 1-1 or through various codes which can be sent (see below). This command works as the ejecting paper command when the optional automatic sheet feeder is installed.

SEE Chapter 4

PURPOSE **Reverses the paper to the top of the current page.**

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 4

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

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 32. You can select a power-on default form length of 11 inches or 12 inches by setting DIP switch 1-1. This command is ignored when the optional automatic sheet feeder is installed.

SEE

Chapter 4

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

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 255. This command is ignored when the optional automatic sheet feeder is installed.

SEE

Chapter 4

■ Top/bottom margins and vertical tabs.**PURPOSE****Sets the top margin.**

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.

SEE

Chapter 4

PURPOSE	Sets the bottom margin.		
CODE	<ESC>	"N"	<i>n</i>
(decimal ASCII)	27	78	<i>n</i>
(hex ASCII)	1B	4E	<i>n</i>
REMARKS	This command sets the bottom margin to <i>n</i> lines. The printer will generate a form feed whenever there are <i>n</i> lines left on the page. This command is ignored when the optional automatic sheet feeder is installed. The value of <i>n</i> must be between 1 and 255.		
SEE	Chapter 4		
PURPOSE	 Cancels top and bottom margins.		
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 4		
PURPOSE	Advances paper to the next vertical tab position.		
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 it finds first. If the vertical tab positions are not set, this command works as a line feed command.		
SEE	Chapter 4		

PURPOSE**Sets vertical tab positions.**

CODE	<ESC>	"B"	<i>n1 n2 n3 ...</i>	0
(decimal ASCII)	27	66	<i>n1 n2 n3 ...</i>	0
(hex ASCII)	1B	42	<i>n1 n2 n3 ...</i>	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 4

PURPOSE**Selects vertical channel.**

CODE	<ESC>	"P"	<i>n0</i>
(decimal ASCII)	27	47	<i>n0</i>
(hex ASCII)	1B	2F	<i>n0</i>

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 4

PURPOSE	Sets vertical tab positions in a channel.				
CODE	<ESC>	“b”	<i>n0 n1 n2 n3 ...</i>	0	
(decimal ASCII)	27	98	<i>n0 n1 n2 n3 ...</i>	0	
(hex ASCII)	1B	62	<i>n0 n1 n2 n3 ...</i>	00	
REMARKS	This command cancels all current vertical tab positions in channel <i>n0</i> and sets those defined at lines <i>n1</i> , <i>n2</i> , <i>n3</i> , 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, <i>n0</i> , must be between 0 and 7.				
SEE	Chapter 4				

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).				
CODE	<CR>				
(decimal ASCII)	13				
(hex ASCII)	0D				
REMARKS	This command returns the print head to the left margin. If DIP switch 1-8 has been set off, then this command will also cause a line feed character to be generated after the carriage return, thereby advancing to the beginning of the next print line automatically.				
SEE	Chapter 4				

PURPOSE**Sets the left margin.**

CODE	<ESC>	"I"	<i>n</i>
(decimal ASCII)	27	108	<i>n</i>
(hex ASCII)	1B	6C	<i>n</i>

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 with 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 4

PURPOSE**Sets the right margin.**

CODE	<ESC>	"Q"	<i>n</i>
(decimal ASCII)	27	81	<i>n</i>
(hex ASCII)	1B	51	<i>n</i>

REMARKS

This command sets the right margin to *n*, which is the last character position that can 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 1 and 255. You can set the right margin manually with 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 4

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

CODE	⟨ESC⟩	“X”	<i>n1</i>	<i>n2</i>
(decimal ASCII)	27	88	<i>n1</i>	<i>n2</i>
(hex ASCII)	1B	58	<i>n1</i>	<i>n2</i>

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 1 and 255 and *n2* should be greater than *n1*.

You can set the left and right margins manually with 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 positions on the page.

SEE Chapter 4

PURPOSE **Moves the print head to the next horizontal tab position.**

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 4

PURPOSE**Sets horizontal tab positions.**

CODE	<ESC>	“D”	<i>n1 n2 n3 ...</i>	0
(decimal ASCII)	27	68	<i>n1 n2 n3 ...</i>	0
(hex ASCII)	1B	44	<i>n1 n2 n3 ...</i>	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 40. The ASCII 0 character is used as a command terminator. Each horizontal tab position must be specified in ascending order.

SEE

Chapter 4

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

CODE	<ESC>	“\$”	<i>n1</i>	<i>n2</i>
(decimal ASCII)	27	36	<i>n1</i>	<i>n2</i>
(hex ASCII)	1B	24	<i>n1</i>	<i>n2</i>

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 $(n1 + n2 \times 256)/60$. The maximum position is 8 inches.

SEE

Chapter 4

PURPOSE Moves the print head to a specified horizontal position.

CODE	<ESC>	"\"	<i>n1</i>	<i>n2</i>
(decimal ASCII)	27	92	<i>n1</i>	<i>n2</i>
(hex ASCII)	1B	5C	<i>n1</i>	<i>n2</i>

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, in inches, is determined by the formula $(n1 + n2 \times 256)/120$.

