

# NEC

P660/P665  
P760/P765  
CP660/CP665  
CP760/CP765



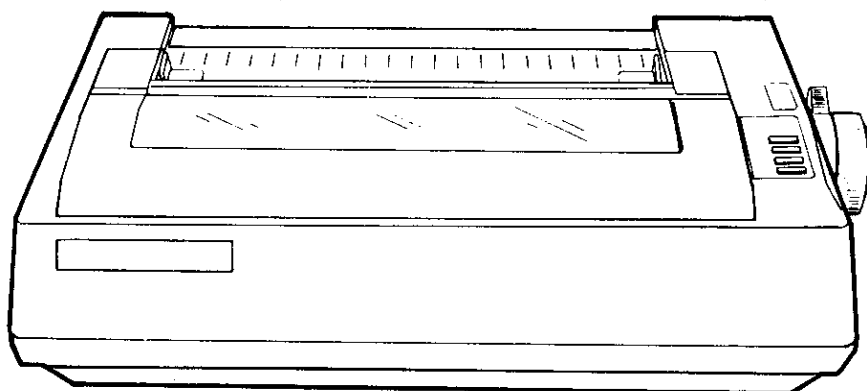
## **PINWRITER** P6/P7 Series Technical Reference Guide

819-150367-000 Rev. 00  
3-86



**NEC**

P660/P665  
P760/P765  
CP660/CP665  
CP760/CP765



# **PINWRITER**

P6/P7 Series

Technical Reference Guide

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**FEDERAL COMMUNICATIONS COMMISSION  
RADIO FREQUENCY INTERFERENCE STATEMENT**

This unit has been type-tested and found to comply with the limits for a Class B computing device in accordance with the specifications for Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation.

***Manufacturer's Instructions and User's Responsibility  
to Prevent Radio Frequency Interference***

**Manufacturer's Instructions**

The user must observe the following precautions in installing and operating this device:

1. Operate the equipment in strict accordance with the manufacturer's instructions for the model.
2. Plug the unit into a properly grounded wall outlet and use the power cord supplied with the unit, unmodified.
3. Always operate the unit with the factory-installed cover on the unit.
4. Make no modification to the equipment which would affect its meeting the specified limits of the Rules.
5. Maintain the equipment in a satisfactory state of repair.
6. Use a shielded and properly grounded I/O cable to ensure compliance of this unit to the specified limits of the Rules.

**User's Responsibility**

The user is ultimately responsible for correcting problems that arise from harmful radio-frequency emissions from equipment under his control. If this equipment does cause interference to radio or television reception (which can be determined by turning the equipment off and on), the user is encouraged to try to correct the interference by one of the following measures. All of these responsibilities and any others not mentioned are exclusively at the expense of the user.

1. Change in orientation of the receiving device antenna.
2. Change in orientation of the equipment.
3. Change in location of equipment.
4. Change in equipment power source.

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If these attempts are unsuccessful, install one or all of the following devices:

1. Line isolation transformers
2. Line filters
3. Electro-magnetic shielding

If necessary, the user should consult the dealer, NEC, or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission to be helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

#### NOTE

The operator of a computing device may be required to stop operating his device upon finding that the device is causing harmful interference and it is in the public interest to stop operation until the interference problem has been corrected.

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## Preface

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This manual provides programming and hardware interface information for Pinwriter P6/P7 series printers. You should be familiar with the *Pinwriter P6/P7 User's Guide* (Document # 819-150366-000) before reading this manual.

There are currently four models in the Pinwriter P6/P7 series. The following table lists the models and explains the differences among them.

MODEL #	COMMAND SET	COLUMNS	INTERFACE
P660	Epson LQ 1500	80	Parallel
P665	Epson LQ 1500	80	Serial
P760	Epson LQ 1500	136	Parallel
P765	Epson LQ 1500	136	Serial

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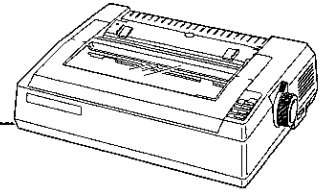
There are currently four models in the Pinwriter P6/P7 series. The following table lists the models and explains the differences among them.

MODEL #	COMMAND SET	COLUMNS	INTERFACE
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P665	Epson LQ 1500	80	Serial
P760	Epson LQ 1500	136	Parallel
P765	Epson LQ 1500	136	Serial

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# Section 1

## Installation



Your Pinwriter user's guide gave you the basic steps for setting up your printer. This section provides additional installation information such as factory switch settings, interface cable information, and software installation.

### SWITCH SETTINGS

The Pinwriter P6/P7 printers have two banks of switches located beneath the acrylic cover. The serial models, Pinwriter P665 and P765, have three additional switch banks located at the rear of the printer.

The factory settings are designed to work with most personal computers and programs, and normally will not have to be reset. They can, however, be easily changed to meet your computer's specific needs.

If you need to change a switch setting, see Section 2 for printer switches and Section 3 for serial interface switches.

### Printer Switches

The printer switches are located beneath the acrylic cover. Figure 1-1 shows the factory settings.

### Serial Interface Switches

There are three banks of serial interface switches located at the rear of the printer. The switches have been preset to communicate at 9600 baud, a word length of 8 data bits, no parity, and 1 stop bit. Figure 1-2 shows the factory settings.

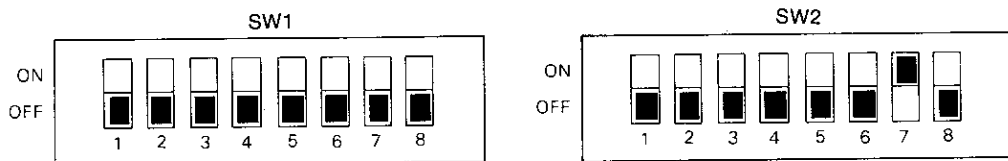


Figure 1-1 Printer Factory Switch Settings

## Installation

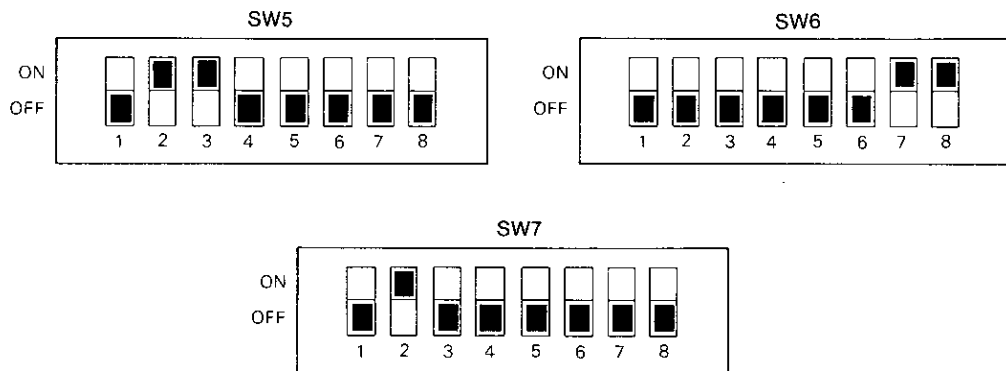


Figure 1-2 Serial Interface Factory Switch Settings

### INTERFACE CABLES

This subsection provides information that can be helpful in selecting the correct interface cable for your particular printer and computer. See your Pinwriter dealer or computer dealer for any additional assistance.

#### Parallel Interface Cables

The interface cable for the Pinwriter P660 and P760 models should be a high-quality shielded Centronics or IBM PC® cable. An 8 or 10-foot cable is most commonly used.

#### Serial Interface Cables

The standard length for a serial interface cable is 8 or 10 feet. Greater lengths of up to 50 feet can be used provided the cable is of the highest quality and lower baud rates are used.

In many cases, Pinwriter models P665 and P765 require a special serial interface cable. Your Pinwriter dealer or computer dealer can help you find the cable that fits your needs.

There are, however, several configurations that work with most popular personal computers. In the figures that follow, three of these typical serial configurations are shown.

The following computers work with Configuration 1, shown in Figure 1-3. This configuration uses a 25-pin male-to-male cable.

- Columbia®
- Compaq®
- Eagle PC®
- IBM PC®
- IBM XT®
- Other IBM compatibles

All of the computers listed above must be told that the Pinwriter is connected to the serial port. This is done by changing the mode command in MS-DOS®. The following information should be typed in at the A prompt.

```
MODE LPT1 = COM1
MODE COM1: 9600, N, 8, 1, P
```

This command sets the Pinwriter to COM1 and sets the communication to 9600 baud, no parity, 8 data bits, one stop bit, and continuous retry.

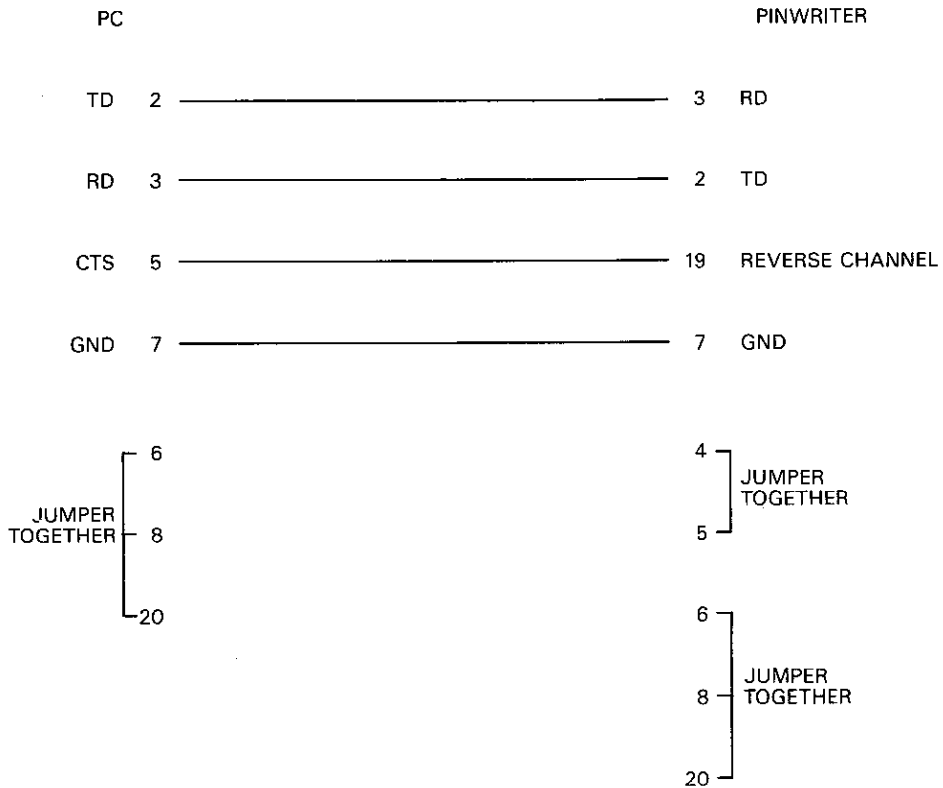


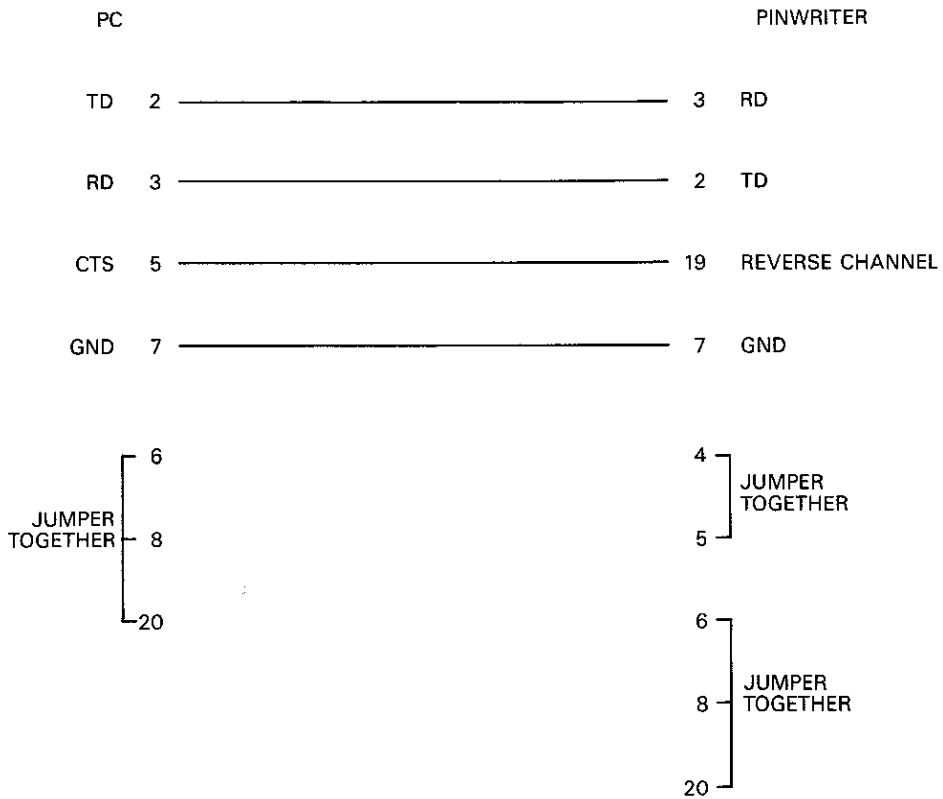
Figure 1-3 Configuration 1

*Installation*

The following computers work with Configuration 2, shown in Figure 1-4. This configuration uses a 25-pin female-to-male cable.

NEC APC III®  
 HP-85®  
 HP-125®  
 Kaypro II/IV®

Commodore® (with serial adaptor)  
 Epson QX-10®  
 TRS-80 Mod, I, II, III®



**Figure 1-4 Configuration 2**

The following computers work with Configuration 3, shown in Figure 1-5. This configuration uses a 25-pin male-to-male cable.

Altos®  
 Apple II/IIe/II+®  
 (super serial cards)  
 Franklin Ace 1000®  
 Franklin Ace 1200®

Kaypro 10®  
 Televideo 8XX Series®  
 Zenith Z-100®

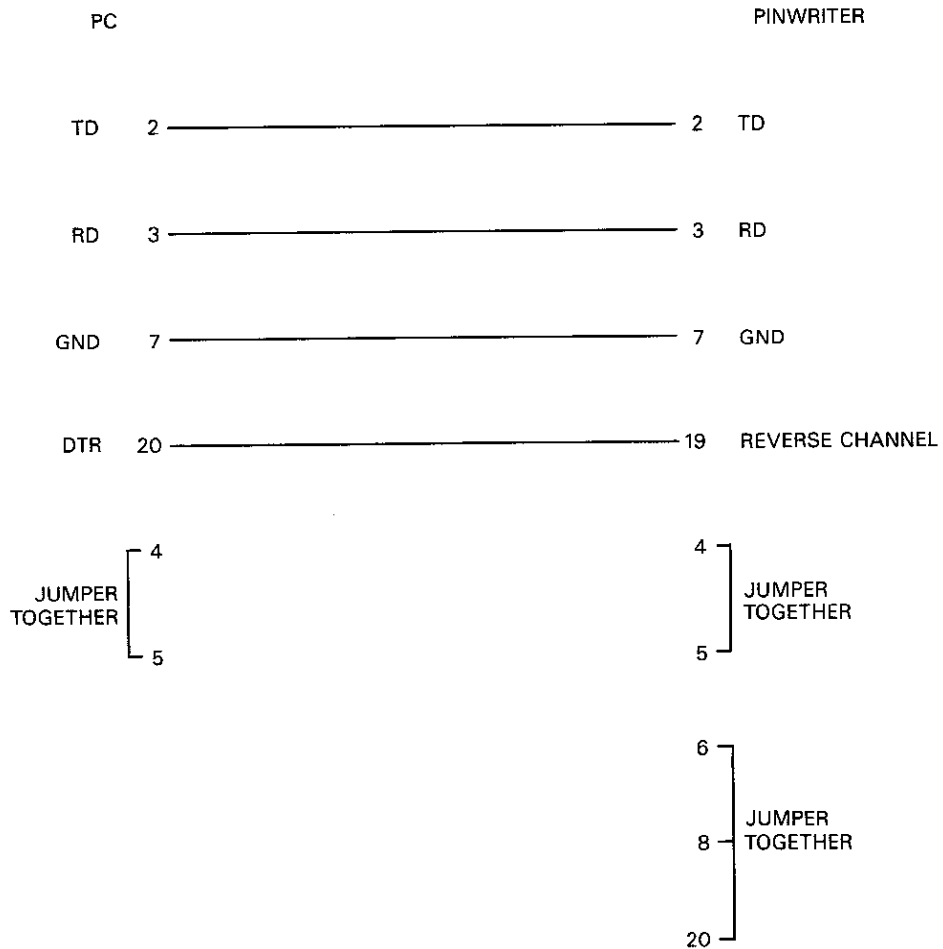


Figure 1-5 Configuration 3

*Installation*

**SOFTWARE INSTALLATION**

The software package that you are using will ask you to identify the printer that is connected to the host computer. The following are possible selections that may appear on the menu. Each is listed according to priority. For example, for a parallel configuration, if the P660 or P760 is not listed on the menu, go to the second selection, and so on.

The following are the menu selections for a parallel configuration.

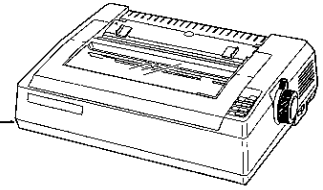
- P660 or P760
- P560
- Epson LQ 1500
- Epson FX Series
- Epson LX Series
- Epson RX Series
- Epson MX Series

The following are the menu selections for a serial configuration.

- P665 or P765
- P565
- Epson LQ 1500
- Epson FX Series
- Epson LX Series
- Epson RX Series
- Epson MX Series

## Section 2

# Parallel Interface



Pinwriter models P660 and P760 are equipped with a parallel interface. This section provides switch setting information, a lines description, timing charts, and logic elements for the Pinwriter's parallel interface.

### PRINTER SWITCH SETTINGS

The Pinwriter P660 and P760 printers have two banks of switches located beneath the acrylic cover. The factory settings are designed to work with most personal computers and programs, and normally will not have to be reset. They can, however, be easily changed to meet your computer's specific needs.

Factory settings and a description of switch functions are shown in Figures 2-1 and 2-2.

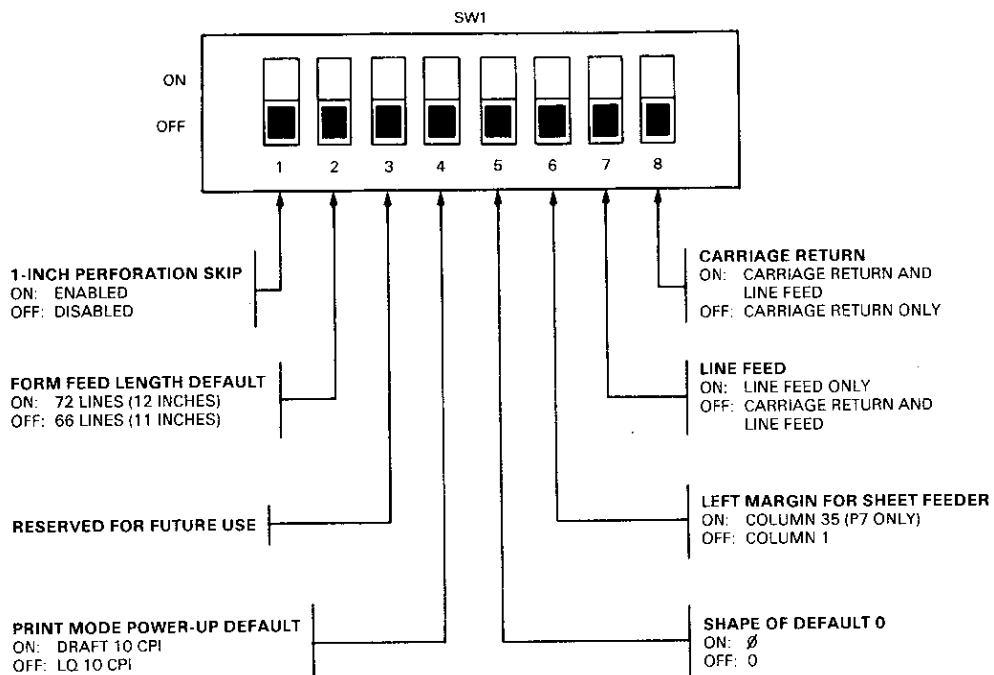


Figure 2-1 SW1 Settings

## Parallel Interface

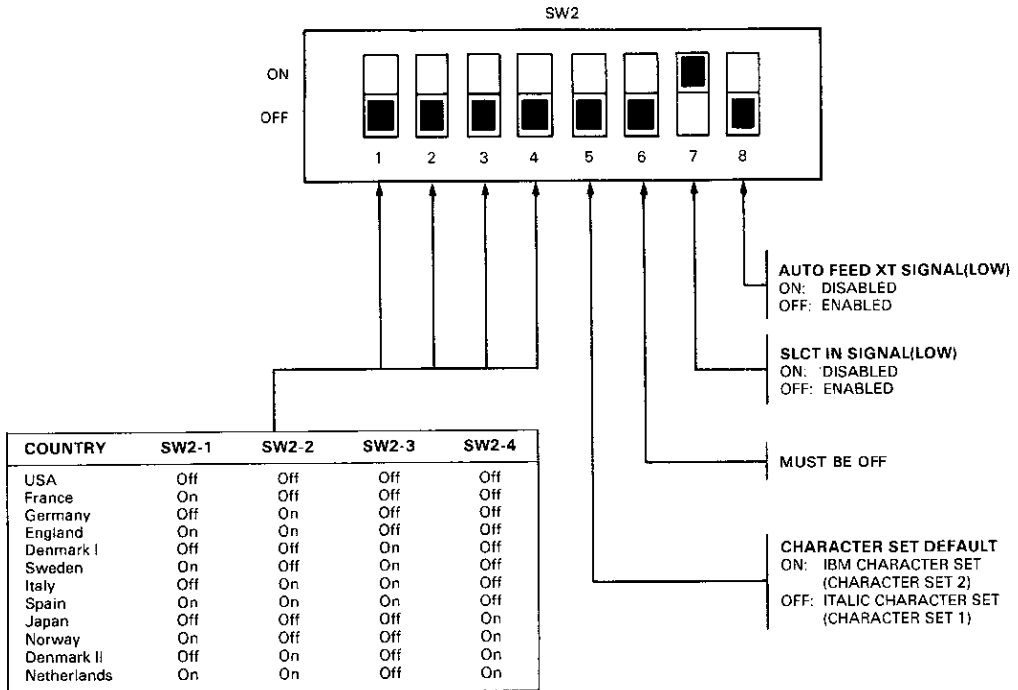


Figure 2-2 SW2 Settings

## PARALLEL INTERFACE LINES

Figure 2-3 shows signal and control lines across the Pinwriter parallel interface. Table 2-1 describes the signal lines and pin assignments.

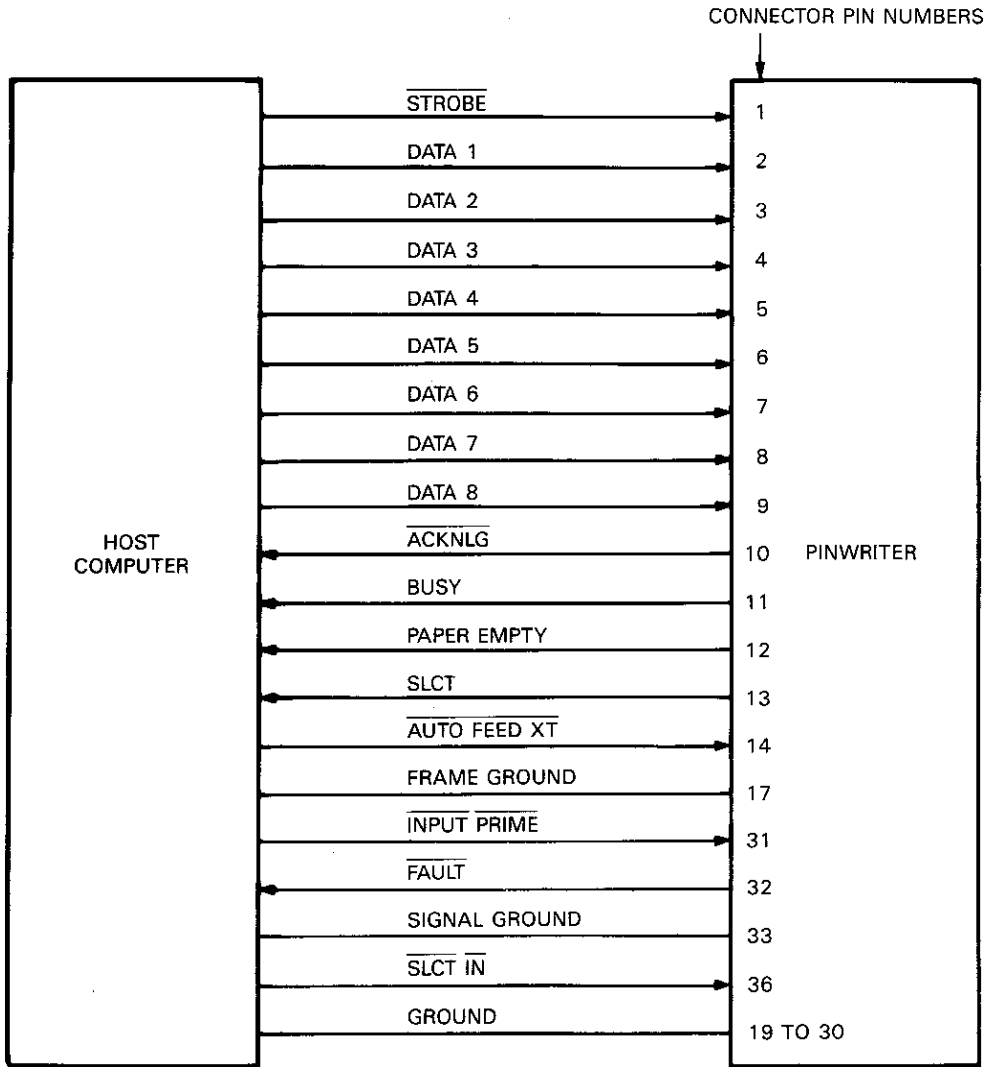


Figure 2-3 Parallel Interface Lines Diagram

Parallel Interface

Table 2-1 Interface Lines Description

SIGNAL PIN	RETURN PIN	SIGNAL	DIRECTION	DESCRIPTION
1	19	$\overline{\text{Strobe}}$	To printer	Strobes a data byte to the printer. The minimum pulse width of the signal is 1 $\mu\text{s}$ , normally active low.
2	20	Data 1	To printer	Data lines 1 to 8 transmit ASCII code. The lines are high (true) at logic 1 and low (false) at logic 0.
3	21	Data 2		
4	22	Data 3		
5	23	Data 4		
6	24	Data 5		
7	25	Data 6		
8	26	Data 7		
9	27	Data 8		
10	28	$\overline{\text{Acknlg}}$	From printer	An 8 $\mu\text{s}$ pulse on this status line indicates that the printer received a data byte and it can receive another.
11	29	Busy	From printer	This signal goes high when the printer is busy because <ul style="list-style-type: none"><li>• the buffer is full, or</li><li>• it is initializing, or</li><li>• it is deselected, or</li><li>• a printer fault has occurred.</li></ul>
12	30	Paper Empty	From printer	This status line goes high when the printer is out of paper.
13		Slct	From printer	This status line goes high when the printer is selected. The line is low when the printer is deselected.

Table 2-1 Interface Lines Description (cont'd)

SIGNAL PIN	RETURN PIN	SIGNAL	DIRECTION	DESCRIPTION
14	—	$\overline{\text{Auto Feed XT}}$	To printer	When this line is low, the printer performs an automatic line feed after each line.
15	—	—	—	Unused.
16	—	—	—	Unused.
17	—	FG	—	Frame ground.
18	—	+5V (Direct)	—	Unused.
19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30	—	Gnd	—	Ground. Pins 19-27 are ground for data 1-8, pin 28 is ground for <u>Acknlg</u> , pin 29 is ground for <u>Busy</u> , and pin 30 is ground for <u>Input Prime</u> .
31	30	$\overline{\text{Input Prime}}$	To printer	A low on this line initializes the printer. The signal pulse width must be more than 15 $\mu\text{s}$ .
32	—	$\overline{\text{Fault}}$	From printer	This line goes low when the printer is <ul style="list-style-type: none"> <li>● out of paper</li> <li>● deselected</li> <li>● in a fault state.</li> </ul>
33	—	SG	—	Signal ground.
34	—	—	—	Unused.
35	—	—	—	Unused.
36	—	$\overline{\text{Slect In}}$	To printer	When this line goes low, the printer overrides DC1/DC3 codes.

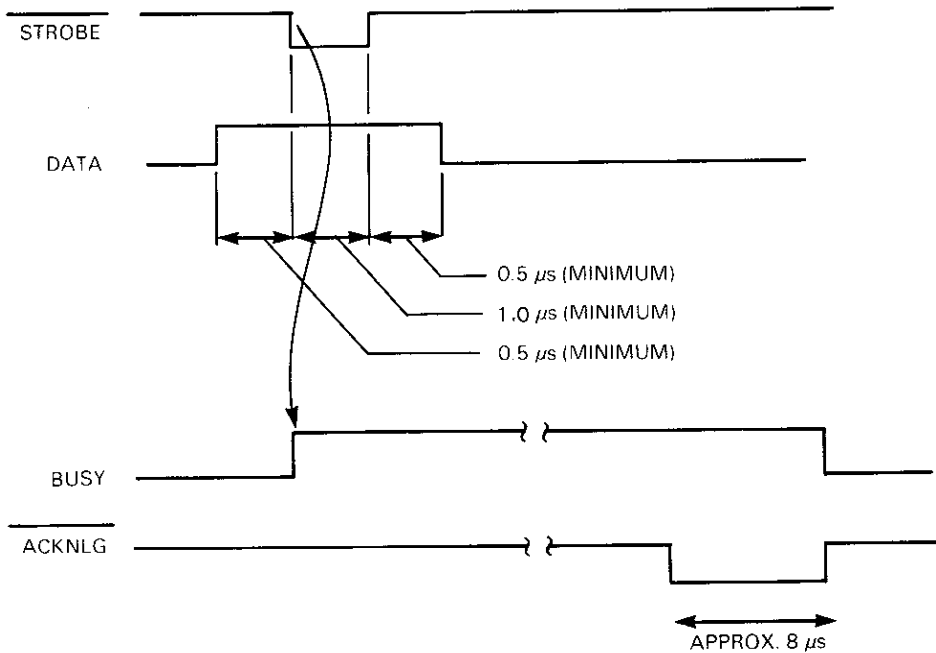
*Parallel Interface*

**PARALLEL INTERFACE TIMING**

The timing relationships of the signals for data input, paper empty, and deselect are shown in Figures 2-4 to 2-6.

**PARALLEL INTERFACE LOGIC ELEMENTS**

The Pinwriter models P660 and P760 interface logic consists of 7404 integrated circuits (ICs) or equivalent ICs for the input lines. Output lines are 7405 integrated circuits or equivalent ICs. Figure 2-7 illustrates this logic.



**Figure 2-4 Timing for Data Input Signals**

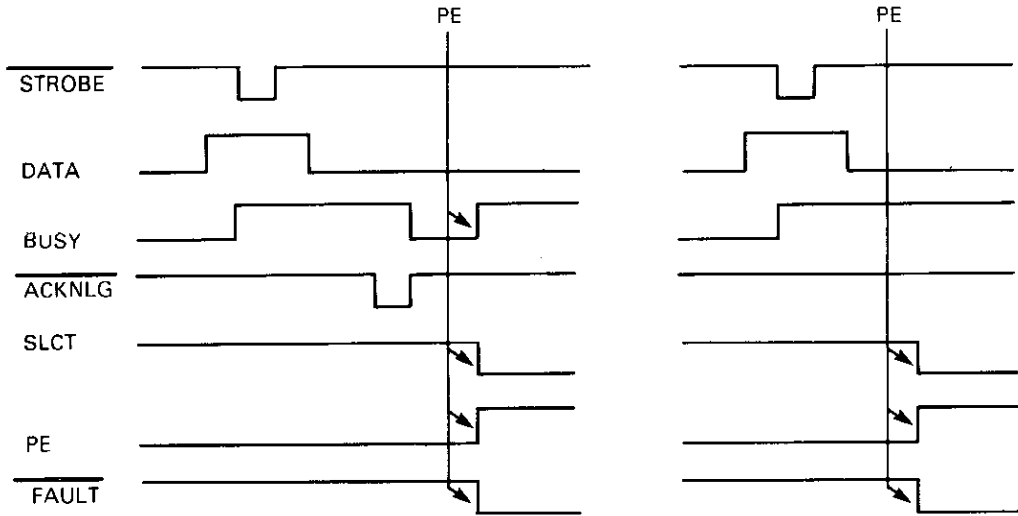


Figure 2-5 Timing for Paper Empty Signals

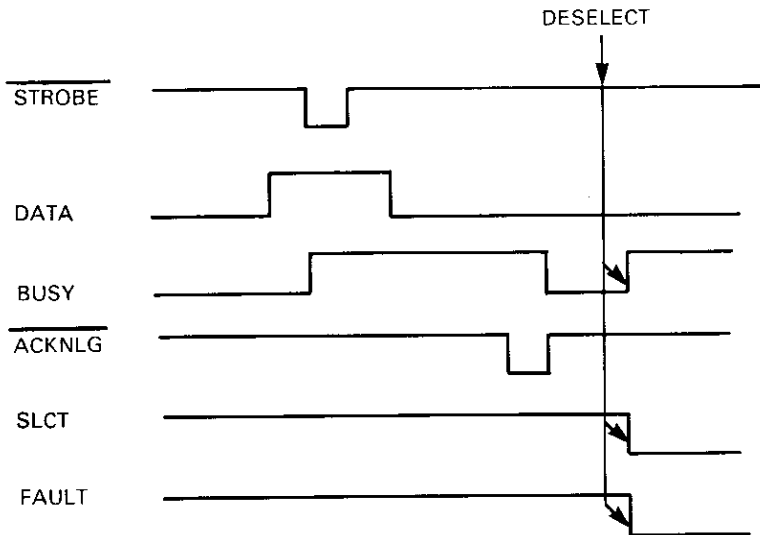
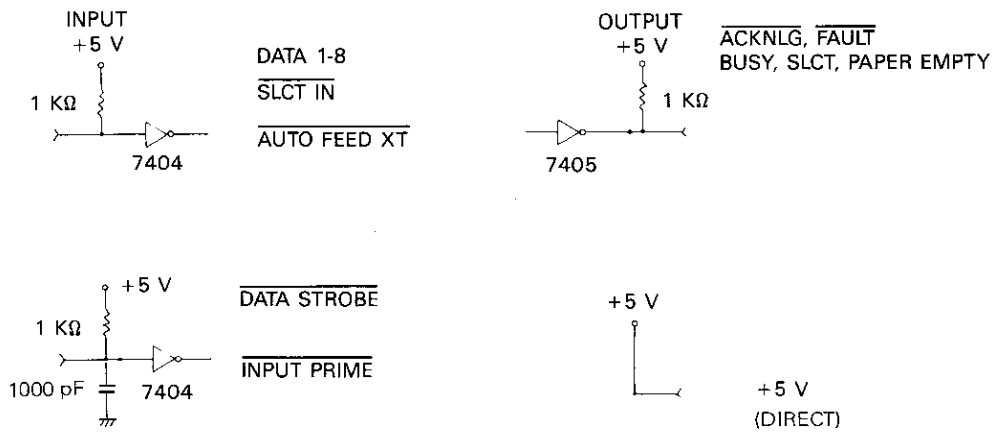


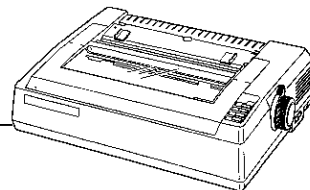
Figure 2-6 Timing for Deselect Signals

*Parallel Interface*



**Figure 2-7 Interface Logic**

## Section 3



# Serial Interface

The Pinwriter P665 and P765 printers have both an RS-232C interface and a 20 mA current loop interface. This section provides information on both types of interface, and also gives the serial interface switch settings and their functions.

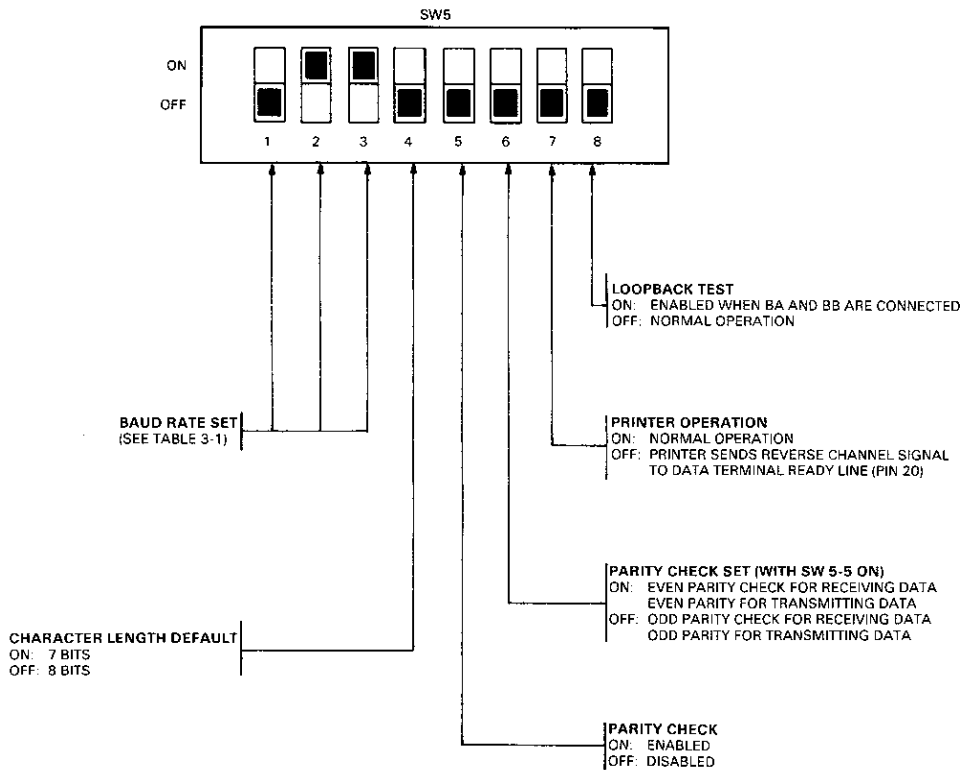
### PRINTER SWITCH SETTINGS

The Pinwriter P6/P7 printers have two banks of switches located beneath the acrylic cover. These switches are used to select specific printer functions and can be changed by the operator. See Section 1 for a description of these switches.