To move to the left, add 64 to the calculated value of *n2*. The maximum distance is 8 inches. The command will be ignored if you try to move to a position outside of the current margins.

SEE Chapter 4

PURPOSE Adds *n* dot spaces between characters.

CODE	<ESC>	"space"	<i>n</i>
(decimal ASCII)	27	32	<i>n</i>
(hex ASCII)	1B	20	<i>n</i>

REMARKS This command increases the space between NLQ characters by *n* dots when the DIP switch 1-6 is set on.

SEE Chapter 5

PURPOSE Moves the print head back one print position (backspace).

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 characters.

SEE Chapter 5

PURPOSE**Sets alignment, or centering.****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-aligned (ragged right margin)

1 Centered

2 Right-aligned

SEE

Chapter 4

DOWNLOAD CHARACTER COMMANDS

PURPOSE	Defines download characters into RAM.			
CODE	<ESC> "&"	0	<i>n1 n2 m0 m1 ... m11</i>	<i>[m12 ... m22]</i>
(decimal ASCII)	27 38	0	<i>n1 n2 m0 m1 ... m11</i>	<i>[m12 ... m22]</i>
(hex ASCII)	1B 26	00	<i>n1 n2 m0 m1 ... m11</i>	<i>[m12 ... m22]</i>
REMARKS	<p>This command is used to set up one or more user-defined characters and store them into RAM for later use. RAM is cleared when the power is turned off. The values of <i>n1</i> and <i>n2</i> specify the range of positions in RAM that the characters are to occupy. Valid character positions are any number between 0 and 255. Following <i>n2</i> this printer expects character data bytes for each character to be defined. The first byte, <i>m0</i>, is the attribute bytes, for it specifies whether the character is a descender (if the first bit is 0), and the proportional width of the draft character (starting and ending dot columns are defined by the low order seven bits). <i>m1</i> through <i>m11</i> determine which dots form the draft character. In case of NLQ download characters, <i>m1</i> through <i>m22</i> determine which dots form the character.</p> <p>Note: This command is ignored when the DIP switch 2-1 is set on.</p>			
SEE	Chapter 6			

PURPOSE **Copies standard character ROM font into RAM.**

CODE	<ESC>	“.”	0	0	0
(decimal ASCII)	27	58	0	0	0
(hex ASCII)	1B	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 2-1 is set on.

SEE Chapter 6

PURPOSE **Selects download character set.**

CODE	<ESC>	“%”	1	0
(decimal ASCII)	27	37	1	0
(hex ASCII)	1B	25	01	00

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 6

PURPOSE **Cancels download character set.**

CODE	<ESC>	“%”	0	0
(decimal ASCII)	27	37	0	0
(hex ASCII)	1B	25	00	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 the first ASCII 0.

SEE Chapter 6

DOT GRAPHICS COMMANDS

PURPOSE	Prints normal-density graphics.		
CODE	<ESC>	“K”	<i>n1 n2 m1 m2.....</i>
(decimal ASCII)	27	75	<i>n1 n2 m1 m2.....</i>
(hex ASCII)	1B	4B	<i>n1 n2 m1 m2.....</i>
REMARKS	This command selects 60 dots-per-inch, column-scan, bit-image graphics mode. The values of <i>n1</i> and <i>n2</i> represent the number of graphics characters to be printed, where the total number of characters = <i>n2</i> times 256 + <i>n1</i> . The correct number of graphics data bytes (<i>m1</i> , <i>m2</i> , etc.) must follow <i>n2</i> . The ASCII value of these characters determine which pins are fired for each character.		
SEE	Chapter 7		
PURPOSE	Prints double-density graphics.		
CODE	<ESC>	“L”	<i>n1 n2 m1 m2.....</i>
(decimal ASCII)	27	76	<i>n1 n2 m1 m2.....</i>
(hex ASCII)	1B	4C	<i>n1 n2 m1 m2.....</i>
REMARKS	This command selects 120 dots-per-inch, column-scan, bit-image graphics mode. The values of <i>n1</i> and <i>n2</i> are the same as in normal-density graphics. The correct number of graphics data bytes (<i>m1</i> , <i>m2</i> , etc.) must follow <i>n2</i> . The ASCII value of these characters determine which pins are fired for each character.		
SEE	Chapter 7		

PURPOSE**Prints double-density graphics with double-speed.****CODE** $\langle \text{ESC} \rangle$ "Y" $n1\ n2\ m1\ m2\dots$

(decimal ASCII)

27 89 $n1\ n2\ m1\ m2\dots$

(hex ASCII)

1B 59 $n1\ n2\ m1\ m2\dots$ **REMARKS**

This command selects 120 dots-per-inch, column-scan, bit-image graphics mode with 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 value of these characters determine which pins are fired for each character.

SEE

Chapter 7

PURPOSE**Prints quadruple-density graphics.****CODE** $\langle \text{ESC} \rangle$ "Z" $n1\ n2\ m1\ m2\dots$

(decimal ASCII)

27 90 $n1\ n2\ m1\ m2\dots$

(hex ASCII)

1B 5A $n1\ n2\ m1\ m2\dots$ **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 value of these characters determine which pins are fired for each character.