### SERIAL INTERFACE SWITCH SETTINGS

Pinwriter models P665 and P765 have three banks of switches located at the rear of the printer. The switches have been preset to communicate at 9600 baud, a word length of 8 data bits, no parity, and 1 stop bit. Factory switch settings and an explanation of switch functions are shown in Figures 3-1 through 3-3.

*Serial Interface*



**Figure 3-1 SW5 Settings**

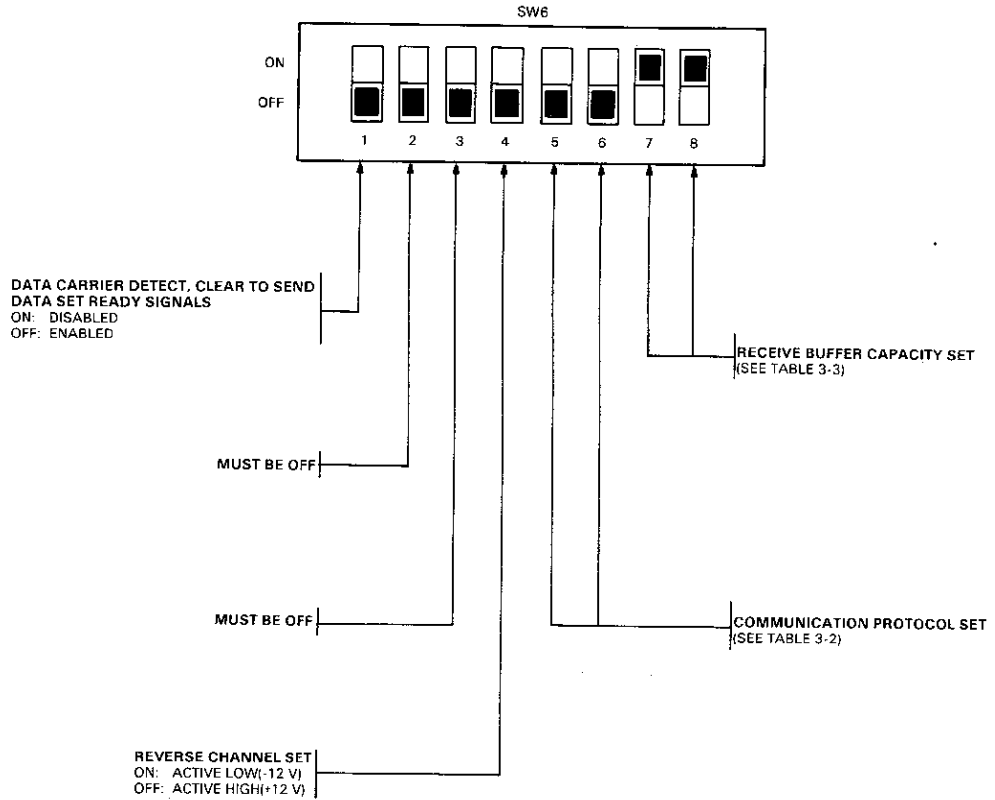
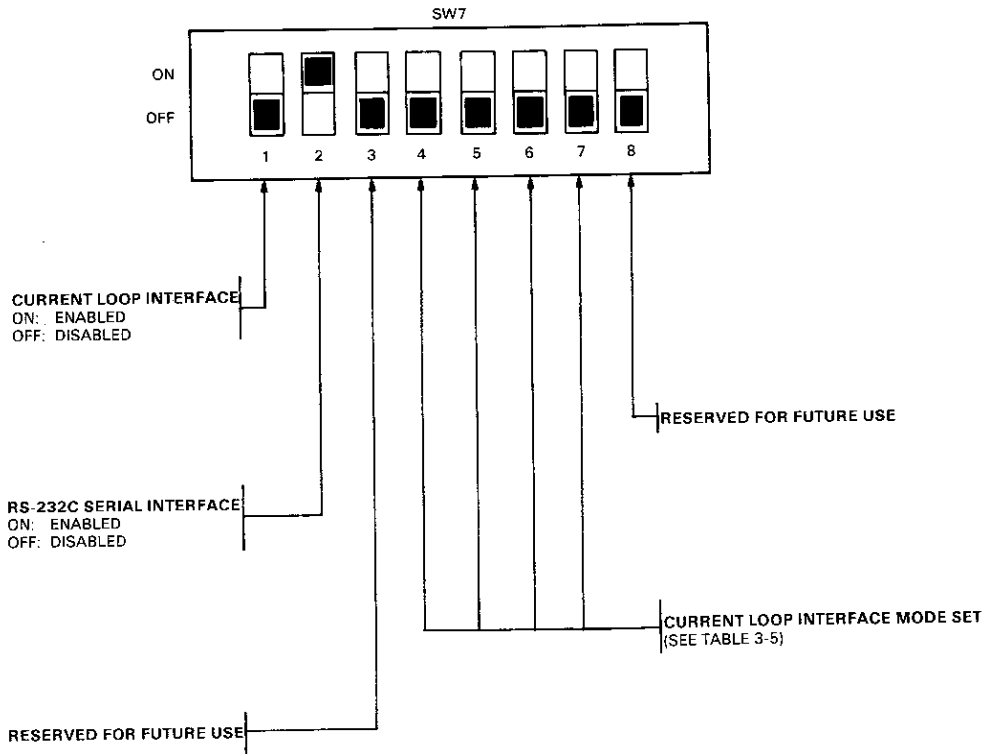


Figure 3-2 SW6 Settings

*Serial Interface*



**Figure 3-3 SW7 Settings**

**NOTE**

SW7-1 and SW7-2 may not be both ON or both OFF at the same time.

Table 3-1 gives the baud rates as set by switches 5-1, 5-2, and 5-3.

**Table 3-1 Baud Rate Switch Settings**

BAUD RATE (BITS PER SECOND)	SW5-1	SW5-2	SW5-3
1,200	Off	Off	Off
2,400	Off	Off	On
4,800	Off	On	Off
9,600	Off	On	On
19,200	On	Off	Off
150	On	Off	On
300	On	On	Off
600	On	On	On

Table 3-2 shows how switches 6-5 and 6-6 are used to set the communication protocol.

**NOTE**

The current loop interface performs the X-ON/  
X-OFF protocol only. Therefore, SW6-5 and  
SW6-6 must be off when the current loop inter-  
face is being used.

**Table 3-2 Communication Protocol Switch Settings**

REVERSE CHANNEL	ETX/ACK	X-ON/X-OFF REPETITION*	X-ON/X-OFF*	SW6-5	SW6-6
Enabled	Disabled	Disabled	Enabled	Off	Off
Enabled	Disabled	Enabled	Disabled	Off	On
Enabled	Enabled	Disabled	Disabled	On	Off

\*In the X-On/ X-Off Repetition State signals are transmitted repeatedly, and in the X-On/ X-Off state a signal is transmitted only once.

## Serial Interface

Switches 6-7 and 6-8 can be set to vary the capacity of the 2 K receive buffer. The settings for receive buffer capacity are given in Table 3-3.

**Table 3-3 Receive Buffer Capacity Switch Settings**

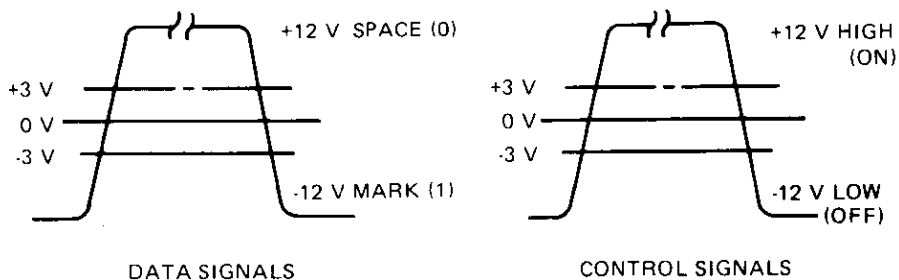
RECEIVE BUFFER CAPACITY	SW6-7	SW6-8
152 characters	Off	Off
288 characters	Off	On
560 characters	On	Off
1,936 characters	On	On

### RS-232C SIGNAL LEVELS

The Pinwriter P665 and P765 RS-232C interface can receive input signal levels of +25 volts (V). However, the output signal level is set at about +8 V, hereafter referred to as +12 V (nominal).

Data signals are -12 V for logic "1" (designated as Mark), and +12 V for logic "0" (designated as Space). All other signals are +12 V on, or high, and -12 V off, or low.

Figure 3-4 illustrates the signal levels for the RS-232C serial interface.



**Figure 3-4 Interface Signal Levels**

### RS-232C SERIAL INTERFACE LINES

Figure 3-5 shows signal and control lines across the Pinwriter RS-232C interface. Table 3-4 describes these lines.

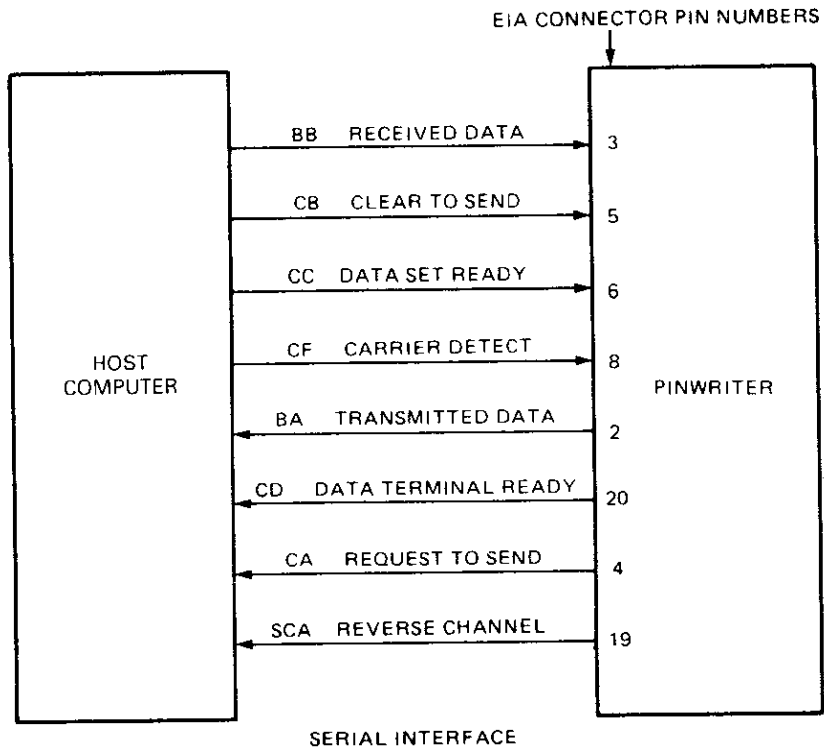


Figure 3-5 Serial Interface Lines Diagram

**Table 3-4 Interface Lines Description**

SIGNAL/CONTROL LINES	DIRECTION OF SIGNAL	DESCRIPTION
Carrier Detect (EIA Pin 8)	To printer	This line must be active (on) for the Pinwriter to operate. The line goes active (on) when the modem detects a carrier tone, indicating that the phone line is usable. When SW6-1 is on, this line goes active even if this signal line is not connected.
Data Terminal Ready (EIA Pin 20)	From printer	When SW5-7 is on, this line goes active (on) when the printer is in the following condition. Power is supplied to the Pinwriter, no errors are detected, and the Pinwriter is in the remote mode.  When SW5-7 is off, this line is the same functional signal as reverse channel.  When this mode is set, the polarity of the line can be reversed by setting SW6-4.
Data Set Ready (EIA Pin 6)	To printer	This line must be active (on) for the Pinwriter to operate. The line goes active (on) when the modem power is on and the modem is not in a test mode. When SW6-1 is on, this line goes active even if this signal line is not connected.
Request to Send (EIA Pin 4)	From printer	This line goes active (on) when the Data Terminal Ready is available and when the modem replies with Data Set Ready.
Clear to Send (EIA Pin 5)	To printer	This line must be active for the Pinwriter to operate. The input signal from the modem goes active (on) when the modem is ready for the Pinwriter to transmit. When SW6-1 is on, this line goes active even if the signal line is not connected.
Transmitted Data (EIA Pin 2)	From printer	This line transmits ASCII-coded digital data to a modem.  This line is held at Mark (logic "1") when no data is being transmitted.
Received Data (EIA Pin 3)	To printer	This line holds ASCII-coded digital data received by the Pinwriter.  This line must be held at Mark (logic "1") when no data is being received from the modem.

**Table 3-4 Interface Lines Description**

<b>SIGNAL/CONTROL LINES</b>	<b>DIRECTION OF SIGNAL</b>	<b>DESCRIPTION</b>
Reverse Channel (EIA Pin 19)	From printer	<p>This line goes from active (on) to inactive (off) when any one of the following occurs.</p> <ul style="list-style-type: none"> <li>● 2 kilobyte (K) receive buffer is almost full (152, 288, 560, or 1936 characters).</li> <li>● Printer is out of paper.</li> <li>● Printer's condition must be checked.</li> <li>● Printer's cover is open.</li> </ul> <p>Polarity of the line can be reversed by setting SW6-4.</p>

### **CURRENT LOOP INTERFACE**

In addition to an RS-232C interface, Pinwriter models P665 and P765 have a 20 mA current loop interface. The current loop interface is generally used in transmitting data over long distances. Current loop transmissions of 1000 feet or more are very common, especially in an industrial environment.

Some computers support current loop directly. In other cases, additional hardware is required. Contact your computer dealer for more information.

#### **Current Loop Interface Signal Levels**

The 20 mA current loop serial interface receives and transmits current signals up to 80 mA. Data signals are greater than 20 mA for logic "1" (designated as Mark), and less than 1 mA for logic "0" (designated as Space).

#### **Current Loop Interface Modes**

Switch 7-1 selects the current loop interface, and SW7-2 selects the RS-232C interface. Note that these two switches cannot be both ON or both OFF at the same time.

Switches 7-4 through 7-7, located at the rear of the printer, can be set to select the different operational modes of the current loop interface. Table 3-5 gives these switch settings.

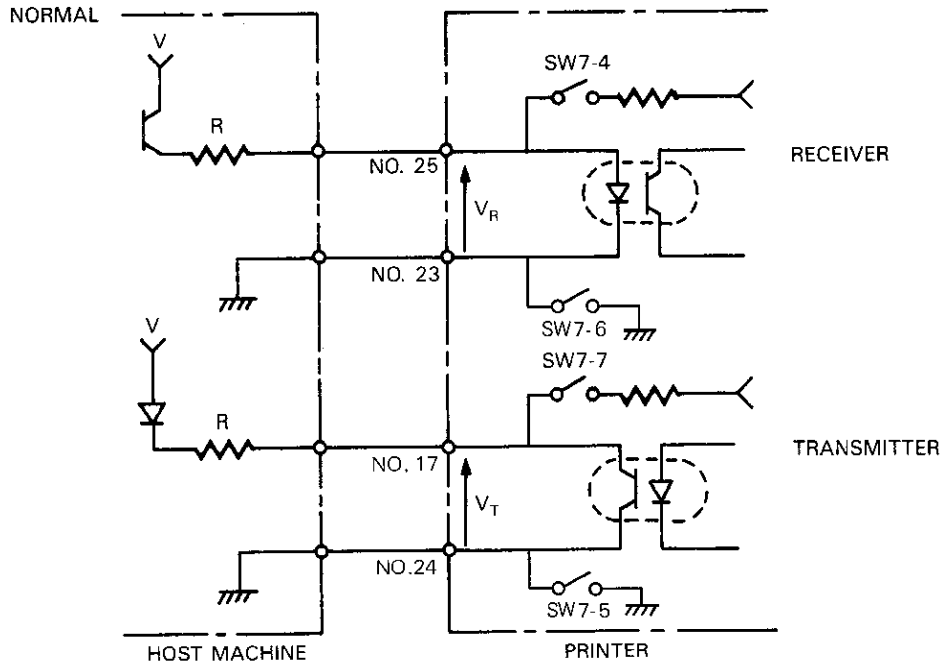
*Serial Interface*

**Table 3-5 Current Loop Interface Mode Switch Settings**

<b>MODE</b>	<b>SW7-4</b>	<b>SW7-5</b>	<b>SW7-6</b>	<b>SW7-7</b>
Normal operation.	Off	Off	Off	Off
The Pinwriter supplies power to the current loop interface when the host computer is not equipped to do so.	On	Off	Off	On
Executes loopback test when pins 17 and 23 are connected.	On	On	Off	Off
Executes loopback test when pins 24 and 25 are connected.	Off	Off	On	On

**Current Loop Interface Circuit**

Figure 3-6 is an interface circuit of a normal current loop interface. Figure 3-7 shows the interface circuit when the Pinwriter supplies the power for the current loop interface.

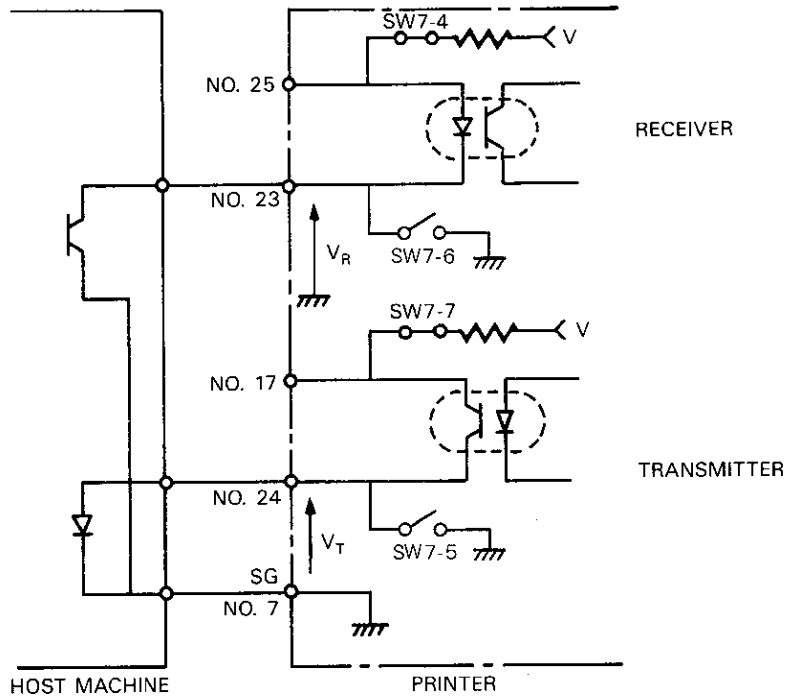


**Figure 3-6 Current Loop Interface Circuit A**

NOTE

The value of V should be less than 25 volts. The value of R should be selected so that the loop current is 20 to 30 mA ( $V_R = 1.5$  to 2 V,  $V_T = 1$  V).

*Serial Interface*



**Figure 3-7 Current Loop Interface Circuit B**

**NOTE**

The value of  $V_R$  should be less than 1 volt. The loop current becomes 20 to 35 mA. The value of  $V_T$  should be less than 2 volts. The loop current becomes 20 to 40 mA. The value of  $V$  is 5 volts.

### Current Loop Interface Lines

Table 3-6 describes the signal and control lines across the current loop interface.

**Table 3-6 Current Loop Interface Lines Description**

SIGNAL/CONTROL LINES	DIRECTION OF SIGNAL	DESCRIPTION
Received Data (EIA PIN 25) Received Data Return (EIA PIN 23)	To printer	This line holds ASCII-coded digital data received by the Pinwriter and must be held at Mark (logic "1") when no data is being received from the host.
Transmitted Data (EIA PIN 17) Transmitted Data Return (EIA PIN 24)	From printer	This line transmits ASCII-coded digital data to the host and is held at Mark (logic "1") when no data is being transmitted.

### SERIAL INTERFACE TIMING

The bit period and the character period are functions of the baud rate, as outlined in Table 3-7. The character period is made up of 10 bits, including one start bit, eight data and parity bits, and one stop bit.

**Table 3-7 Interface Timing Table**

BAUD RATE (BITS PER SECOND)	BIT PERIOD (ms)	CHARACTER PERIOD (ms)
150	6.66	66.6
300	3.33	33.3
600	1.67	16.7
1,200	0.83	8.3
2,400	0.42	4.2
4,800	0.21	2.1
9,600	0.10	1.0
19,200	0.05	0.5

*Serial Interface*

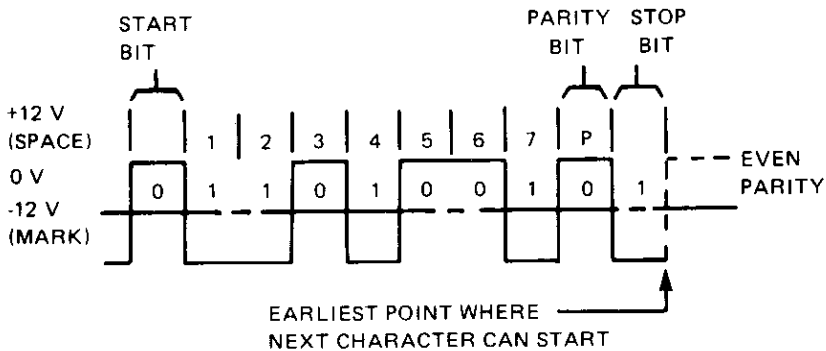
**SERIAL DATA FORMAT**

The serial, asynchronous ASCII data from the transmit or receive data circuit is shown in Figure 3-8. If the circuit does not contain data, it should be held in the Mark state.

Each character consists of a start bit, seven or eight bits, the appropriate parity bit (even, odd, or none), and one or more stop bits. The parity switches on the interface card control the parity bit assigned.

Data received on the serial input port is assembled into 8-bit characters. Once parity is checked, the character is stored in the 2 K receive buffer before being sent to the 8 K printer buffer for character printing or function execution.

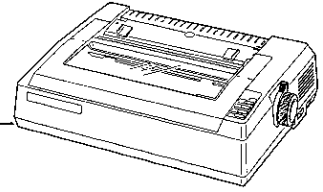
The data transfer rate ranges from 150 to 19,200 baud and is selected by switches on the interface board.



**Figure 3-8 ASCII Data Format**

## Section 4

# Programming



This section supplies you with the programming explanations and code descriptions necessary to program your Pinwriter P6/P7 series printer. Intended for users who write their own programs, this section assumes some knowledge of BASIC programming. Users who do not write programs but depend on preprogrammed applications packages can skip this section completely, or read it for insight into how the Pinwriter works.

### ASCII CODING

Table 4-1 lists the ASCII codes that can be used to control the Pinwriter. The bold 0 to F numbers on the top and left side are the hexadecimal (hex) numbers for the alphanumeric, special, and graphics characters inside the boxes. The numbers inside the boxes, underneath the characters, are decimal equivalents of the hex numbers for these characters.

#### Programming ASCII Characters

To print ASCII character "A" from the preceding table, use the ASCII *A*, its decimal equivalent, 65, or its hex equivalent, 41 (column 4, row 1). In BASIC you could use any of the following.

- LPRINT "A"
- LPRINT CHR\$(65)
- LPRINT CHR\$(&H41)

The preceding example was for an uppercase *A*. For a lowercase *a*, the ASCII equivalent is 97, not 65. The hexadecimal equivalent is 61, not 41. The following print a lowercase *a*.

- LPRINT "a"
- LPRINT CHR\$(97)
- LPRINT CHR\$(&H61)

Table 4-1 ASCII Table for Character Set 1

SECOND HEX DIGIT	FIRST HEX DIGIT															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL 00	16	SP 32	0 48	54	P 80	96	p 112	NUL 128	144	SP 160	0 176	192	P 208	224	p 240
1	01	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	! 161	1 177	A 193	Q 209	a 225	q 241
2	02	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	" 162	2 178	B 194	R 210	b 226	r 242
3	03	ETX 19	35	3 51	C 67	S 83	c 99	s 115	131	ETX 147	163	3 179	C 195	S 211	c 227	s 243
4	04	DC4 20	36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	164	4 180	D 196	T 212	d 228	t 244
5	05	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	% 165	5 181	E 197	U 213	e 229	u 245
6	06	ACK 22	& 38	6 54	F 70	V 86	f 102	v 118	134	ACK 150	& 166	6 182	F 198	V 214	f 230	v 246
7	07	BEL 23	' 39	7 55	G 71	W 87	g 103	w 119	135	BEL 151	' 167	7 183	G 199	W 215	g 231	w 247
8	08	BS 24	CAN 40	( 56	8 72	X 88	x 104	120	136	BS 152	CAN 168	( 184	8 200	X 216	x 232	120 248
9	09	HT 25	EM 41	) 57	9 73	Y 89	y 105	121	137	HT 153	EM 169	) 185	9 201	Y 217	y 233	121 249
A	10	LF 26	* 42	: 58	J 74	Z 90	j 106	z 122	138	LF 154	* 170	: 186	J 202	Z 218	j 234	z 250
B	11	VT 27	ESC 43	; 59	K 75	91	k 107	123	139	VT 155	ESC 171	; 187	K 203	219	k 235	251
C	12	FF 28	FS 44	< 60	L 76	92	l 108	124	140	FF 156	FS 172	< 188	L 204	220	l 236	252
D	13	CR 29	- 45	= 61	M 77	93	m 109	125	141	CR 157	- 173	= 189	M 205	221	m 237	253
E	14	SO 30	. 46	> 62	N 78	94	n 110	126	142	SO 158	. 174	> 190	N 206	222	n 238	254
F	15	SI 31	/ 47	? 63	O 79	- 95	o 111	DEL 127	143	SI 159	/ 175	? 191	O 207	- 223	o 239	255



### Programming Control Codes

Control codes are nonprintable ASCII codes that control various printer functions. Examples of this type of function are condensed and elongated printing. To send any control code to the Pinwriter using BASIC programming, use the hexadecimal or decimal value of the code you want. For example, `LPRINT CHR$(x)`, where `x` is the decimal or hex equivalent of the control code you want, sends the code to the printer. Thus,

```
LPRINT CHR$(13)
```

sends a carriage return code to the printer. `CHR$(13)` is the ASCII decimal of the carriage return control code.

Control codes are always sent using their decimal or hexadecimal equivalents. For example, here are correct and incorrect ways to send a vertical tab control code.

- Incorrect: `LPRINT "VT"`
- Correct (decimal form): `LPRINT CHR$(11)`
- Correct (hex form): `LPRINT CHR$(&H0B)`

### Programming Escape Sequences

Escape sequences are combinations of the ESC control code and control characters. They are used to program various functions such as tabs, forms length, or margins. An escape sequence always consists of the ESC control code followed by one or more characters.

For example, to program ESC A, you have three choices.

- ASCII character form: `LPRINT CHR$(27); "A"`
- Decimal form: `LPRINT CHR$(27);CHR$(65)`
- Hex form: `LPRINT CHR$(&H1B);CHR$(&H41)`

In this guide, `ESC A(n)` indicates that `(n)` is a numeric (decimal or hex) value. `ESC An` indicates that `n` is an ASCII (character) value.

## Programming

### Programming Form Separator Sequences

Form separator (FS) sequences function much like escape sequences. They consist of the FS control code followed by one or more control characters. Note that the decimal equivalent of the FS control code is 28, while the decimal equivalent of the ESC control code is 27.

For example, to program FS.R, you could use any of the following.

- ASCII character form: `LPRINT CHR$(28);"R"`
- Decimal form: `LPRINT CHR$(28);CHR$(82)`
- Hex form: `LPRINT CHR$(&H1C);CHR$(&H52)`

### CONTROL CODES AND SEQUENCES

The Pinwriter P6/P7 responds to the control codes, escape sequences, and FS sequences presented in this section.

Table 4-2 is a quick reference to the control codes and sequences, their hex and decimal equivalents, and their functions. The codes and sequences are listed in numeric and alphabetic order.

**Table 4-2 Quick Reference to Control Codes and Sequences**

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
Backspace (BS)	08	08	Moves the print head one space to the left (backspace).
Cancel (CAN)	18	24	Cancels current line of data. Cancels elongated printing mode.
Carriage Return (CR)	0D	13	Moves the print head to the left margin.
Delete (DEL)	7F	127	Deletes the preceding character.
Device Control 1 (DC1)	11	17	Places the printer in the active state. SW2-7 must be off.
Device Control 2 (DC2)	12	18	Cancels condensed print, returning the printer to the previously set print mode.

Table 4-2 Quick Reference to Control Codes and Sequences (cont'd)

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
Device Control 3 (DC3)	13	19	Places the printer in the inactive state. The lights on the operator control panel are not affected. The printer will ignore all codes until it receives a Select Printer code (DC1). SW2-7 must be off.
Device Control 4 (DC4)	14	20	Cancels elongated printing mode.
Form Feed (FF)	0C	12	Advances the paper one page length. With sheet feeder installed, ejects a sheet already in the printer to the stacker and inserts the next sheet from the hopper.
Horizontal Tab (HT)	09	09	Advances the paper to the next preset horizontal tab.
Line Feed (LF)	0A	10	Advances the paper one line.
Shift In (SI)	0F	15	Selects condensed printing mode (17 cpi or 20 cpi).
Shift Out (SO)	0E	14	Selects one-line elongated printing mode.
Vertical Tab (VT)	0B	11	Advances the paper to the next preset vertical tab.
ESC 0	30	48	Sets line spacing at 8 lines per inch.
ESC 2	32	50	Sets line spacing at 6 lines per inch.
ESC 3(n)	33(n)	51(n)	Sets line spacing at n/180-inch where n = 0 to 255.
ESC 4	34	52	Selects italic printing.
ESC 5	35	53	Cancels italic printing.

**Table 4-2 Quick Reference to Control Codes and Sequences (cont'd)**

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
ESC A(n)	41(n)	65(n)	Sets the line spacing at n/60-inch where n = 0 to 127.
ESC B(n1)(n2) (n...)NUL	42(n1)(n2) (n...)00	66(n1)(n2) (n...)0	Sets vertical tabs where n = 1 to 255. Up to 16 vertical tabs may be set. Tabs must be set in ascending order.
ESC C(n)	43(n)	67(n)	Sets page length at n lines per where n = 1 to 127.
ESC C NUL(n)	43 00(n)	67 0(n)	Sets page length at n inches per page where n = 1 to 22.
ESC D(n1)(n2) (n...)NUL	44(n1)(n2) (n...)00	68(n1)(n2) (n...)0	Sets horizontal tabs where n is the column. The maximum value of n depends upon the pitch. Tabs must be set in ascending order. Up to 32 horizontal tabs may be set.
ESC E	45	69	Selects enhanced printing.
ESC EM(R)	25(52)	82	Ejects a sheet from the sheet feeder.
ESC F	46	70	Cancels enhanced printing.
ESC G	47	71	Selects double-strike printing.
ESC H	48	72	Cancels double-strike printing.
ESC J(n)	4A(n)	74(n)	Advances the paper n/180-inch where n = 0 to 255. Line spacing is not changed.
ESC K(n1)(n2)	4B(n1)(n2)	75(n1)(n2)	Sets 8-bit single-density dot mode (60 dots per inch).
ESC L(n1)(n2)	4C(n1)(n2)	76(n1)(n2)	Sets 8-bit double-density dot mode (120 dots per inch).
ESC M	4D	77	Selects 12 cpi printing mode.

Table 4-2 Quick Reference to Control Codes and Sequences (cont'd)

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
ESC N(n)	4E(n)	78(n)	Selects skip-over perforation function where n = 1 to 127 lines.
ESC O	4F	79	Cancels skip-over perforation function.
ESC P	50	80	Selects 10 cpi printing mode.
ESC Q(n)	51(n)	81(n)	Sets right margin where n = 1 to 255 character columns. Maximum value of n depends upon the pitch.
ESC R(n)	52(00-0B)	82(00-11)	Selects language character sets. n=0 United States n=1 France n=2 Germany n=3 England n=4 Denmark I n=5 Sweden n=6 Italy n=7 Spain n=8 Japan n=9 Norway n=10 Denmark II n=11 Netherlands
ESC S(n)	53(n)	83(n)	Selects superscripts or subscripts. n=0 selects superscripts. n=1 selects subscripts.
ESC SI	0F	15	Selects condensed printing mode. Same as SI.
ESC SO	0E	14	Selects one-line elongated printing mode. Same as SO.
ESC SP(n)	20(n)	32(n)	Sets the space between characters at n dots where n = 0 to 127.
ESC T	54	84	Cancels superscripts and subscripts.

**Table 4-2 Quick Reference to Control Codes and Sequences (cont'd)**

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
ESC U(n)	55(n)	85(n)	Selects unidirectional printing or bidirectional printing in text or graphics. n=0 selects bidirectional printing. n=1 selects unidirectional printing.
ESC V(n) (data)	56(n)	86(n)	Repeats data n times where n = 1 to 255. Defines beginning of data to be repeated. Must be immediately followed by data. ESC V NUL indicates end of data to be repeated. Amount of data cannot exceed size of input buffer.
ESC V NUL	56 00	86 0	
ESC W(n)	57(n)	87(n)	Selects or cancels elongated printing. n=1 selects elongated printing. n=0 cancels elongated printing.
ESC Y(n1)(n2)	59(n1)(n2)	89(n1)(n2)	Selects high-speed double-density dot graphics (120 dots per inch).
ESC Z(n1)(n2)	5A(n1)(n2)	90(n1)(n2)	Selects quadruple-density dot graphics (240 dots per inch).
ESC a(n)	61(n)	97(n)	Selects justification. n=0 selects left justification. n=1 selects center justification. n=2 selects right justification. n=3 selects full justification.
ESC e 0(n)	65 30(n)	101 48(n)	Sets horizontal tabs at every column n, based upon the current pitch. The value of n ranges from 1 to 255.
ESC e 1(n)	65 31(n)	101 49(n)	Sets vertical tabs at every line n, based upon the current line spacing. The value of n ranges from 1 to 255.

Table 4-2 Quick Reference to Control Codes and Sequences (cont'd)

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
ESC f 0(n)	66 30(n)	102 48(n)	Moves print head n columns after printing data in buffer. The value of n ranges from 1 to 255.
ESC f 1(n)	66 31(n)	102 49(n)	Advances the paper n lines after printing data in buffer. The value of n ranges from 1 to 255.
ESC g	67	103	Selects 15 cpi printing.
ESC j(n)	6A(n)	106(n)	Reverses the paper n/180-inch where n=0 to 255. Line spacing is not changed.
ESC b(c)(n1)(n2) (n...)NUL	62(c)(n1) (n2)(n...)00	98(c)(n1) (n2)(n...)00	Sets vertical tabs in tab channels.
ESC l(n)	6C(n)	108(n)	Sets left margin where n = 0 to 255 character columns.
ESC p(n)	70(n)	112(n)	Selects or cancels proportional spacing. n=1 selects proportional spacing. n=0 cancels proportional spacing.
ESC r(n) *See note.	72(00-07)	114(00-07)	Selects the print color where n = 0 to 7. n=0 black n=1 magenta n=2 cyan n=3 violet n=4 yellow n=5 orange n=6 green n=7 brown
ESC s(n)	73(n)	115(n)	Selects half-speed (quiet mode) or full-speed printing. n=1 selects half-speed printing. n=0 selects full-speed printing.

\*Used with models configured for color printing.

**Table 4-2 Quick Reference to Control Codes and Sequences (cont'd)**

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
ESC x(n)	78(n)	120(n)	Selects the draft or letter-quality mode. n=0 selects draft mode. n=1 selects letter-quality mode.
ESC *(m) (n1)(n2)	2A (m) (n1)(n2)	42 (m) (n1)(n2)	Prints selected-density dot graphics. See Table 4-3 for value of m.
ESC-(n)	2D(n)	45(n)	Selects or cancels continuous underlining. n=1 selects underlining. n=0 cancels underlining.
ESC/(n)	2F(n)	47(n)	Selects a vertical tab channel where n = 0 to 7.
ESC #	23	35	Cancels control of the eighth data bit.
ESC \$(n1)(n2)	24(n1)(n2)	36(n1)(n2)	Moves the print head to an absolute horizontal position. The position, in inches, is determined by the formula $(n1+n2 \times 256) / 60$ .
ESC \ (n1)(n2)	5C(n1)(n2)	92(n1)(n2)	Moves the print head a specified distance in either direction. The distance, in inches, is determined by the following formulas. Draft $(n1+n2 \times 256) / 120$ LQ $(n1+n2 \times 256) / 180$ PS $(n1+n2 \times 256) / 180$
ESC !(n)	21(n)	33(n)	Selects any print style or combination according to the value of n (n = 0 to 255). See Table 4-4 to calculate the value of n.
ESC %(n)	25(n)	37(n)	Selects either the internal or user-defined character set. n=0 selects internal set. n=1 selects user-defined set.

Table 4-2 Quick Reference to Control Codes and Sequences (cont'd)

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
ESC : (NUL) (NUL)(NUL)	3A(00) (00)(00)	58 (0)(0)(0)	Copies the currently active character set to the user-defined character set.
ESC & NUL (n1)(n2)	26 00 (n1)(n2)	38 0 (n1)(n2)	Loads user-defined characters into the user-defined character set.
ESC ?(s)(m)	3F(s)(m)	63(s)(m)	Assigns any graphics mode to any one of the four other graphics commands (ESC K, ESC L, ESC Y, ESC Z).
ESC <	3C	60	Returns the print head to the left side of the printer (one-line unidirectional printing).
ESC =	3D	61	Sets the eighth data bit to 0.
ESC >	3E	62	Sets the eighth data bit to 1.
ESC @	40	64	Initializes the printer to default values except for control-panel-selectable features, subscript and superscript, user-defined buffer, character sets, and unidirectional printing in graphics mode.
FS 3(n)	33(n)	51(n)	Sets line spacing at n/360-inch where n = 0 to 255.
FS E(n)	45(n)	69(n)	Selects horizontal enlargement. n=0 cancels enlargement. n=1 selects double horizontal enlargement. n=2 selects triple horizontal enlargement.
FS F	46	70	Selects forward line feed.
FS I(n)	49(n)	73(n)	Selects italic or IBM character set. n=0 selects italic set. n=1 selects IBM set.