SEE

Chapter 7

PURPOSE**Selects graphics modes.****CODE**

(decimal ASCII)

(hex ASCII)

<ESC>	"*"	<i>n0 n1 n2 m1 m2.....</i>
27	42	<i>n0 n1 n2 m1 m2.....</i>
1B	2A	<i>n0 n1 n2 m1 m2.....</i>

REMARKS

This command selects one seven 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 value of these characters determine which pins are fired for each character. The value of *n0* must be between 0 and 6 as shown below.

<i>n</i>	Graphics mode
0	Normal-density
1	Double-density
2	Double-density with double-speed
3	Quadruple-density
4	CRT graphics
5	Plotter graphics
6	CRT graphics type II

SEE

Chapter 7

PURPOSE**Prints 9-pin graphics.****CODE**

(decimal ASCII)

(hex ASCII)

<ESC>	"^"	<i>n0 n1 n2 m1 m2 ...</i>
27	94	<i>n0 n1 n2 m1 m2 ...</i>
1B	5E	<i>n0 n1 n2 m1 m2 ...</i>

REMARKS

This command selects 60 dots-per-inch, column-scan, 9-pin bit-image graphics mode. The value of *n0* determines the print density. 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 two characters determine which pins are fired for each character.

SEE

Chapter 7

PURPOSE	Redefines the graphics mode.			
CODE	⟨ESC⟩	“?”	<i>n0</i>	<i>n1</i>
(decimal ASCII)	27	63	<i>n0</i>	<i>n1</i>
(hex ASCII)	1B	3F	<i>n0</i>	<i>n1</i>
REMARKS	This command redefines one of the 4 alternate graphics codes — ⟨ESC⟩ “K”, ⟨ESC⟩ “L”, ⟨ESC⟩ “Y”, or ⟨ESC⟩ “Z” — as one of the seven graphics density numbers with the ⟨ESC⟩ “*” command, where <i>n0</i> is “K”, “L”, “Y”, or “Z” and <i>n1</i> is between 0 and 6.			
SEE	Chapter 7			

MACRO INSTRUCTION COMMANDS

PURPOSE	Defines macro instruction.			
CODE	⟨ESC⟩	“+”	.....	⟨RS⟩
(decimal ASCII)	27	43	.....	30
(hex ASCII)	1B	2B	.....	1E
REMARKS	This command cancels any existing macro instruction, and replace it with the instruction defined. The maximum number of characters allowed in the macro instruction is 16. The ⟨RS⟩ character marks the end of the macro definition.			
SEE	Chapter 5			
PURPOSE	Executes macro instruction.			
CODE	⟨ESC⟩	“+”	1	
(decimal ASCII)	27	43	1	
(hex ASCII)	1B	2B	01	
REMARKS	This command executes a macro instruction that was previously defined.			
SEE	Chapter 5			

OTHER COMMANDS

PURPOSE **Sets the value of the eighth data bit to logical 1.**

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 5

PURPOSE **Sets the value of the eighth data bit to logical 0.**

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 5

PURPOSE **Accepts the value of the eighth data bit as is.**

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 5

PURPOSE **Print “slash zero”.**

CODE	⟨ESC⟩	“~”	1
(decimal ASCII)	27	126	1
(hex ASCII)	1B	7E	01

REMARKS This command causes to print “zero” with slash.

Note: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 5

PURPOSE **Prints “normal zero”.**

CODE	⟨ESC⟩	“~”	0
(decimal ASCII)	27	126	0
(hex ASCII)	1B	7E	00

REMARKS This command cancels to print “slash zero” and returns to print “normal zero”.

Note: The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE Chapter 5

PURPOSE	Deletes the last character sent.
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 5
PURPOSE	 Cancels line.
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 5
PURPOSE	Sets printer off line.
CODE	<DC3>
(decimal ASCII)	19
(hex ASCII)	13
REMARKS	This command causes the printer to set itself off line, disregarding all subsequent characters and function codes, with the exception of <DC1>, which will return the printer to an on line state. This is not the same as pushing the On Line key. When the On Line lamp is out the printer will not respond to <DC1>.
SEE	Chapter 5

PURPOSE	Sets printer on line.
CODE	⟨DC1⟩
(decimal ASCII)	17
(hex ASCII)	11
REMARKS	This command resets the printer to an on line state, thus 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 lamp is out the printer will not respond to ⟨DC1⟩.
SEE	Chapter 5
PURPOSE	Sounds the printer bell.
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 5
PURPOSE	Disables paper-out detector.
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 1-5 can also set to disable the paper-out detector.
SEE	Chapter 5

PURPOSE Enables paper-out detector.

CODE	<ESC>	“9”	
(decimal ASCII)	27	57	
(hex ASCII)	1B	39	

REMARKS This command restores the function of the paper-out detector.

SEE Chapter 5

PURPOSE Selects uni-directional printing.

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 in alignment.
Note: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 5

PURPOSE Cancels uni-directional printing.