**Table 4-2 Quick Reference to Control Codes and Sequences (cont'd)**

CONTROL CODE OR SEQUENCE	CONTROL CHARACTER EQUIVALENTS		FUNCTION
	HEX	DECIMAL	
FS R	52	82	Selects reverse line feed. This command is ignored when sheet feeder is installed.
FS S(n)	53(n)	83(n)	Selects 12 cpi printing. n=0 selects draft 12. n=1 selects high-speed 12.
FS V(n)	56(n)	86(n)	Selects vertical enlargement. n=0 cancels enlargement. n=1 selects double vertical enlargement.
FS Z(n1)(n2)	5A(n1)(n2)	90(n1)(n2)	Selects high-density dot graphics (360 dpi).
FS @	40	64	Initializes the printer to default values except for user-defined buffer.

Table 4-3 lists the graphics modes and corresponding value of  $m$  used with ESC \*(m)(n1)(n2).

**Table 4-3 Graphics Modes**

MODE	NUMBER OF PINS	$m$	DOTS PER INCH
Single density	8	0	60
Double density	8	1	120
High-speed, double density	8	2	120
Quadruple density	8	3	240
CRT screen	8	4	80
Other CRT screens	8	6	90
Single density	24	32	60
Double density	24	33	120
Other CRT screens	24	38	90
Triple density	24	39	180
High density	24	40	360

*Programming*

Table 4-4 shows the values of the different print styles for ESC !(n). All print styles can be used in either the draft or letter-quality mode with the following exception: proportionally spaced characters cannot be printed in the draft mode.

**Table 4-4 Print Style Values**

PRINT STYLE	ASSIGNED VALUE	BIT
10 cpi	0	1
12 cpi	1	1
Proportional	2	2
Condensed	4	3
Enhanced	8	4
Double-strike	16	5
Elongated	32	6
Italic	64	7
Underlined	128	8

To calculate the value of n, add the values of the features you want. For example, if you want to select 10 cpi italic enhanced print, you would calculate the value of n like this.

$$\begin{array}{r} 10 \text{ cpi} \quad 0 \\ \text{Italic} \quad 64 \\ \text{Enhanced} \quad 8 \\ \hline n = \quad 72 \end{array}$$

## DESCRIPTION OF ESCAPE AND FS SEQUENCES

An explanation of each escape and FS sequence is given below. Sample BASIC programs are included to demonstrate how the sequences function.

### 8 lpi

### ESC 0

ESC 0 sets the line spacing at 8 lines per inch.

```
10 '---- Control Code ESC 0 ----
20 'Sets line spacing at 8 lines per inch.
30 LPRINT "This is the default line spacing"
40 LPRINT "This is the default line spacing"
50 'Sets 8 lines per inch
60 LPRINT CHR$(27);"0"
70 LPRINT "This is at 8 lines per inch"
80 LPRINT "This is at 8 lines per inch"
90 'Resets to default settings
100 LPRINT CHR$(27);"@"
```

```
This is the default line spacing
This is the default line spacing
```

```
This is at 8 lines per inch
This is at 8 lines per inch
```

*Programming*

**6 lpi**

**ESC 2**

ESC 2 sets the line spacing at 6 lines per inch.

```
10 '----Control Code ESC 2 ----
20 'Sets line spacing at 6 lines per inch.
30 'Sets line spacing at 8 lpi.
40 LPRINT CHR$(27);"0"
50 FOR X = 1 TO 8
60 LPRINT "This is 8 lines per inch.
65 NEXT X
70 'Sets line spacing at 6 lines per inch.
75 LPRINT CHR$(27);"2"
80 FOR X = 1 TO 6
90 LPRINT "This is 6 lines per inch.
95 NEXT X
```

```
This is 8 lines per inch.
This is 8 lines per inch.
This is 8 lines per inch.
This is 8 lines per inch.
This is 8 lines per inch.
This is 8 lines per inch.
This is 8 lines per inch.
This is 8 lines per inch.
```

```
This is 6 lines per inch.
This is 6 lines per inch.
This is 6 lines per inch.
This is 6 lines per inch.
This is 6 lines per inch.
This is 6 lines per inch.
```



*Programming*

**n/180 lpi**

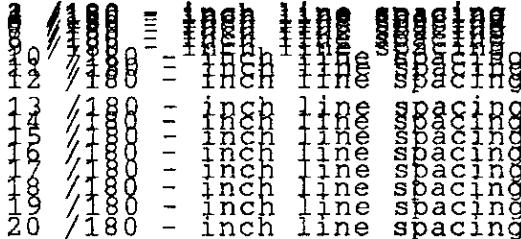
**ESC 3(n)**

ESC 3(n) sets the line spacing at n/180-inch. For example, if n = 5, each line is printed 5/180-inch, or 5 vertical dots below the previous line. The value of n can range from 0 to 255.

```

10 '----Control Code ESC 3 (n) ----
20 'Sets line spacing at n/180 -inch where n = 0 to 255.
30 'Sets n =1 to 20.
40 FOR I = 1 TO 20
50 LPRINT CHR$(27);"3";CHR$(I);
60 LPRINT I;"/180 - inch line spacing"
70 NEXT I

```





---

*Programming*

**Page length  
(lines)**

**ESC C(n)**

ESC C(n) sets the page length at n lines per page. The value of n can range from 1 to 127. Once set, the page length remains unchanged even if the line spacing is changed.

```
10 '-----CONTROL CODE ESC C (n)-----
20 'SETS PAGE LENGTH AT n LINES
30 LPRINT CHR$(27) "C" CHR$(12); "TOP"
40 'SETS PAGE LENGTH AT 12 LINES
50 LPRINT CHR$(12); "BOTTOM"
60 LPRINT CHR$(27) "C" CHR$(24); "TOP"
70 'SETS PAGE LENGTH AT 24 LINES
80 LPRINT CHR$(12); "BOTTOM"
90 LPRINT CHR$(27) "@" 'RESETS PRINTER
100 END
```

TOP

BOTTOM  
TOP

BOTTOM

**Page length  
(inches)**

**ESC C NUL(n)**

ESC C NUL(n) sets the page length at n inches per page. The value of n can range from 1 to 22. Once set, the page length remains unchanged even if the line spacing is changed.

```
10 '----CONTROL CODE ESC C NUL (n)----  
20 'SETS PAGE LENGTH AT n INCHES  
30 LPRINT CHR$(27) "C" CHR$(0) CHR$(3);"TOP"  
40 'SETS PAGE LENGTH AT 3INCHES  
50 LPRINT CHR$(12);"BOTTOM"  
60 LPRINT CHR$(27) "C" CHR$(0) CHR$(5);"TOP"  
70 'SETS PAGE AT 6 INCHES  
80 LPRINT CHR$(12);"BOTTOM"  
90 LPRINT CHR$(27) "@";'RESETS PRINTER  
100 END
```

TOP

BOTTOM  
TOP

BOTTOM

## Programming

### Forward LF      FS F

FS F selects forward line feed.

### Reverse LF      FS R

FS R selects reverse line feed. This command is ignored when the cut sheet feeder is installed.

```
10 '----CONTROL CODE FS R & FS F----
20 'FS R SELECTS REVERSE LINE FEED
30 'FS F SELECTS FORWARD LINE FEED
40 LPRINT "THIS IS THE TOP LINE
50 FOR I=1 TO 8
60 LPRINT CHR$(10);
70 NEXT
80 LPRINT "THIS IS 8 LINE FEEDS FROM TOP"
90 LPRINT CHR$(28)"R";'SELECTS REVERSE LF
100 LPRINT CHR$(10);CHR$(10)
110 LPRINT "THIS IS 2 REVERSE LF"
120 LPRINT CHR$(10)
130 LPRINT "THIS IS 2 MORE REVERSE LF FROM LAST LINE";
140 LPRINT CHR$(28)"F" 'SELECTS FORWARD LF
150 LPRINT "THIS IS 1 FORWARD LF FROM LINE ABOVE"
160 END
```

THIS IS THE TOP LINE

THIS IS 2 MORE REVERSE LF FROM LAST LINE  
THIS IS 1 FORWARD LF FROM LINE ABOVE

THIS IS 2 REVERSE LF

THIS IS 8 LINE FEEDS FROM TOP

**n/180-inch paper advance    ESC J(n)**

ESC J(n) advances the paper n/180-inch. The Pinwriter prints the data preceding the ESC J(n) sequence, advances the paper n/180-inch, and then continues to print. It does not execute a carriage return. The value of n can range from 0 to 255.

ESC J(n) does not set a value for subsequent line feeds, nor does this sequence cancel one-line elongated print set by SO or ESC SO.

```
10 '----CONTROL CODE ESC J (n)----
20 'ADVANCES THE PAPER n/180-INCH
25 ' n = 0 TO 255, ONE TIME ONLY
30 LPRINT "THIS IS NORMAL LINE SPACING"
40 LPRINT "THIS IS ONE TIME SPECIAL LINE FEED";
50 LPRINT CHR$(27)"J"CHR$(5);
60 LPRINT "OF 5/180 in. "
70 LPRINT "NOW WE ARE BACK TO NORMAL LINE SPACING"
80 END
```

```
THIS IS NORMAL LINE SPACING
THIS IS ONE TIME SPECIAL LINE FEEDOF 5/180 in.
NOW WE ARE BACK TO NORMAL LINE SPACING
```

*Programming*

**n/180-inch paper  
reverse**

**ESC j(n)**

ESC j(n) reverses the paper n/180-inch. The Pinwriter prints the data preceding the ESC j(n) sequence, reverses the paper n/180-inch, and then continues to print. It does not execute a carriage return. The value of n can range from 0 to 255.

ESC j(n) does not set a value for subsequent line feeds, nor does this sequence cancel one-line elongated print set by SO or ESC SO. This command is ignored when the cut sheet feeder is installed.

```
10 '-----CONTROL CODE ESC j n -----  
20 ' REVERSE LINEFEED IN n/180" INCREMENTS  
30 LPRINT "LINE 1 IS PRINTED FIRST"  
40 LPRINT CHR$(27);"j";CHR$(110)  
45 LPRINT "LINE 2 IS PRINTED UP HERE"  
50 LPRINT:LPRINT  
60 LPRINT "LINE 3 IS PRINTED LAST"  
70 END
```

LINE 2 IS PRINTED UP HERE

LINE 1 IS PRINTED FIRST

LINE 3 IS PRINTED LAST

**Skip-over  
perforation set**

**ESC N(n)**

ESC N(n) sets a value of n lines to be skipped over; that is, it causes the printer to skip over the perforations in continuous form paper. The value of n can range from 1 to 127, but must be less than the page length.

This command is ignored when the sheet feeder is installed.

**Skip-over  
perforation  
cancelled****ESC O**

ESC O cancels the skip-over perforation function; that is, printing is not interrupted when the print head encounters perforations.

```
10 '----CONTROL CODE ESC N (n) & O----
20 'ESC N (n) SELECTS SKIP OVER PERFORATION OF n LINES
30 'ESC O CANCELS SKIP OVER PERFORATION
35 'SETS FORMS LENGTH AT 12 LINES
40 LPRINT CHR$(27) "C"; CHR$(12);
50 LPRINT CHR$(27) "N"; CHR$(3); 'SETS SKIP AT 3 LINES
60 GOSUB 110
70 LPRINT CHR$(27) "O"; 'CANCELS SKIP
80 GOSUB 110
90 LPRINT CHR$(27) "@"
100 END
110 FOR X = 1 TO 12
120 LPRINT "THIS IS A TEST OF SKIP OVER & CANCEL"
130 NEXT X
140 RETURN
```

```
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
```

```
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
THIS IS A TEST OF SKIP OVER & CANCEL
```

---

*Programming*

THIS IS A TEST OF SKIP OVER & CANCEL  
THIS IS A TEST OF SKIP OVER & CANCEL  
THIS IS A TEST OF SKIP OVER & CANCEL  
THIS IS A TEST OF SKIP OVER & CANCEL  
THIS IS A TEST OF SKIP OVER & CANCEL  
THIS IS A TEST OF SKIP OVER & CANCEL  
THIS IS A TEST OF SKIP OVER & CANCEL

**Vertical tabs**      **ESC B(n1)(n2)(n...)NUL**

ESC B(n1)(n2)(n...)NUL sets vertical tabs on lines n1, n2, and so on. The values of n1, n2, etc. can range from 1 to 255 and must be entered in ascending order. Up to 16 vertical tabs may be set.

Vertical tabs are stored as an absolute position on the page, so they do not move if the line spacing is later changed.

When ESC B NUL is entered, all vertical tab settings (including printer default settings) are cleared, and subsequent vertical tab commands will not advance the paper.

```

10 '----CONTROL CODE ESC B N1 N... NUL----
20 'SETS UP TO 16 VERTICAL TABS IN ASCENDING ORDER
30 'N = 1 TO 254
35 LPRINT CHR$(27)"@";"THIS IS TOP LINE";
40 LPRINT CHR$(27)"B" CHR$(1) CHR$(5) CHR$(10) CHR$(0);
50 FOR I = 1 TO 3
60 LPRINT CHR$(11);"VERTICAL TAB SET";
65 LPRINT
70 NEXT
80 LPRINT CHR$(27)"@";
90 END

```

```

THIS IS TOP LINE
VERTICAL TAB SET

```

```

VERTICAL TAB SET

```

```

VERTICAL TAB SET

```

*Programming*

**Repeated  
vertical tabs**

**ESC e 1(n)**

ESC e 1(n) sets vertical tabs at every line n, based upon the current line spacing. The value of n ranges from 1 to 255.

```
10 '----- CONTROL CODE ESC e 1 (n) -----
20 'SETS VERTICAL TABS AT EVERY nth LINE
30 '
40 'SET VERTICAL TABS AT EACH 2ND LINE
50 LPRINT CHR$(27);"e";CHR$(1);CHR$(2)
52 GOSUB 94
54 LPRINT:LPRINT:LPRINT
60 'NOW WE'LL SET TABS AT EACH 5TH LINE
65 LPRINT CHR$(27);"e";CHR$(1);CHR$(5)
70 GOSUB 94
93 END
94 LPRINT"LINE 1";CHR$(11)
95 LPRINT"LINE 2";CHR$(11)
96 LPRINT"LINE 3"
97 LPRINT CHR$(28);"@"
98 RETURN
```

LINE 1

LINE 2

LINE 3

LINE 1

LINE 2

LINE 3

**Vertical tabs in  
tab channels set****ESC b(c)(n1)(n2)(n...)NUL**

ESC b(c)(n1)(n2)(n...)NUL sets vertical tabs on lines n1, n2, etc. of vertical tab channel c. The values of n1, n2, etc. can range from 1 to 254 and must be entered in ascending order. Up to 16 vertical tabs can be set in each channel. The number of channels ranges from 0 to 7.

Vertical tab positions are stored as absolute positions on the page, so they do not move if the line spacing is changed.

**Tab channels****ESC /(n)**

ESC /(n) selects one of the eight vertical tab channels. Subsequent vertical tab codes will advance the paper to the tab positions set in that channel. The number of tab channels ranges from 0 to 7. The power-on default channel is 0.

```

10 '----CONTROL CODE ESC b (c) n1 n2...NUL ----
20 'SETS VERTICAL TABS IN TAB CHANNELS
30 'VERTICAL TAB CHANNEL = C
40 '  C = 0 TO 7
50 'N(x) IS THE TAB SETTING WITHIN THE CHANNEL
60 ' X = 1 TO 254 IN ASCENDING ORDER
70 'SETS PAGE LENGTH
80 LPRINT CHR$(27) "C" CHR$(24);
90 'SETS VERTICAL TABS CHANNEL 0
100 LPRINT CHR$(27) "b" CHR$(0);
110 LPRINT CHR$(3) CHR$(6) CHR$(9) CHR$(0);
120 'SETS VERTICAL TABS CHANNEL 1
130 LPRINT CHR$(27) "b" CHR$(1);
140 LPRINT CHR$(12) CHR$(15) CHR$(18) CHR$(0);
150 'SETS VERTICAL TABS CHANNEL 2
160 LPRINT CHR$(27) "b" CHR$(2);
170 LPRINT CHR$(2) CHR$(4) CHR$(9) CHR$(0);
180 'SETS VERTICAL TABS CHANNEL 3
190 LPRINT CHR$(27) "b" CHR$(3);
200 LPRINT CHR$(12) CHR$(14) CHR$(18) CHR$(0);
210 'SELECTS CHANNEL 0
220 LPRINT CHR$(27) "/" CHR$(0);
230 LPRINT "CHANNEL 0"
240 GOSUB 480;
250 'SELECTS CHANNEL 1
260 LPRINT CHR$(27) "/" CHR$(1);
265 LPRINT "CHANNEL 1"

```

*Programming*

```
270 GOSUB 480;
280 LPRINT CHR$(13);
290 'SETS REVERSE LINE FEED
300 LPRINT CHR$(28) "R";
310 FOR X=1 TO 20
320 LPRINT CHR$(10);
330 NEXT X
340 LPRINT CHR$(28) "F";
350 'SETS HORIZONTAL TAB
360 LPRINT CHR$(27) "D" CHR$(25) CHR$(0);
370 LPRINT CHR$(137);
375 LPRINT CHR$(27) "1" CHR$(25);
380 'SELECTS CHANNEL 2
390 LPRINT CHR$(27) "/" CHR$(2);
400 LPRINT "CHANNEL 2"
410 GOSUB 480;
420 'SELECTS CHANNEL 3
430 LPRINT CHR$(27) "/" CHR$(3);
440 LPRINT "CHANNEL 3"
450 GOSUB 480;
460 LPRINT CHR$(27) "@";
470 END
480 FOR I=1 TO 3
485 LPRINT CHR$(11);
490 LPRINT "VT POSITION #";I
500 NEXT
510 RETURN
```

CHANNEL 0

CHANNEL 2

VT POSITION # 1

VT POSITION # 1

VT POSITION # 2

VT POSITION # 2

VT POSITION # 3  
CHANNEL 1

VT POSITION # 3  
CHANNEL 3

VT POSITION # 1

VT POSITION # 1

VT POSITION # 2

VT POSITION # 2

VT POSITION # 3

VT POSITION # 3

Vertical enlargement      FS V(n)  
 FS V(n) selects vertical enlargement.  
 n=0 cancels enlargement.  
 n=1 selects double vertical enlargement.

```

10 '----CONTROL CODE FS E (n) & FS V (n)----
20 'FS E  SELECTS HORIZONTAL ENLARGEMENT
30 ' n = 0 enlargement OFF
40 ' n = 1 DOUBLE ENLARGEMENT
50 ' n = 2 TRIPLE ENLARGEMENT
60 'FS V  SELECTS VERTICAL ENLARGEMENT
70 ' n = 0 enlargement OFF
80 ' n = 1 DOUBLE ENLARGEMENT
90 LPRINT "THIS IS STANDARD 10 CPI PRINT"
100 LPRINT CHR$(28)"E";CHR$(1);
110 LPRINT "THIS IS DOUBLE HORIZONTAL "
120 LPRINT CHR$(28)"E";CHR$(2);
130 LPRINT "TRIPLE HORIZONTAL"
140 LPRINT CHR$(28)"E"CHR$(0);
150 LPRINT "WE ARE BACK TO STANDARD 10 CPI"
160 LPRINT CHR$(28)"V"CHR$(1);
170 LPRINT "THIS IS DOUBLE VERTICAL ENLARGEMENT"
180 LPRINT CHR$(28)"E";CHR$(1);
190 LPRINT "THIS IS 2 X VERT. & HORZ."
200 LPRINT CHR$(28)"E";CHR$(2);
210 LPRINT "2 X VERT.& 3 X HORZ."
220 LPRINT CHR$(28)"E";CHR$(0);
230 LPRINT CHR$(28)"V";CHR$(0);
240 LPRINT "BACK TO STANDARD PRINT"

```

```

THIS IS STANDARD 10 CPI PRINT
THIS IS DOUBLE HORIZONTAL
TRIPLE HORIZONTAL
WE ARE BACK TO STANDARD 10 CPI
THIS IS DOUBLE VERTICAL ENLARGEMENT
THIS IS 2 X VERT. & HORZ.
2 X VERT.& 3 X HORZ.
BACK TO STANDARD PRINT

```

*Programming*

**Right margin**

**ESC Q(n)**

ESC Q(n) sets the right margin at n character columns of the current character width. The value of n can range from 1 to 255, but if the right margin is set beyond where the printer can actually print, the command will be ignored. This command must be sent at the beginning of a line.

```
10 '---- CONTROL CODE ESC Q (n) ----
20 'SETS RIGHT MARGIN AT n
30 ' (n) = 1 TO 255
40 LPRINT "PICA WIDTH PRINTING"
50 GOSUB 140
60 LPRINT CHR$(27)"!";CHR$(1);'SETS 12 CPI.
70 LPRINT "ELITE WIDTH PRINTING"
80 GOSUB 140
90 LPRINT CHR$(27)"W";CHR$(1);'SETS EXPANDED PRINT
100 LPRINT "EXPANDED WIDTH PRINTING"
110 GOSUB 140
120 LPRINT CHR$(27)"!";CHR$(0);'SETS 10 CPI.
130 END
140 LPRINT CHR$(27)"Q";CHR$(25);
150 FOR I=1 TO 70
160 LPRINT "#";
170 NEXT
180 LPRINT CHR$(10);
190 LPRINT CHR$(10);
200 LPRINT CHR$(27)"@";
210 RETURN
```

PICA WIDTH PRINTING  
#####  
#####  
#####

ELITE WIDTH PRINTING  
#####  
#####  
#####

EXPANDED WIDTH PRINTING  
#####  
#####  
#####

**Left margin**      **ESC I(n)**

ESC I(n) sets the left margin at n character columns of the current character width and does not change with subsequent changes in pitch. The value of n can range from 0 to 255.

With proportional spacing, the left margin is set based on the character width of 10 cpi print. This command should be placed at the beginning of a line.

```
10 '--- CONTROL CODE ESC I (n) ---
20 '--- SETS LEFT MARGIN AT CHARACTER COLUMN (n) ---
25 'NOW LET'S TRY IT
35 LPRINT "LEFT MARGIN - TEST PRINT"
40 'NOW WE'LL CHANGE LEFT MARGIN TO COL # 12
50 LPRINT CHR$(27);"1";CHR$(12)
60 LPRINT "LEFT MARGIN - AT COLUMN 12"
65 'NOW WE'LL RESET THE LEFT MARGIN TO COL # 1
70 LPRINT CHR$(27);"1";CHR$(1)
80 LPRINT "LEFT MARGIN - AT COLUMN 1"
100 END
```

LEFT MARGIN - TEST PRINT

LEFT MARGIN - AT COLUMN 12

LEFT MARGIN - AT COLUMN 1

**Horizontal tabs    ESC D(n1)(n2)(n...)NUL**

ESC D(n1)(n2)(n...)NUL sets horizontal tabs at positions n1, n2, and so on. The maximum value of n depends upon the pitch as follows:

- 10 cpi    n = 1 to 135
- 12 cpi    n = 1 to 162
- 17 cpi    n = 1 to 232
- 20 cpi    n = 1 to 255

With proportional printing, the tab settings are set based on the character width of 10 cpi print.

All tabs must be entered in ascending order. Up to 32 horizontal tabs can be set.

If the print head goes beyond a horizontal tab setting, it will not go back when it receives another tab command, but will continue to the next horizontal tab setting.

When ESC D NUL is entered, all horizontal tab settings (including printer default settings) are cleared and subsequent horizontal tab commands will not advance the print head.

**NOTE**

This program requires 136-column paper.

```
10 '----CONTROL CODE ESC D (n)----
20 'SETS HORIZONTAL TABS
30 'MAX SETTING FOR n DEPENDS ON CPI.
40 ' 10 CPI. n = 1 TO 135
50 ' 12 CPI. n = 1 TO 162
60 ' 17 CPI. n = 1 TO 232
70 ' 20 CPI. n = 1 TO 255
80 LPRINT "THIS TEST IS AT 10 CPI."
90 LPRINT CHR$(27) "D" CHR$(10) CHR$(50);
95 LPRINT CHR$(100) CHR$(135) CHR$(0)
100 GOSUB 280
110 '
120 LPRINT CHR$(27) "!" CHR$(1);'SETS 12 CPI.
130 LPRINT "THIS TEST IS AT 12 CPI."
140 LPRINT CHR$(27) "D" CHR$(10) CHR$(50);
145 LPRINT CHR$(100) CHR$(162) CHR$(0)
150 GOSUB 280
160 '

```

```

170 LPRINT CHR$(27) "!" CHR$(4);'SETS 17 CPI.
180 LPRINT "THIS TEST IS AT 17 CPI."
190 LPRINT CHR$(27) "D" CHR$(10) CHR$(50);
195 LPRINT CHR$(100) CHR$(232) CHR$(0)
200 GOSUB 280
210 '
220 LPRINT CHR$(27) "!" CHR$(5);'SETS 20 CPI.
230 LPRINT "THIS TEST IS AT 20 CPI."
240 LPRINT CHR$(27) "D" CHR$(10) CHR$(50);
245 LPRINT CHR$(100) CHR$(255) CHR$(0)
250 GOSUB 280
260 '
270 END
280 FOR I=1 TO 4
290 LPRINT CHR$(137);"T";
300 NEXT
310 LPRINT CHR$(10);
320 LPRINT
330 LPRINT CHR$(27) "@";
340 RETURN

```

**Repeated horizontal tabs**      **ESC e 0(n)**  
ESC e 0(n) sets horizontal tabs at every column n, based upon the current pitch. The value of n ranges from 1 to 255.

```

10 '----- CONTROL CODE ESC e 0 (n) -----
20 'SET'S TABS AT EVERY nth COLUMN
30 '
40 'SET TABS EACH 15TH COLUMN
50 LPRINT CHR$(27);"e";CHR$(0);CHR$(15)
51 LPRINT CHR$(27);"!";CHR$(8)
52 GOSUB 94
55 'LET'S SET 12 PITCH AND SEE WHAT HAPPENS
57 LPRINT CHR$(27);"!";CHR$(9)
58 GOSUB 94:LPRINT:LPRINT
60 'NOW WE'LL SET TABS AT EACH 5TH COLUMN
65 LPRINT CHR$(27);"e";CHR$(0);CHR$(5)
67 LPRINT CHR$(27);"!"CHR$(8)
70 GOSUB 94
75 'NOW WE'LL TRY IT AT 12 PITCH
78 LPRINT CHR$(27);"!";CHR$(9)

```

*Programming*

```
80 GOSUB 94
93 END
94 LPRINT"AAA";CHR$(9);"BBB";CHR$(9);"CCC"
95 RETURN
```

```
AAA          BBB          CCC
```

```
AAA          BBB          CCC
```

```
AAA BBB CCC
```

```
AAA BBB CCC
```

**Inter-character spacing**      **ESC SP(n)**  
ESC SP(n) sets the space between characters at n dots. The value of n ranges from 0 to 127.

```
10 '--- CONTROL CODE ESC SPACE (n) ---
20 '--- SELECT THE INTERCHARACTER SPACING ---
30 FOR N=1 TO 10
40 LPRINT CHR$(27);" ";CHR$(N);
50 LPRINT "AT THIS SPACING N EQUALS ";N
60 NEXT N
70 END
```

```

AT THIS SPACING N EQUALS 1
AT THIS SPACING N EQUALS 2
AT THIS SPACING N EQUALS 3
AT THIS SPACING N EQUALS 4
AT THIS SPACING N EQUALS 5
AT THIS SPACING N EQUALS 6
AT THIS SPACING N EQUALS 7
AT THIS SPACING N EQUALS 8
AT THIS SPACING N EQUALS 9
AT THIS SPACING N EQUALS 10

```

**Print head at  
horizontal  
position**

**ESC \$(n1)(n2)**

ESC \$(n1)(n2) moves the print head to an absolute horizontal position. The position, in inches, is determined by the following formula.

$$(n1 + n2 \times 256) / 60.$$

The maximum position is 13.6 inches. If you attempt to position the print head beyond the right margin, the command is ignored.

```

10 '----CONTROL CODE ESC $ N1 N2 ----
20 'HORIZONTAL TAB FUNCTION
30 'LET'S TRY ONE
40 FOR X=10 TO 15
50 Y=X*5
60 'THE POSITION EQUALS ( Y+0 x 256/60 )
70 LPRINT CHR$(27);"$";CHR$(Y);CHR$(0);"TAB TO HERE "
80 NEXT X
90 END

```

```

TAB TO HERE
TAB TO HERE
TAB TO HERE
TAB TO HERE
TAB TO HERE
TAB TO HERE

```

Programming

**Print head  
moved**

**ESC \ (n1)(n2)**

ESC \ (n1)(n2) moves the print head a specified distance in either direction. The distance, in inches, is determined by the following formulas.

Draft	$(n1 + n2 \times 256) / 120$
Letter-Quality	$(n1 + n2 \times 256) / 180$
Proportional Spacing	$(n1 + n2 \times 256) / 180$

```
10 '----CONTROL CODE ESC \ N1 N2----
20 'MOVES PRINT HEAD A SPECIFIED DISTANCE FROM
30 'THE LAST CHARACTER PRINTED.
40 'Selects Draft Mode
50 LPRINT CHR$(27)"x";CHR$(0);
60 LPRINT CHR$(27)"!";CHR$(0); 'SETS PICA
70 LPRINT "AAAAAAAAAA";
75 'SETS 1 INCH MOVEMENT
80 LPRINT CHR$(27)"\";CHR$(120);CHR$(0);
90 LPRINT "BBBBBBBBBB"
100 LPRINT CHR$(27)"@" 'RESETS PRINTER
110 LPRINT CHR$(27)"x";CHR$(1); 'SETS LQ
120 LPRINT CHR$(27)"!";CHR$(0); 'SETS PICA
130 LPRINT "AAAAAAAAAA";
135 'SETS 1 INCH MOVEMENT
140 LPRINT CHR$(27)"\";CHR$(180);CHR$(0);
150 LPRINT "BBBBBBBBBB"
160 LPRINT CHR$(27)"@"
165 LPRINT CHR$(27)"x";CHR$(1); 'SETS PS
170 LPRINT CHR$(27)"p";CHR$(1); 'SETS LQ
180 LPRINT CHR$(27)"!";CHR$(2); 'SETS PICA PS
190 LPRINT "ABCIMIHMIO";
195 'SETS MOVEMENT FOR PS
200 LPRINT CHR$(27)"\";CHR$(180);CHR$(0);
210 LPRINT "ABCIMIHMIO"
220 LPRINT CHR$(27)"@"
230 END
```

AAAAAAAAAA

BBBBBBBBBB

AAAAAAAAAA

BBBBBBBBBB

ABCIMIHMIO

ABCIMIHMIO

**Justification      ESC a (n)**

ESC a(n) selects justification.

n=0 selects left justification.

n=1 selects center justification.

n=2 selects right justification.

n=3 selects full justification.

This command must be given at the beginning of a line or it will be ignored. When n=3, the printer only breaks the line at spaces between words. The printer reduces the space in a line up to 50% before breaking it into two lines. It justifies a short line by increasing the space in the line up to 50%. If this fails, the line is printed left justified.

All other values of n work correctly only when a line is terminated with a carriage return.

Because horizontal tabbing commands ESC \$(n1)(n2) and HT reference the left margin, they are disabled with center or right justification (n = 0 or 3).

```

10 '----CONTROL CODE ESC a (n)----
20 'SETS AUTO - CENTERING AND JUSTIFICATION
30 LPRINT "12345678901234567890123456789012345678901234";
35 LPRINT "56789012345"
40 LPRINT "This is the first print position no margins"
50 LPRINT CHR$(27)"1";CHR$(5); 'sets left margin = 5
60 LPRINT CHR$(27)"Q";CHR$(55); 'sets right margin = 55
70 'n = 0 sets data flush against left margin
80 LPRINT CHR$(27)"a";CHR$(0);
90 LPRINT "This will be flush against the left margin."
100 'n = 1 centered between left and right margins
110 'commonly called AUTO - CENTERING
120 LPRINT CHR$(27)"a";CHR$(1);
130 LPRINT "This is auto-centering"
140 'n = 2 sets data flush against right margin
150 LPRINT CHR$(27)"a";CHR$(2);
160 LPRINT "This will be flush against the right margin."
170 LPRINT CHR$(27)"@"
180 'The following is an example of what will happen if
190 'the set margin are exceeded.
200 LPRINT"This is the first print position no margins."
210 LPRINT CHR$(27)"1";CHR$(10); 'sets left margin at 10
220 LPRINT CHR$(27)"Q";CHR$(40); 'sets right margin at 40

```

*Programming*

```
230 'n = 0 sets data flush against left margin
240 LPRINT CHR$(27)"a";CHR$(0);
250 LPRINT "This will be flush against the left margin."
260 'n = 2 sets data flush against right margin
270 LPRINT CHR$(27)"a";CHR$(2);
280 LPRINT "This will be flush against the right margin."
290 LPRINT CHR$(27)"@"
300 'n = 3 sets full justification , both margins.
310 LPRINT "1234567890123456789012345678901234567890123456789012345";
315 LPRINT "456789012345"
320 LPRINT CHR$(27)"l";CHR$(10); 'sets left margin = 10
330 LPRINT CHR$(27)"Q";CHR$(47); 'sets right margin = 47
340 LPRINT "This is a sample of normal spacing"
350 LPRINT CHR$(27)"a";CHR$(3); 'sets full justification
360 LPRINT "This is a sample of FULL justification"
370 LPRINT "This is sample of FULL justification"
380 LPRINT CHR$(27)"@"
```

```
12345678901234567890123456789012345678901234567890123456789012345
This is the first print position no margins
  This will be flush against the left margin.
    This is auto-centering
      This will be flush against the right margin.
```

```
This is the first print position no margins.
  This will be flush against the
    left margin.
    This will be flush against the
      right margin.
```

```
12345678901234567890123456789012345678901234567890123456789012345
  This is a sample of normal spacing
  This is a sample of FULL justification
  This is sample of FULL justification
```

**Horizontal  
enlargement****FS E(n)**

FS E(n) selects horizontal enlargement.

n=0 cancels enlargement.

n=1 selects double horizontal enlargement.

n=2 selects triple horizontal enlargement.

```
10 '----CONTROL CODE FS E (n) & FS V (n)----
20 'FS E  SELECTS HORIZONTAL ENLARGEMENT
30 ' n = 0 enlargement OFF
40 ' n = 1 DOUBLE ENLARGEMENT
50 ' n = 2 TRIPLE ENLARGEMENT
60 'FS V  SELECTS VERTICAL ENLARGEMENT
70 ' n = 0 enlargement OFF
80 ' n = 1 DOUBLE ENLARGEMENT
90 LPRINT "THIS IS STANDARD 10 CPI PRINT"
100 LPRINT CHR$(28)"E";CHR$(1);
110 LPRINT "THIS IS DOUBLE HORIZONTAL  "
120 LPRINT CHR$(28)"E";CHR$(2);
130 LPRINT "TRIPLE HORIZONTAL"
140 LPRINT CHR$(28)"E"CHR$(0);
150 LPRINT "WE ARE BACK TO STANDARD 10 CPI"
160 LPRINT CHR$(28)"V"CHR$(1);
170 LPRINT "THIS IS DOUBLE VERTICAL ENLARGEMENT"
180 LPRINT CHR$(28)"E";CHR$(1);
190 LPRINT "THIS IS 2 X VERT. & HORZ."
200 LPRINT CHR$(28)"E";CHR$(2);
210 LPRINT "2 X VERT.& 3 X HORZ."
220 LPRINT CHR$(28)"E";CHR$(0);
230 LPRINT CHR$(28)"V";CHR$(0);
240 LPRINT "BACK TO STANDARD PRINT"
```

*Programming*

THIS IS STANDARD 10 CPI PRINT  
THIS IS DOUBLE HORIZONTAL  
TRIPLE HORIZONTAL  
WE ARE BACK TO STANDARD 10 CPI  
THIS IS DOUBLE VERTICAL ENLARGEMENT  
THIS IS 2 X VERT. & HORZ.  
2 X VERT. & 3 X HORZ.  
BACK TO STANDARD PRINT

**Print modes**

**ESC x(n)**

ESC x(n) selects the draft mode (n=0) or the letter-quality mode (n=1). The Pinwriter prints 180 characters per second (cps) in draft mode and 60 cps in letter-quality (LQ) mode. In terms of density, the printer prints 120 dots per inch in draft mode and 360 dots per inch in LQ mode.

```
10 '----CONTROL CODE ESC x (n)----
20 'SELECTS DRAFT OR LETTER QUALITY PRINT MODE
30 ' n = 0 SELECTS DRAFT
40 ' n = 1 SELECTS LETTER QUALITY
50 LPRINT CHR$(27)"x";CHR$(0);'SETS DRAFT
60 LPRINT "WE ARE NOW PRINTING IN DRAFT MODE"
70 LPRINT CHR$(27)"x";CHR$(1);'SETS LQ MODE
80 LPRINT "WE HAVE CHANGED TO LETTER QUALITY"
90 LPRINT CHR$(27)"x";CHR$(0);
100 LPRINT "YOU ARE IN DRAFT,";
110 LPRINT CHR$(27)"x";CHR$(1);
120 LPRINT "YOU CAN CHANGE TO LQ AT ANY TIME"
130 END
```

WE ARE NOW PRINTING IN DRAFT MODE  
WE HAVE CHANGED TO LETTER QUALITY  
YOU ARE IN DRAFT, YOU CAN CHANGE TO LQ AT ANY TIME

**PS****ESC p(n)**

ESC p(n) selects proportional spacing (n=1) or cancels proportional spacing (n=0). The width of proportional characters varies depending on the shape of the characters. For example, an "M" is wider than an "i"; thus it would be allocated more space by the printer. (With conventional spacing, characters and spaces are the same width, regardless of their size.)

```
10 '--- CONTROL CODE ESC p (n) ---
20 '--- SELECTS OR CANCELS PROPORTIONAL SPACE PRINTING ---
25 'NOW LET'S TRY IT
35 LPRINT "TEST PRINTING - THIS IS MONOSPACE"
40 'NOW WE'LL SELECT PS MODE
50 LPRINT CHR$(27);"p";CHR$(1)
60 LPRINT "TEST PRINTING - THIS IS PROPORTIONAL"
65 'NOW WE'LL RESET MONOSPACE PRINTING
70 LPRINT CHR$(27);"p";CHR$(0)
80 LPRINT "TEST PRINTING - THIS IS MONOSPACE"
100 END
```

TEST PRINTING - THIS IS MONOSPACE

TEST PRINTING - THIS IS PROPORTIONAL

TEST PRINTING - THIS IS MONOSPACE

---

*Programming*

**15 cpi**                    **ESC g**  
ESC g selects 15 cpi printing.

```
10 '----- CONTROL CODE ESC g -----  
20 ' SET 15 PITCH PRINTING  
30 '  
40 'WE'LL PRINT FIRST IN 10 PITCH  
50 LPRINT "JUST A LINE OF TEXT"  
60 LPRINT  
70 'NOW WE'LL TRY 15 PITCH  
80 LPRINT CHR$(27);"g"  
90 LPRINT "JUST A LINE OF TEXT"  
91 LPRINT  
95 'NOW WE'LL RETURN TO 10 PITCH  
98 LPRINT CHR$(27);"!";CHR$(8)  
99 LPRINT "JUST A LINE OF TEXT"
```

**JUST A LINE OF TEXT**

**JUST A LINE OF TEXT**

**JUST A LINE OF TEXT**

**12 cpi**                    **ESC M**  
ESC M selects 12 cpi printing. This pitch can be combined with the other character width control codes (except for proportional print). The printing mode (draft or letter-quality) is not affected.