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 5

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

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 5

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

CODE	<ESC>	“h”	<i>n</i>
(decimal ASCII)	27	104	<i>n</i>
(hex ASCII)	1B	68	<i>n</i>

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

<i>n</i>	Effect
0	Cancels enlargement
1	Double-high, double-wide
2	Quadruple-high, quadruple-wide
3	Double-high, double-wide (Lower half only)
4	Double-high, double-wide (Upper half only)
5	Quadruple-high, quadruple-wide (Lower half only)
6	Quadruple-high, quadruple-wide (Upper half only)

SEE Chapter 5

PURPOSE	Expands the printable area.		
CODE	⟨ESC⟩	“6”	
(decimal ASCII)	27	54	
(hex ASCII)	1B	36	
REMARKS	This command causes the printer to use the high-order control code area as the printable character area when the DIP switch 1-6 is set on.		
SEE	Chapter 5		
PURPOSE	Cancels the expansion of printable area.		
CODE	⟨ESC⟩	“7”	
(decimal ASCII)	27	55	
(hex ASCII)	1B	37	
REMARKS	This command cancels the expansion of the printable character area and restores the high-order control code area when the DIP switch 1-6 is set on.		
SEE	Chapter 5		
PURPOSE	Prints characters in the undefined control code area.		
CODE	⟨ESC⟩	“1”	1
(decimal ASCII)	27	73	1
(hex ASCII)	1B	49	01
REMARKS	This command causes the printer to print the characters in the undefined control code area. Note: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.		
SEE	Chapter 5		

PURPOSE

Selects undefined codes as control codes.

CODE	<ESC>	"I"	0
(decimal ASCII)	27	73	0
(hex ASCII)	1B	49	00

REMARKS

This command cancels to print the characters in the undefined control codes and restores them as the control codes.

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

SEE

Chapter 5

PURPOSE

Sets immediate print mode.

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 5

PURPOSE **Cancels immediate print mode.**

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 5

PURPOSE **Resets the printer.**

CODE	<ESC>	“@”
(decimal ASCII)	27	64
(hex ASCII)	1B	40

REMARKS This command reinitializes the printer. The print buffer is cleared, and the form length, 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 and macro instructions are preserved with this command.

SEE Chapter 5

PURPOSE **Selects auto feed mode.**

CODE	<ESC>		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.

SEE Chapter 5

PURPOSE **Selects auto feed mode.**

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

REMARKS The same as <ESC> 4, above.

SEE Chapter 5

PURPOSE **Cancels auto feed mode.**

CODE	<ESC>		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.

SEE Chapter 5

PURPOSE **Cancels auto feed mode.**

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

REMARKS The same as <ESC> 0, above.

SEE Chapter 5

PURPOSE **Supplies paper.**

CODE	<ESC>		1
(decimal ASCII)	27	25	1
(hex ASCII)	1B	19	01

REMARKS This command causes the printer to supply paper under non-auto sheet feeding mode. This command is ignored when the optional automatic sheet feeder is not mounted.

SEE Chapter 5

PURPOSE	Supplies paper.				
CODE	“(”	“(”	“1”	“)”	“)”
(decimal ASCII)	40	40	49	41	41
(hex ASCII)	28	28	31	29	29
REMARKS	The same as <ESC> 1, above.				
SEE	Chapter 5				

PURPOSE	Ejects paper.		
CODE	<ESC>		“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.		
SEE	Chapter 5		

PURPOSE	Ejects paper.				
CODE	“(”	“(”	“R”	“)”	“)”
(decimal ASCII)	40	40	82	41	41
(hex ASCII)	28	28	52	29	29
REMARKS	The same as <ESC> “R”, above.				
SEE	Chapter 5				

MEMO

APPENDIX E

COMMAND SUMMARY

IN NUMERIC ORDER

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)	Advance 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 the condensed print
CHR\$(19)	Sets printer off line
CHR\$(20)	Cancels one line expanded print
CHR\$(24)	Cancels 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
⟨ESC⟩ CHR\$(25) CHR\$(4)	Selects auto feed mode
⟨ESC⟩ CHR\$(25) “R”	Ejects paper
⟨ESC⟩ CHR\$(32) <i>n</i>	Adds <i>n</i> dot spaces between characters
⟨ESC⟩ “!” <i>n</i>	Sets the master print mode
⟨ESC⟩ “#”	Accepts the value of the eighth data bit as is
⟨ESC⟩ “\$” <i>n1 n2</i>	Moves the print head to an absolute horizontal position
⟨ESC⟩ “%” 0 CHR\$(0)	Cancels download character set
⟨ESC⟩ “%” 1 CHR\$(0)	Selects download character set
⟨ESC⟩ “&” CHR\$(0) <i>n1 n2 m0 m1 ... m11 [m12 ... m22]</i>	Defines download character into RAM
⟨ESC⟩ “*” <i>n0 n1 n2 m1 m2 ...</i>	Selects graphics modes
⟨ESC⟩ “+” CHR\$(1)	Executes macro instruction
⟨ESC⟩ “+” CHR\$(30)	Defines macro instruction
⟨ESC⟩ “-” 0	Cancels underlining
⟨ESC⟩ “-” 1	Selects underlining
⟨ESC⟩ “/” <i>n0</i>	Selects vertical channel
⟨ESC⟩ “0”	Sets line spacing to 1/8 inch
⟨ESC⟩ “1”	Sets line spacing to 7/72 inch
⟨ESC⟩ “2”	Sets line spacing to 1/6 inch or uses the ⟨ESC⟩ “A” definition
⟨ESC⟩ “3” <i>n</i>	Sets line spacing to <i>n</i> /216 inch
⟨ESC⟩ “4”	Selects italic characters
⟨ESC⟩ “5”	Cancels italic characters
⟨ESC⟩ “6”	Expands the printable area / Selects character set #2
⟨ESC⟩ “7”	Cancels the expansion of printable area / 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⟩ “?” <i>n0 n1</i>	Redefines the graphics mode
⟨ESC⟩ “@”	Resets the printer
⟨ESC⟩ “A” <i>n</i>	Sets or defines line spacing to <i>n</i> /72 inch
⟨ESC⟩ “B” <i>n1 n2 n3 ...</i> CHR\$(0)	Sets vertical tab positions
⟨ESC⟩ “C” CHR\$(0) <i>n</i>	Sets page length to <i>n</i> inches
⟨ESC⟩ “C” <i>n</i>	Sets page length to <i>n</i> lines
⟨ESC⟩ “D” <i>n1 n2 n3 ...</i> CHR\$(0)	Sets horizontal tab positions
⟨ESC⟩ “E”	Selects emphasized printing
⟨ESC⟩ “F”	Cancel s emphasized printing
⟨ESC⟩ “G”	Selects boldface printing
⟨ESC⟩ “H”	Cancel s boldface printing
⟨ESC⟩ “I” 0	Selects undefined codes as control codes
⟨ESC⟩ “I” 1	Prints characters in the undefined control code area
⟨ESC⟩ “J” <i>n</i>	Sends a one-time paper feed of <i>n</i> /216 inch
⟨ESC⟩ “K” <i>n1 n2 m1 m1 ...</i>	Prints normal-density graphics
⟨ESC⟩ “L” <i>n1 n2 m1 m2 ...</i>	Prints double-density graphics
⟨ESC⟩ “M”	Sets the print pitch to elite
⟨ESC⟩ “N” <i>n</i>	Sets the bottom margin
⟨ESC⟩ “O”	Cancel s top and bottom margins
⟨ESC⟩ “P”	Sets the print pitch to pica
⟨ESC⟩ “Q” <i>n</i>	Sets the right margin
⟨ESC⟩ “R” <i>n</i>	Selects an international character set
⟨ESC⟩ “S” 0	Selects superscripts
⟨ESC⟩ “S” 1	Selects subscripts
⟨ESC⟩ “T”	Cancel s a superscript or subscript
⟨ESC⟩ “U” 0	Cancel s uni-directional printing
⟨ESC⟩ “U” 1	Selects uni-directional printing
⟨ESC⟩ “W” 0	Cancel s the expanded print
⟨ESC⟩ “W” 1	Sets the printer to expanded print
⟨ESC⟩ “X” <i>n1 n2</i>	Sets the left and right margins
⟨ESC⟩ “Y” <i>n1 n2 m1 m2 ...</i>	Prints double-density graphics with double-speed

⟨ESC⟩ “Z” <i>n1 n2 m1 m2...</i>	Prints quadruple-density graphics
⟨ESC⟩ “\” <i>n1 n2</i>	Moves the print head to a specified horizontal position
⟨ESC⟩ “^” <i>n0 n1 n2 m1 m2...</i>	Prints 9-pin graphics
⟨ESC⟩ “a” <i>n</i>	Sets alignment, or centering
⟨ESC⟩ “b” <i>n0 n1 n2 n3 ...</i>	CHR\$(0) Sets vertical tab positions in a channel
⟨ESC⟩ “h” <i>n</i>	Enlarges characters in whole or in part; cancels same
⟨ESC⟩ “i” 0	Cancels immediate print mode
⟨ESC⟩ “i” 1	Sets immediate print mode
⟨ESC⟩ “j” <i>n</i>	Sends a one-time reverse feed of <i>n</i> /216 inch
⟨ESC⟩ “l” <i>n</i>	Sets the left margin
⟨ESC⟩ “p” 0	Cancels proportional print
⟨ESC⟩ “p” 1	Sets the printer to proportional print
⟨ESC⟩ “r” <i>n</i>	Sets the top margin
⟨ESC⟩ “x” 0	Cancels NLQ characters
⟨ESC⟩ “x” 1	Selects NLQ characters
⟨ESC⟩ “~” 0	Prints “normal zero”
⟨ESC⟩ “~” 1	Prints “slash zero”
“((0))”	Cancels auto feed mode
“((1))”	Supplies paper
“((4))”	Selects auto feed mode
“((R))”	Ejects paper

APPENDIX F

TECHNICAL

SPECIFICATIONS

Printing

Printing method	Serial impact dot matrix
Printing speed	120 characters per second (in Draft pica) 30 characters per second (in NLQ mode)
Print buffer	5KB
Paper feed	2.7 inches/second (in case of 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 33 international characters [11 sets] 81 IBM special characters 52 IBM block graphics characters 96 italic ASCII characters 33 italic international characters [11 sets] 81 italic IBM special characters
NLQ characters	96 standard ASCII characters 33 international characters [11 sets] 81 IBM special characters
Other characters	255 downloadable characters
Character matrix	18 × 11 dots, NLQ characters 9 × 11 dots, Draft characters 12 × 11 dots, IBM block graphics characters 8 × 480 dots, normal-density graphics 8 × 960 dots, double-density graphics 8 × 1920 dots, quadruple-density graphics 8 × 640 dots, CRT graphics