Table 4-5 shows the combinations as well as the number of print columns for both 8½-inch and 15-inch paper widths.

Table 4-5 Printing Columns for 12 cpi Printing

CHARACTER WIDTH	NUMBER OF COLUMNS	
	8½-INCH PAPER WIDTH	15-INCH PAPER WIDTH
12 cpi	96	163
12 cpi Condensed	160	272
12 cpi Elongated	48	81

**10 cpi****ESC P**

ESC P selects 10 cpi printing.

The right margin is stored as an absolute position on the page, so it doesn't change when the print pitch changes. With proportional spacing, the right margin is set based on the character width of 10 cpi print.

If a line to be printed exceeds the right margin, a carriage return and line feed are inserted to keep the line from exceeding the right margin. The printer puts as many characters as will fit on the line and then starts on the next line — even if it breaks a word in the middle.

```

10 '----CONTROL CODE ESC M & P----
20 'ESC M SELECTS ELITE WIDTH PRINTING
30 'ESC P SELECTS PICA WIDTH PRINTING
40 LPRINT "THIS IS A TEST OF ESC M"
50 LPRINT CHR$(27);"M" 'SELECTS 12 CPI PRINTING
60 LPRINT "THIS IS A TEST OF ESC M"
70 LPRINT CHR$(27);"P" 'SELECTS 10 CPI PRINTING
80 LPRINT "THIS IS A TEST OF ESC P"
90 END

```

THIS IS A TEST OF ESC M

THIS IS A TEST OF ESC M

THIS IS A TEST OF ESC P

*Programming*

**12 cpi print mode FS S(n)**

FS S(n) selects the 12 cpi print mode, after sending the command ESC M or ESC! (I).

n=0 selects draft 12 mode.

n=1 selects high-speed 12 mode.

```
10 '----CONTROL CODE FS S (n)----
20 'SELECTS 12 CPI PRINTING
30 ' n = 0 DRAFT 12
40 ' n = 1 HIGH SPEED 12
50 LPRINT "THIS IS 10 CPI PRINTING"
60 LPRINT CHR$(27);"x";CHR$(0);
70 LPRINT CHR$(27);"!";CHR$(1);
80 LPRINT CHR$(28)"S";CHR$(0) 'SETS DRAFT 12
90 FOR I=1 TO 10
100 LPRINT "THIS IS DRAFT 12 CPI PRINTING"
110 NEXT
120 LPRINT CHR$(28)"S";CHR$(1)
130 FOR I=1 TO 10
140 LPRINT "THIS IS HIGH SPEED 12 CPI PRINTING"
150 NEXT
160 LPRINT CHR$(27)"x";CHR$(1);CHR$(27)"P";
170 LPRINT "THIS IS STANDARD 10 CPI PRINTING"
180 END
```

THIS IS 10 CPI PRINTING

```
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
THIS IS DRAFT 12 CPI PRINTING
```

THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
 THIS IS HIGH SPEED 12 CPI PRINTING  
**THIS IS STANDARD 10 CPI PRINTING**

**Print styles**

**ESC !(n)**

ESC !(n) selects the print style. The value of n determines the style selected. Table 4-6 shows the values of the different print styles.

**Table 4-6 Print Style Values**

PRINT STYLE	ASSIGNED VALUE	BIT
10 cpi	0	1
12 cpi	1	1
Proportional	2	2
Condensed*	4	3
Enhanced	8	4
Double-strike	16	5
Elongated	32	6
Italic	64	7
Underlined	128	8

\*10 cpi condensed becomes 17 cpi.  
 12 cpi condensed becomes 20 cpi.

## Programming

To calculate the value of n, add the values of the features you want. For example, if you want to select 10 cpi italic enhanced print, you would calculate the value of n like this.

10 cpi	0
Italic	64
Enhanced	8
n =	<u>72</u>

```
10 '--- CONTROL CODE ESC ! (n) ---
20 '--- SELECTS ANY PRINT MODE COMBINATION
30 'LET'S TRY A FEW
40 FOR N=1 TO 10
50 LPRINT TAB(T);CHR$(27);"!";CHR$(N);
60 LPRINT "MODE SELECTION";N
90 NEXT N
100 LPRINT
110 LPRINT "UP TO 256 MODE COMBINATIONS ARE AVAILABLE"
```

```
MODE SELECTION 1
MODE SELECTION 2
MODE SELECTION 3
MODE SELECTION 4
MODE SELECTION 5
MODE SELECTION 6
MODE SELECTION 7
MODE SELECTION 8
MODE SELECTION 9
MODE SELECTION 10
```

**UP TO 256 MODE COMBINATIONS ARE AVAILABLE**

**One-line  
elongated  
printing****ESC SO**

ESC SO selects elongated printing for the remainder of the current line. Normal and elongated characters can be printed on the same line. The printer expands the characters to twice their normal width.

Elongated print can be combined with the other character width commands. See Table 4-7 for these combinations as well as the number of print columns for both 8½-inch and 15-inch paper widths.

**Table 4-7 Printing Columns for Elongated Print**

CHARACTER WIDTH	NUMBER OF COLUMNS	
	8½-INCH PAPER WIDTH	15-INCH PAPER WIDTH
10 cpi Elongated	40	68
12 cpi Elongated	48	81
Condensed Elongated	68	116

```

10 '--- CONTROL CODE ESC SO ---
20 '--- SELECTS ELONGATED PRINTING MODE FOR A SINGLE LINE ---
30 LPRINT "TESTING "
40 'SELECT ELONGATED PRINT MODE
50 LPRINT CHR$(27);CHR$(14);
60 LPRINT "TESTING - NOW IT'S ELONGATED"
70 'NOW WE'LL RESET THE PRINTER
80 LPRINT CHR$(27);"@
85 LPRINT "TESTING - NOW THE DEFAULT MODE IS RESTORED"
90 END

```

```

TESTING
TESTING - NOW IT'S ELONGATED

TESTING - NOW THE DEFAULT MODE IS RESTORED

```

*Programming*

**Elongated printing**

**ESC W(n)**

ESC W(n) selects elongated printing (n=1) or cancels elongated printing (n=0). In elongated printing, characters are expanded to twice their normal width. This command is not cancelled by a line feed. You can print normal and elongated characters on the same line.

You can also combine elongated print with the other character width escape sequences. Table 4-8 shows these combinations as well as the number of print columns for both 8½-inch and 15-inch paper widths.

**Table 4-8 Printing Columns for Elongated Print**

CHARACTER WIDTH	NUMBER OF COLUMNS	
	8½-INCH PAPER WIDTH	15-INCH PAPER WIDTH
10 cpi Elongated	40	68
12 cpi Elongated	48	81
15 cpi Elongated	60	102
Condensed Elongated	68	116

```
10 '--- CONTROL CODE ESC W (n) ---
20 '--- SELECT OR CANCEL ELONGATED PRINTING ---
30 LPRINT "TESTING"
40 'NOW WE'LL TRY IT ELONGATED
50 LPRINT CHR$(27);"W";CHR$(1)
60 LPRINT "TESTING"
65 'NOW WE'LL RESET IT TO NORMAL
70 LPRINT CHR$(27);"W";CHR$(0)
80 LPRINT "TESTING"
100 END
```

TESTING

TESTING

TESTING

**Condensed  
printing****ESC SI**

ESC SI selects condensed printing. Condensed printing can be combined with 10 cpi, 12 cpi, 15 cpi, elongated character widths, and proportional printing. It can be used with both draft and letter-quality modes.

Table 4-9 shows these combinations, as well as the number of print columns for both 8½-inch and 15-inch paper widths.

**Table 4-9 Printing Columns for Condensed Print**

CHARACTER WIDTH	NUMBER OF COLUMNS	
	8½-INCH PAPER WIDTH	15-INCH PAPER WIDTH
10 cpi Condensed	137	233
12 cpi } Condensed 15 cpi }	160	272
10 cpi Condensed Elongated	68	116

```

10 '--- CONTROL CODE ESC SI ---
20 '--- THIS SELECTS CONDENSED PRINTING MODE ---
30 LPRINT "TESTING "
40 'SELECT CONDENSED PRINT MODE
50 LPRINT CHR$(27);CHR$(15)
60 LPRINT "TESTING -NOW IT'S CONDENSED"
70 'NOW WE'LL CANCEL CONDENSED PRINTING"
80 LPRINT CHR$(18)
85 LPRINT "TESTING - NOW THE DEFAULT MODE IS RESTORED"
90 END

```

TESTING

TESTING -NOW IT'S CONDENSED

TESTING - NOW THE DEFAULT MODE IS RESTORED

*Programming*

**Enhanced  
printing  
selected**

**ESC E**

ESC E selects enhanced printing for the current character width. For every column of dots, the printer prints another column slightly to the right (1/180 in. for letter-quality and 1/120 in. for draft).

Enhanced print can be combined with double-strike print for even darker characters and can be used with both draft and letter-quality modes.

Enhanced printing is cancelled by using ESC F or ESC !(n).

**Enhanced  
printing  
cancelled**

**ESC F**

ESC F cancels enhanced printing.

```
10 '----CONTROL CODE ESC E & F----
20 'ESC E SELECTS ENHANCED PRINTING
30 'ESC F CANCELS ENHANCED PRINTING
40 LPRINT "THIS IS POWER UP MODE PRINTING"
50 LPRINT CHR$(27);"E" 'SETS ENHANCED PRINT
60 LPRINT "THIS IS POWER UP MODE PRINTING ENHANCED"
70 LPRINT CHR$(27);"F" 'CANCELS ENHANCED PRINT
80 LPRINT "ENHANCED PRINTING IS CANCELED"
90 END
```

THIS IS POWER UP MODE PRINTING

THIS IS POWER UP MODE PRINTING ENHANCED

ENHANCED PRINTING IS CANCELED

**Double-strike  
printing  
selected**

**ESC G**

ESC G selects double-strike printing for the current character width. In double-strike printing, the line is printed once, then the paper is shifted up approximately 1/180 of an inch, and the line is printed again. In this manner, the dot matrix definition is filled in. Double-strike can be combined with enhanced print for even darker characters and can be used with both draft and letter-quality modes.

The Pinwriter prints double-strike characters at half its normal speed. Double-strike printing is cancelled by using ESC H or ESC !(n).

**Double-strike  
printing  
cancelled**

**ESC H**

ESC H cancels double-strike printing.

```
10 '-----CONTROL CODE ESC G & H-----
20 'ESC G SELECTS DOUBLE STRIKE PRINTING
30 'ESC H CANCELS DOUBLE STRIKE PRINTING
40 LPRINT "THIS IS POWER UP PRINTING MODE"
50 LPRINT CHR$(27);"G"
60 LPRINT "THIS IS DOUBLE STRIKE "
70 LPRINT CHR$(27);"H"
80 LPRINT "DOUBLE STRIKE PRINTING IS NOW CANCELED"
90 END
```

THIS IS POWER UP PRINTING MODE

THIS IS DOUBLE STRIKE

DOUBLE STRIKE PRINTING IS NOW CANCELED

*Programming*

**Italic printing  
selected**

**ESC 4**

ESC 4 selects italic printing. Italic printing can be combined with all the functions used with the normal character set. Italic printing is cancelled by ESC 5 or ESC !(n).

**Italic printing  
cancelled**

**ESC 5**

ESC 5 cancels italic printing.

```
10 '----CONTROL CODE ESC 4 & 5----
20 'ESC 4 SELECTS ITALIC CHARA. SET
30 'ESC 5 RETURNS TO STANDARD CHARA. SET
40 LPRINT "THIS IS THE STANDARD CHARA. SET"
50 LPRINT CHR$(27);"4"
60 LPRINT "THIS IS THE ITALIC CHARA. SET"
80 LPRINT CHR$(27);"5"
90 LPRINT "THIS IS THE STANDARD CHARA.SET"
```

THIS IS THE STANDARD CHARA. SET

*THIS IS THE ITALIC CHARA. SET*

THIS IS THE STANDARD CHARA.SET

**Superscripts  
and subscripts  
selected**

**ESC S(n)**

ESC S(n) selects superscripts (n=0) and subscripts (n=1). Both are printed at about 65% of the normal size. Superscripts and subscripts are cancelled by ESC T and are not affected by the escape sequence ESC !(n).

If you underline superscripts, the underline will print at its normal location on the line rather than directly under the superscript.

Superscripts            ESC T  
and subscripts        ESC T cancels superscripts and subscripts.  
cancelled

```
10 '---- CONTROL CODE ESC S (n) & ESC T ---
20 'SELECT AND RESET SUPERSCRIPTS OR SUBSCRIPTS
35 LPRINT "H2O - NOTHING SPECIAL HERE
40 'NOW WE'LL TRY SUBSCRIPTS
45 LPRINT "THIS IS SUBSCRIPTED ";
50 LPRINT "H";CHR$(27);"S";CHR$(1);"2";CHR$(27);"T";"O"
65 'NOW WE'LL TRY SUPERSCRIPTS
67 LPRINT "AND SUPERSCRIPTED ";
70 LPRINT "E=MC";CHR$(27);"S";CHR$(0);"2"
90 LPRINT "OOPS! LET'S RESET IT TO NORMAL"
95 LPRINT CHR$(27);"T";
100 LPRINT "OK"
110 END
```

```
H2O - NOTHING SPECIAL HERE
THIS IS SUBSCRIPTED H2O
AND SUPERSCRIPTED E=MC2
OOPS! LET'S RESET IT TO NORMAL
OK
```

*Programming*

**Graphics modes    ESC \*(m)(n1)(n2)**

ESC \*(m)(n1)(n2) allows you to use any one of the 11 graphics modes. The value of m selects the graphics mode, as listed in Table 4-10.

The following formula determines how many bytes of graphics data the printer is expecting to receive.

$$n1 + (n2 \times 256) = \text{number of columns.}$$

**Table 4-10    Graphics Modes**

MODE	NUMBER OF PINS	m	DOTS PER INCH
Single density	8	0	60
Double density	8	1	120
High-speed, double density	8	2	120
Quadruple density	8	3	240
CRT screen	8	4	80
Other CRT screens	8	6	90
Single density	24	32	60
Double density	24	33	120
Other CRT screens	24	38	90
Triple density	24	39	180
High density	24	40	360

See Section 7 for a more detailed explanation of the graphics modes.

```
10 '--- CONTROL CODE ESC * (M) ---
20 '--- SELECTS GRAPHIC DENSITY ACCORDING TO (M) ---
30 'WE'LL SELECT ALL TEN AVAILABLE
40 FOR M=0 TO 4
50 GOSUB 160
60 NEXT M
70 M=6:GOSUB 160
90 M=32:GOSUB 160
110 M=33:GOSUB 160
130 M=38:GOSUB 160
```



*Programming*

**Single-density  
dot mode**

**ESC K(n1)(n2)**

ESC K(n1)(n2) sets the 8-bit, single-density dot mode (60 dots per inch). The values n1 and n2 determine the number of dot columns of graphics data, as follows:

$$n1 + (n2 \times 256) = \text{number of columns.}$$

See Section 7 for a more detailed explanation of how the dot graphics modes work.

```
10 '----CONTROL CODE ESC K N1 N2----
20 'SELECT 8-BIT SINGLE DENSITY GRAPHICS AT 60 DPI
30 'WE'LL PRINT 4 LINES OF 8-BIT SD GRAPHICS
35 WIDTH "LPT1:",90
40 FOR M=1 TO 4
50 LPRINT CHR$(27) "K";CHR$(80);CHR$(0);
60 FOR Z=1 TO 80
70 LPRINT CHR$(255);
80 NEXT Z
90 LPRINT
100 NEXT M
110 END
```



**Double-density  
dot mode****ESC L(n1)(n2)**

ESC L(n1)(n2) sets the 8-bit, double-density dot mode (120 dots per inch). The values n1 and n2 determine the number of dot columns of graphics data, as follows:

$$n1 + (n2 \times 256) = \text{number of columns.}$$

See Section 7 for a more detailed explanation of how the dot graphics modes work.

```
10 '----CONTROL CODE ESC L N1 N2----
20 'SELECTS 8-BIT DOUBLE DENSITY GRAPHICS AT 120 DPI.
30 'WE'LL PRINT 4 LINES OF 8-BIT DD GRAPHICS
35 WIDTH "LPT1:",90
40 FOR M=1 TO 4
50 LPRINT CHR$(27) "L";CHR$(80);CHR$(0);
60 FOR Z=1 TO 80
70 LPRINT CHR$(255);
80 NEXT Z
90 LPRINT
100 NEXT M
110 END
```



*Programming*

**High-speed,  
double-density  
dot mode**

**ESC Y(n1)(n2)**

ESC Y(n1)(n2) selects high-speed, double-density dot graphics (120 dots per inch). The values n1 and n2 determine the number of dot columns of graphics data, as follows:

$$n1 + (n2 \times 256) = \text{number of columns.}$$

See Section 7 for a more detailed explanation of how the dot graphics modes work.

```
10 '--- CONTROL CODE ESC Y N1 N2 ---
20 '--- SELECTS GRAPHIC DOUBLE DENSITY AT 120 DPI ---
30 'WE'LL PRINT 4 LINES OF DOUBLE DENSITY GRAPHICS
35 WIDTH "LPT1:",90
40 FOR M=1 TO 4
50 LPRINT CHR$(27);"Y";CHR$(80);CHR$(0);
60 FOR Z=1 TO 80
70 LPRINT CHR$(255);
80 NEXT Z
85 LPRINT
90 NEXT M
100 END
```



**Quadruple-  
density dot mode****ESC Z(n1)(n2)**

ESC Z(n1)(n2) selects quadruple-density dot graphics (240 dots per inch). The values of n1 and n2 determine the number of dot columns of graphics data, as follows:

$$n1 + (n2 \times 256) = \text{number of columns.}$$

See Section 7 for a more detailed explanation of how the graphics modes work.

```

10 '--- CONTROL CODE ESC Z N1 N2 ---
20 '--- SELECTS GRAPHIC QUAD DENSITY AT 240 DPI ---
30 'WE'LL PRINT 4 LINES OF QUAD DENSITY GRAPHICS
35 WIDTH "LPT1:",151
40 FOR M=1 TO 4
50 LPRINT CHR$(27);"Z";CHR$(150);CHR$(0);
60 FOR Z=1 TO 150
70 LPRINT CHR$(255);
80 NEXT Z
85 LPRINT
90 NEXT M
100 END

```



*Programming*

**High-density  
dot mode**

**FS Z(n1)(n2)**

FS Z(n1)(n2) selects high-density dot graphics (360 dots per inch). The values of n1 and n2 determine the number of dot columns of graphics data, as follows:

$$n1 + (n2 \times 256) = \text{number of columns.}$$

See Section 7 for a more detailed explanation of how the graphics modes work.

```
10 '--- CONTROL CODE FS Z N1 N2 ---
20 '--- SELECTS HIGH DENSITY GRAPHICS AT 360 DPI ---
30 'WE'LL PRINT 4 LINES OF HIGH DENSITY GRAPHICS
35 WIDTH "LPT1:",151
40 FOR M=1 TO 4
50 LPRINT CHR$(28);"Z";CHR$(150);CHR$(0);
60 FOR Z=1 TO 150
70 LPRINT CHR$(255);CHR$(255);CHR$(255);
80 NEXT Z
85 LPRINT
90 NEXT M
100 END
```



**Graphics mode  
assigned to  
graphics sequence**

**ESC ?(s)(m)**

ESC ?(s)(m) assigns any one of the graphics modes to any one of the four graphics sequences (ESC K, ESC L, ESC Y, and ESC Z). The value s is the letter of the escape sequence that is assigned (K, L, Y, or Z), and the value m is the graphics mode number as used with the ESC \* (m)(n1)(n2) escape sequence.