	8 × 720 dots, CRT type II graphics
	8 × 576 dots, plotter graphics
Line spacing	1/6 inch standard
	1/8, <i>n</i> /72, or <i>n</i> /216 inch programmable
Column width	80, normal pica
	96, normal elite
	136, condensed pica
	160, condensed elite
	40, expanded pica
	48, expanded elite
	68, expanded condensed pica
	80, expanded condensed elite
	and proportional spacing
Special features	Near Letter Quality
	Short tear-off
	Easy access format switches
	Self-test
	Hex dump
	Skip over perforation
	Automatic sheet feeder (option)

Paper

Single sheets	5.5 – 8.5 inches, wide
	0.07 – 0.10 mm, thickness
Sprocket-feed paper	4 – 10 inches, wide
	0.07 – 0.10 mm, one-part form thickness
	Max 0.28 mm, 3-part form thickness

Printer

Dimensions	Height 104 mm (4.1 inches)
	Width 400 mm (15.7 inches)
	Depth 336 mm (13.2 inches)
Weight	6 Kg (13.2 pounds)
Power	120 VAC ± 10%, 60Hz.
	220 VAC ± 10%, 50/60Hz.
	240 VAC ± 10%, 50/60Hz.
Environment	Temperature: 5 to 35°C (40 to 95°F)
	Humidity: 10 to 80%, non condensing
Ribbon	Black cloth ribbon in special cartridge

Parallel interface

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

MEMO

APPENDIX G

THE

PARALLEL INTERFACE

This printer has a parallel interface to communicate with the computer that it is connected to. 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 STROBE pulses
Handshaking:	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 we need to look at the functions of the various signals carried by the pins of the interface connector.

Pin 1 carries the 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 beginning at least 0.5 microseconds before the strobe pulse starts and continuing for at least 0.5 microseconds after the strobe pulse ends.

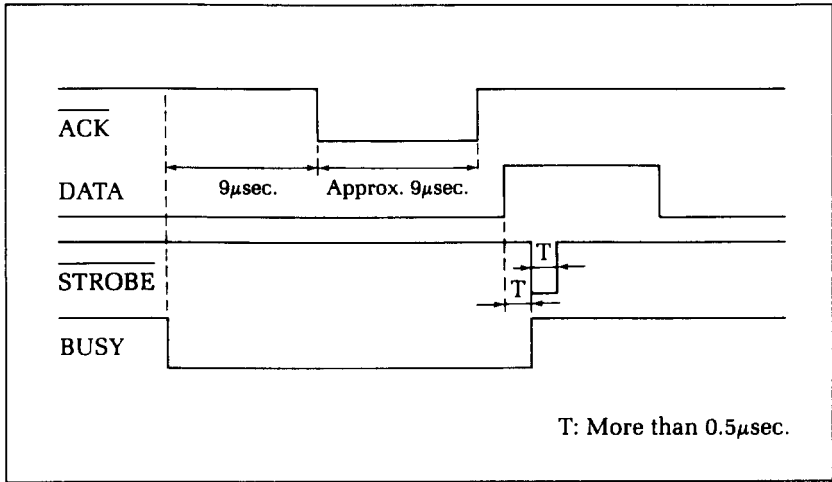


Figure G-1. The interface timing diagram.

Signal Name	Circuit Example
DATA 1 - DATA 8 (To Printer)	<p>74LS Compatible</p>
$\overline{\text{STROBE}}$ (To Printer)	<p>74LS Compatible</p>
BUSY, $\overline{\text{ACK}}$ (From Printer)	<p>74LS Compatible</p>

Figure G-2. Typical interface circuit.

When the printer has successfully received the byte of data from the computer it sets pin 10 low for approximately 9 microseconds. This signal acknowledges the receipt of the data and so is called the $\overline{\text{ACK}}$ (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 1-5 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, and 34-36 are not used, while pins 16, 17, 19-30

Table G-1
Parallel interface pin functions

Pin No.	Signal Name	Direction	Function
1	STROBE		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	ACK	OUT	A 9 microsecond 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 1-5 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	RESET	IN	When this signal goes LOW the printer is reset to its power-on condition.
32	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.
34-36	N/C		Unused.

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 signal ($\overline{\text{RESET}}$) goes low the printer will reinitialize. Pin 32 is used to report error conditions in the printer. This signal ($\overline{\text{ERROR}}$) is high during normal operation and goes low to report that the printer cannot print due to an error condition.

APPENDIX H

CONNECTING

WITH COMPUTER

In this appendix, we'll show you how to connect with various computers.

If you cannot find out the name of your computer, your printer dealer will give you advice on connecting this printer to your computer.

CONNECTING WITH IBM-PC AND COMPAQ

Both the IBM Personal Computer and the Compaq computer function the same when connected to this printer. We will discuss the IBM-PC, knowing that all we say works just as well as for the Compaq.

You only need a cable to connect this printer to your IBM-PC. Your printer dealer can furnish this cable, or you can use a standard IBM-PC parallel printer cable for the parallel interface.

Table H-1
IBM-PC parallel cable

Printer		IBM-PC Parallel	
Pin No.	Function	Pin No.	Function
1	STROBE	1	STROBE
2	D1	2	D0
3	D2	3	D1
4	D3	4	D2
5	D4	5	D3
6	D5	6	D4
7	D6	7	D5
8	D7	8	D6
9	D8	9	D7
10	ACK	10	ACK
11	BUSY	11	BUSY
12	PAPER END	12	PAPER END
13	SELECTED	13	SELECT
16	GROUND	18-25	GROUND
31	RESET	16	RESET
32	ERROR	15	ERROR

■ BASIC programming

When you start writing your own programs there are several things you should know.

IBM BASIC defaults to a printer width of 80. This means that it will automatically insert a carriage return and line feed after every 80 characters. If you want to print lines longer than 80 characters you will need to change the width of the printer. If you set the printer width to 255, then the IBM will *never* insert a line feed and carriage return, unless you start a new line. (This is what you want usually.) To set the width of the printer to 255, use this statement:

```
100 WIDTH "LPT1:", 255
```

IBM BASIC has one other little trick that will mess up your graphics if you let it. IBM BASIC is very insistent about adding a line feed to a carriage return. This is fine if you are printing text, but if an ASCII 13 pops up in the middle of your graphics printout, IBM BASIC will *still* add a line feed to it. This will put strange things in the middle of your graphics, and leave you with extra characters at the end of your line.

There is an easy way to avoid this problem. You just open the printer as a random file. The following program shows how this is done.

```
10 OPEN "LPT1:" AS #1           ' RANDOM ACCESS
20 WIDTH #1, 255                ' SET WIDTH TO 255
30 PRINT #1, "TESTING"         ' PRINT A LINE
40 PRINT #1, CHR$(10)          ' ADD YOUR OWN LF
```

■ Listing programs

To list programs on this printer, make sure the program is in the IBM's memory and use the LLIST command. This directs the listing to the printer instead of the screen.

CONNECTING WITH APPLE II COMPUTERS

Apple II computers require an interface board (mounted inside the Apple II) and a cable to run this printer. We recommend that you use the **grafstar**TM interface for the Apple II, II + ,

and IIe. It comes complete with a cable and is easily installed. A unique feature of the **grafstar**TM makes it possible to do some fancy dot graphics programming.

You can, of course, use many of the available parallel interface boards for the Apple II, and an appropriate cable.

Table H-2
Apple parallel cable

Printer		Apple Board	
Pin No.	Function	Pin No.	Function
25	SIG GND	1	SIG GND
26	SIG GND	2	SIG GND
27	SIG GND	3	SIG GND
1	STROBE	4	STROBE
28	SIG GND	5	N/C
2	DATA1	6	DATA1
3	DATA2	7	DATA2
4	DATA3	8	DATA3
5	DATA4	9	DATA4
6	DATA5	10	DATA5
7	DATA6	11	DATA6
8	DATA7	12	DATA7
9	DATA8	13	DATA8
10	ACK	14	ACK
29	SIG GND	15	SIG GND

■ Applesoft BASIC

The Apple II computer, using Applesoft BASIC, does not have different types of PRINT statements for the screen and printer. You must add commands to your programs that direct the output of the PRINT statements to the printer. To direct output to the printer (with the interface board in slot # 1) you must use the PR # 1 command. Depending on the version of Applesoft BASIC that you are using this command can take various forms. It is usually one of the following:

```
10 PR#1
or
10 PRINT "<Ctrl-D>PR#1"
or
10 PRINT CHR$(4) "PR#1"
```

To return output to the screen, the command is PR # 0, in the same form that works for PR # 1.

To allow line length longer than the Apple II usually uses you must add the following statement to your programs:

```
20 PRINT CHR$(9) "255N"
```

This allows lines of any length to be sent to the printer and is especially important for dot graphics. (The number 255 in the BASIC statement above could be replaced by any number from 0 to 255 and would set the line length to that value.)

Two codes are particular problem on the Apple II: CHR\$(7) and CHR\$(9). The computer will not send these codes to this printer. Try to avoid using these in dot graphics programs.

The Apple II computer uses CHR\$(9) as a printer initialization code. It won't send it on to the printer. There is a way to bypass this problem, however. You can change the printer initialization code to a value other than CHR\$(9) like this:

```
PR#1  
PRINT CHR$(9); CHR$(1)
```

This makes CHR\$(1) the printer initialization code (and transfers the problems to *that* code) and allows you to use this printer's tabs.

There is one more way to sneak problem codes past the Apple II's operating system and that's to poke the codes directly to the output port. To send ASCII code 9, for example, you could do this:

```
100 N = 9  
110 IF PEEK(49601)>127 THEN 110  
120 POKE 49296,N
```

Line 110 checks the printer's status, and when it's okay, line 120 pokes the code to the printer.

■ Listing programs

To make a listing of your BASIC programs on this printer from your Apple II computer you must take the following steps:

1. Be sure that the program that you wish to list is in the memory of the Apple II.
2. Direct the output to the printer by typing PR # 1.
3. Type LIST to start the listing.

- When the listing is finished, type PR # 0 to redirect the output to the screen.

CONNECTING WITH TRS-80 COMPUTERS

All that's required to connect this printer to your TRS-80 is a cable. It is available at your printer dealer.

Table H-3
TRS-80 Model I parallel cable

Printer		TRS-80 Model I	
Pin No.	Function	Pin No.	Function
1	STROBE	1	STROBE
2	D1	3	D1
3	D2	5	D2
4	D3	7	D3
5	D4	9	D4
6	D5	11	D5
7	D6	13	D6
8	D7	15	D7
9	D8	17	D8
11	BUSY	21	READY

Table H-4
TRS-80 Model II parallel cable

Printer		TRS-80 Model II	
Pin No.	Function	Pin No.	Function
1	STROBE	1	STROBE
2	D1	3	D1
3	D2	5	D2
4	D3	7	D3
5	D4	9	D4
6	D5	11	D5
7	D6	13	D6
8	D7	15	D7
9	D8	17	D8
10	ACK	19	ACK
11	BUSY	21	BUSY

■ TRS-80 BASIC

You may have to initialize your Model II to direct LPRINT statements to the printer. Use the SYSTEM "FORMS" command to do it.

TRS-80 uses another version of Microsoft BASIC. TRS-80 does have a few unique "problem codes". They are 0, 10, 11, and 12. None of these are passed properly to the printer.

You can bypass the TRS-80's BASIC and send these codes directly to the printer with the following short routine. The variable N must be set equal to the code that you wish to pass (in our example it's 0).

```
90 N = 0
100 IF PEEK(14312)<>63 THEN 100
110 POKE 14312,N
```

Or you can use this special printer driver that will solve all your problems. Just run this program first, and then any codes sent by a BASIC program will be sent directly to the printer. This program is for the TRS-80 Model III.

```
5 REM DRIVER FOR TRS-80 III
10 AD=16571
20 FOR I=0 TO 14
30 READ A:POKE AD+1,A
40 NEXT
50 POKE 16422,187
60 POKE 16423,64
70 DATA 33,232,55,203,126,32,252,33,17,0,57,126,
211,251,201
80 END
```

And here is a version for the TRS-80 Model I.

```
5 REM DRIVER FOR TRS-80 I
10 AD=16571
20 FOR I=0 TO 15
30 READ A:POKE AD+1,A
40 NEXT I
50 POKE 16422,187
60 POKE 16423,64
70 DATA 33,232,55,203,126,32,252,33,17,0,57,126,
50,232,55,201
80 END
```

■ Listing programs

To list a BASIC program that is in your TRS-80's memory on

this printer, type LLIST. This directs the listing to the printer instead of the screen.

CONNECTING WITH KAYPRO, OSBORNE, AND OTHER CP/M COMPUTERS

All that you need to connect this printer to an Osborne 1 or Kaypro computer is a cable. Your printer dealer can provide the cable that you need.

Table H-5
Kaypro parallel cable

Printer		Kaypro	
Pin No.	Function	Pin No.	Function
1	STROBE	1	STROBE
2	DATA1	2	DATA1
3	DATA2	3	DATA2
4	DATA3	4	DATA3
5	DATA4	5	DATA4
6	DATA5	6	DATA5
7	DATA6	7	DATA6
8	DATA7	8	DATA7
9	DATA8	9	DATA8
11	BUSY	11	BUSY
16	SIG GND	16	SIG GND

Table H-6
Osborne 1 parallel cable

Printer		Osborne 1	
Pin No.	Function	Pin No.	Function
2	DATA1	1	DATA0
6	DATA5	2	DATA4
3	DATA2	3	DATA1
7	DATA6	4	DATA5
4	DATA3	5	DATA2
8	DATA7	6	DATA6
5	DATA4	7	DATA3
9	DATA8	8	DATA7
1	STROBE	11	STROBE
11	BUSY	15	BUSY
16	SIG GND	16	SIG GND

■ Using MBASIC

Many CP/M computers use Microsoft BASIC (called MBASIC). MBASIC is a very close relative of the IBM-Microsoft BASIC. The only difference is that MBASIC "interprets" CHR\$(9) and substitutes a group of spaces to simulate a

tab. You can send a horizontal tab to this printer by using `CHR$(137)` instead of `CHR$(9)`.

Some versions of Microsoft BASIC will add a carriage return and line feed at the end of every 80 (or sometimes 132) characters. To print lines longer than 80 (or 132) characters (as when doing dot graphics) you must define a wider printer width. The following statement will prevent the computer from inserting unwanted codes.

```
10 WIDTH LPRINT 255
```

■ Listing programs

Microsoft BASIC uses the “L” prefix on several commands to direct them to the printer. To list programs on the printer, just type `LLIST`. To direct program output to the printer, use `LPRINT` in place of `PRINT`.