Remember that when you change from 8-pin graphics to 24-pin graphics, you must supply more data to make the program work. See Section 7 for a more detailed explanation of how the graphics options work.

```

10 '--- CONTROL CODE ESC ? (m) (n) ---
20 '--- ASSIGNS EQUIVALENT GRAPHIC RESOLUTIONS ----
40 'SET UP THE GRAPHICS MODE "L" AS DOUBLE DENSITY
50 LPRINT CHR$(27);"?";"K";CHR$(39);
55 LPRINT CHR$(27)"K";CHR$(70);CHR$(0);
60 FOR Z=1 TO 70
70 LPRINT CHR$(255);CHR$(255);CHR$(255);
80 NEXT Z
85 LPRINT
100 END

```





**Language  
character set****ESC R(n)**

ESC R(n) selects one of the language character sets.

n=0	United States
n=1	France
n=2	Germany
n=3	England
n=4	Denmark I
n=5	Sweden
n=6	Italy
n=7	Spain
n=8	Japan
n=9	Norway
n=10	Denmark II
n=11	Netherlands

```

10 '-----CONTROL CODE ESC R (N) -----
20 'SELECT LANGUAGE CHARACTER SETS -----
30 A=0:LPRINT"USA":GOSUB 140
40 A=1:LPRINT"FRANCE":GOSUB 140;
50 A=2:LPRINT"GERMANY":GOSUB 140;
60 A=3:LPRINT"ENGLAND":GOSUB 140;
70 A=4:LPRINT"DENMARK I":GOSUB 140
80 A=5:LPRINT"SWEDEN":GOSUB 140
90 A=6:LPRINT"ITALY":GOSUB 140
100 A=7:LPRINT"SPAIN":GOSUB 140
110 A=8:LPRINT"JAPAN":GOSUB 140
112 A=9:LPRINT"NORWAY":GOSUB 140
115 A=10:LPRINT"DENMARK II":GOSUB 140
117 A=11:LPRINT"NETHERLANDS":GOSUB 140
120 END
140 REM
145 LPRINT CHR$(27);"R";CHR$(A);
150 FOR B=33 TO 79
160 LPRINT CHR$(B);
170 NEXT B:LPRINT
180 FOR C=80 TO 126
190 LPRINT CHR$(C);
200 NEXT C
205 LPRINT:LPRINT
210 RETURN

```

Programming

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

FRANCE  
!"#\$%&'()\*+,-./0123456789:;<=>?àABCDEFGHIJKLMNO  
PQRSTUVWXYZ`çŠ^\_`abcdefghijklmnopqrstuvwxyzéùè"

GERMANY  
!"#\$%&'()\*+,-./0123456789:;<=>?ŠABCDEFGHIJKLMNO  
PQRSTUVWXYZÄÖÜ^\_`abcdefghijklmnopqrstuvwxyzáöüß

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

DENMARK I  
!"#\$%&'()\*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO  
PQRSTUVWXYZÆØÅ^\_`abcdefghijklmnopqrstuvwxyæøå~

SWEDEN  
!"#¤%&'()\*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNO  
PQRSTUVWXYZÄÖÅÜ\_éabcdefghijklmnopqrstuvwxyzáöåü

ITALY  
!"#\$%&'()\*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO  
PQRSTUVWXYZ`^`é^\_ùabcdefghijklmnopqrstuvwxyzáòèì

SPAIN  
!"R\$%&'()\*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO  
PQRSTUVWXYZiÑ¿^\_`abcdefghijklmnopqrstuvwxyzn~

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

NORWAY  
!"#¤%&'()\*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNO  
PQRSTUVWXYZÆØÅÜ\_éabcdefghijklmnopqrstuvwxyæøåü

DENMARK II  
!"#\$%&'()\*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNO  
PQRSTUVWXYZÆØÅÜ\_éabcdefghijklmnopqrstuvwxyæøåü

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

**Current character set copied to user-defined set**    **ESC :(NUL)(NUL)(NUL)**  
 ESC:(NUL)(NUL)(NUL) copies the currently active character set into the user-defined character set. This command cancels any user-defined characters you have created.  
 See Section 8 for an example of a user-defined program.

**User-defined characters loaded into user-defined set**    **ESC & NUL(n1)(n2)**  
 ESC & NUL(n1)(n2) loads user-defined characters into the user-defined character set. The characters are loaded in the print mode (proportional, letter-quality, or draft) for which the printer is currently set. The values n1 and n2 are the ASCII codes of the first and last characters that are defined. If only one character is being defined, then n1 and n2 are the same.  
 See Section 8 for an example of a user-defined program.

**User-defined character set selected**    **ESC %(n)**  
 ESC %(n) selects the internal character set (n=0) or the user-defined character set (n=1).  
 See Section 8 for an example of a user-defined program.

**Sheet feeder**    **ESC EM(R)**  
 ESC EM(R) ejects a sheet from the sheet feeder.

## Programming

**Unidirectional or bidirectional printing**    **ESC U(n)**  
ESC U(n) selects unidirectional printing (n=1) or returns the printer to bidirectional printing (n=0). The printer defaults to bidirectional printing when printing text, and unidirectional printing when printing graphics. Bidirectional printing of graphics is not cancelled by the reset command (ESC @).

```
10 '--- CONTROL CODE ESC U (n) ---
20 'SELECT UNIDIRECTIONAL OR BIDIRECTIONAL PRINTING
30 LPRINT "BIDIRECTIONAL
40 LPRINT "PRINTING
50 'NOW WE'LL TRY UNIDIRECTIONAL
60 LPRINT CHR$(27);"U";CHR$(1)
70 LPRINT "UNIDIRECTIONAL
80 LPRINT "PRINTING
90 'NOW WE'LL RESET IT TO BIDIRECTIONAL
100 LPRINT CHR$(27);"U";CHR$(0)
110 LPRINT "BIDIRECTIONAL
120 LPRINT "PRINTING
130 END
```

BIDIRECTIONAL  
PRINTING

UNIDIRECTIONAL  
PRINTING

BIDIRECTIONAL  
PRINTING

**Data repeated      ESC V(n)**

ESC V(n) repeats data n times. The value of n ranges from 1 to 255. In a BASIC program, ESC V(n) defines the beginning of data to be repeated, and the data must immediately follow the code.

Since it is stored in the input buffer, data to be repeated cannot exceed 2 K characters.

**End of data to be  
repeated      ESC V NUL**

ESC V NUL indicates the end of data to be repeated. See ESC V(n) for an example of how this sequence is used in a program.

```

10 '-----CONTROL CODE ESC V-----
20 'REPEATS DATA
30 'ESC V n DATA ESC V NUL
40 ' n =NUMBER OF TIMES DATA IS REPEATED
50 'DATA = WHAT IS TO BE REPEATED
60 'ESC V NUL = END OF DATA
70 LPRINT CHR$(27) "V" CHR$(3);
80 LPRINT "THIS IS THE START OF THE DATA TO BE"
90 LPRINT "REPEATED. THE BUFFER CAN BE UP TO 2K IN"
100 LPRINT "LENGTH WHICH IS APPROXIMATELY EQUAL TO 2"
110 LPRINT "TYPED PAGES OF TEXT. THE INFORMATION CAN"
120 LPRINT "THEN BE REPEATED FROM 1 TO 255 TIMES. THE "
130 LPRINT "ADVANTAGE OF THIS IS THAT IF YOU NEED"
140 LPRINT "MORE THAN ONE COPY OF THE DATA YOUR "
150 LPRINT "PRINTER WILL PROCESS THE DATA n TIMES"
160 LPRINT "THUS LEAVING THE COMPUTER FREE TO DO "
170 LPRINT "OTHER OPERATIONS."
180 LPRINT CHR$(27) "V" CHR$(0);
190 END

```

```

THIS IS THE START OF THE DATA TO BE
REPEATED. THE BUFFER CAN BE UP TO 2K IN
LENGTH WHICH IS APPROXIMATELY EQUAL TO 2
TYPED PAGES OF TEXT. THE INFORMATION CAN
THEN BE REPEATED FROM 1 TO 255 TIMES. THE
ADVANTAGE OF THIS IS THAT IF YOU NEED
MORE THAN ONE COPY OF THE DATA YOUR
PRINTER WILL PROCESS THE DATA n TIMES
THUS LEAVING THE COMPUTER FREE TO DO

```

---

*Programming*

OTHER OPERATIONS.

THIS IS THE START OF THE DATA TO BE REPEATED. THE BUFFER CAN BE UP TO 2K IN LENGTH WHICH IS APPROXIMATELY EQUAL TO 2 TYPED PAGES OF TEXT. THE INFORMATION CAN THEN BE REPEATED FROM 1 TO 255 TIMES. THE ADVANTAGE OF THIS IS THAT IF YOU NEED MORE THAN ONE COPY OF THE DATA YOUR PRINTER WILL PROCESS THE DATA  $n$  TIMES THUS LEAVING THE COMPUTER FREE TO DO OTHER OPERATIONS.

THIS IS THE START OF THE DATA TO BE REPEATED. THE BUFFER CAN BE UP TO 2K IN LENGTH WHICH IS APPROXIMATELY EQUAL TO 2 TYPED PAGES OF TEXT. THE INFORMATION CAN THEN BE REPEATED FROM 1 TO 255 TIMES. THE ADVANTAGE OF THIS IS THAT IF YOU NEED MORE THAN ONE COPY OF THE DATA YOUR PRINTER WILL PROCESS THE DATA  $n$  TIMES THUS LEAVING THE COMPUTER FREE TO DO OTHER OPERATIONS.

**Print color****ESC r(n)**

ESC r(n) selects the print color.

n=0 black  
 n=1 magenta  
 n=2 cyan  
 n=3 violet  
 n=4 yellow  
 n=5 orange  
 n=6 green  
 n=7 brown

The print color defaults to black at power-on.

**NOTE**

This command is used only with Pinwriter  
 P6/P7 models configured for color printing.

```

10 '--- CONTROL CODE ESC r (n) ---
20 '--- SELECTS THE PRINT COLOR ACCORDING TO (n) ---
25 'WE'LL SELECT ALL EIGHT AVAILABLE
40 FOR M=0 TO 7
50 LPRINT CHR$(27);"r";CHR$(M);
80 LPRINT "THIS IS COLOR ";M
90 NEXT M
95 LPRINT
100 END

```

```

THIS IS COLOR 0
THIS IS COLOR 1
THIS IS COLOR 2
THIS IS COLOR 3
THIS IS COLOR 4
THIS IS COLOR 5
THIS IS COLOR 6
THIS IS COLOR 7

```

## Programming

### Half-speed printing

### ESC s(n)

ESC s(n) selects half-speed printing (n=1) or full-speed printing (n=0). Printing at half-speed is quieter, and works with both the draft and letter-quality modes.

```
10 '--- CONTROL CODE ESC s (n) ---
20 '--- SELECT HALF SPEED OR FULL SPEED PRINTING ---
30 LPRINT "TESTING AT FULL SPEED "
40 LPRINT "TESTING AT FULL SPEED "
42 'NOW TRY HALF SPEED QUIET MODE PRINTING
45 LPRINT CHR$(27);"s";CHR$(1)
46 LPRINT "TESTING AT HALF SPEED QUIET MODE"
47 LPRINT "TESTING AT HALF SPEED QUIET MODE"
50 'NOW SWITCH BACK TO FULL SPEED PRINTING
60 LPRINT CHR$(27);"s";CHR$(0)
70 LPRINT "TESTING AT FULL SPEED"
80 LPRINT "TESTING AT FULL SPEED"
90 END
```

```
TESTING AT FULL SPEED
TESTING AT FULL SPEED
```

```
TESTING AT HALF SPEED QUIET MODE
TESTING AT HALF SPEED QUIET MODE
```

```
TESTING AT FULL SPEED
TESTING AT FULL SPEED
```

**Underlining****ESC -(n)**

ESC -(n) selects continuous underlining (n=1) or cancels continuous underlining (n=0). Underlining can be combined with all the character sets and print styles in the draft and letter-quality modes as well as with superscripts and subscripts. If you underline superscripts, the underline prints at its normal location on the line rather than directly under the superscript.

```
10 '---CONTROL CODE ESC - (n) ---
20 'SELECT OR CANCEL CONTINUOUS UNDERLINING
30 'IF N=1 UNDERLINING IS SET, IF N=0 IT'S CANCELED
35 'LET'S TRY IT WITH A SHORT PROGRAM
40 LPRINT "THIS ISN'T UNDERLINED, ";
50 LPRINT CHR$(27);"-";CHR$(1);"NOW UNDERLINING IS SET"
55 LPRINT CHR$(27);"-";CHR$(0);" -NOW IT'S CANCELED."
60 END
```

```
THIS ISN'T UNDERLINED, NOW UNDERLINING IS SET
-NOW IT'S CANCELED.
```

*Programming*

**8th data bit control cancelled**      **ESC #**  
ESC # cancels control of the eighth data bit.

**Print head to left margin**      **ESC <**  
ESC < returns the print head to the left side of the printer (one-line unidirectional printing).

```
10 '--- CONTROL CODE ESC < ---  
20 '--- PRINT UNIDIRECTIONALLY FOR A SINGLE LINE  
30 LPRINT "TESTING BIDIRECTIONALLY"  
40 LPRINT "TESTING BIDIRECTIONALLY"  
50 LPRINT "TESTING BIDIRECTIONALLY"  
60 'NOW USE UNIDIRECTIONAL PRINT FOR A SINGLE LINE  
70 LPRINT CHR$(27); "<"  
80 LPRINT "TESTING - PRINTED FROM LEFT TO RIGHT"  
90 END
```

```
TESTING BIDIRECTIONALLY  
TESTING BIDIRECTIONALLY  
TESTING BIDIRECTIONALLY
```

```
TESTING - PRINTED FROM LEFT TO RIGHT
```

Print head  
moved

ESC f 0(n)

ESC f 0(n) moves the print head n columns after printing data in buffer. The value of n ranges from 1 to 255.

```

10 '---- CONTROL CODE ESC f 0 (n) ----
20 'SKIP n COLUMNS AFTER PRINTING BUFFER CONTENTS
30 '
35 'LET'S TRY A SIMPLE COLUMN SKIP
36 'REMEMBER n DETERMINES HOW FAR YOU SKIP
40 '
50 FOR X=1 TO 10
60 LPRINT "START";
70 LPRINT CHR$(27);"f";CHR$(0);CHR$(X);
80 LPRINT "SKIP";X;"COLUMN(S)"
90 NEXT X
99 END

```

```

START SKIP 1 COLUMN(S)
START SKIP 2 COLUMN(S)
START SKIP 3 COLUMN(S)
START SKIP 4 COLUMN(S)
START SKIP 5 COLUMN(S)
START SKIP 6 COLUMN(S)
START SKIP 7 COLUMN(S)
START SKIP 8 COLUMN(S)
START SKIP 9 COLUMN(S)
START SKIP 10 COLUMN(S)

```

*Programming*

**Paper advanced**    **ESC f 1(n)**

ESC f 1(n) advances the paper n lines after printing data in buffer. The value of n ranges from 1 to 255.

```
10 '----- CONTROL CODE ESC f 1 (n) -----
20 'SKIP n LINES AFTER PRINTING BUFFER CONTENTS
30 '
40 LPRINT "THIS IS OUR FIRST START POSITION"
50 LPRINT CHR$(27);"f";CHR$(1);CHR$(5);
60 LPRINT"AND NOW A 5 LINE SKIP"
62 LPRINT:LPRINT
65 'LET'S TRY A 10 LINE SKIP
66 '
70 LPRINT "THIS IS OUR SECOND START POSITION"
80 LPRINT CHR$(27);"f";CHR$(1);CHR$(10)
90 LPRINT "AND NOW THE 10 LINE SKIP"
99 END
```

THIS IS OUR FIRST START POSITION

AND NOW A 5 LINE SKIP

THIS IS OUR SECOND START POSITION

AND NOW THE 10 LINE SKIP

**8th data bit  
set to 0**

**ESC =**

ESC = sets the eighth data bit to 0.

**8th data bit  
set to 1**

**ESC >**

ESC > sets the eighth data bit to 1. This sequence allows users of computers that send only 7 bits of data through the serial interface to utilize the Pinwriter sequences requiring 8-bit data.

This sequence does not allow completely independent control of the eighth bit. It can only be used before other sequences or codes are sent; it cannot be in the middle of a control code sequence.

ESC > is ignored when the IBM character set is selected.

```

10 '--- CONTROL CODE ESC > ---
20 '--- SET THE EIGHTH DATA BIT TRUE
30 LPRINT "TESTING THE CHARACTER SET
40 'SET THE 8TH BIT TRUE TO SELECT
50 'THE CHARACTER SET BETWEEN 128 & 255
60 LPRINT CHR$(27);">"
70 LPRINT "TESTING THE CHARACTER SET "
80 LPRINT "-NOW IT'S ITALIC OR IBM DEPENDING ON SW 3-5"
90 'TO SET THE 8TH BIT NOT-TRUE USE CONTROL CODE ESC =
100 END

```

TESTING THE CHARACTER SET

*TESTING THE CHARACTER SET*

*-NOW IT'S ITALIC OR IBM DEPENDING ON SW 3-5*

## Programming

### Printer initialized

### ESC @

ESC @ initializes or resets the printer. All printer characteristics are reset to the default values (including top of form), except control-panel-selectable features, subscript and superscript, user-defined buffer, character sets, and unidirectional printing in graphics mode.

```
10 '----- CONTROL CODE ESC @ -----
20 'THIS IS A SOFT RESET IT WILL NOT RESET
30 'FRONT PANEL SELECTIONS.
40 LPRINT CHR$(27)"P"; 'SETS 10 CPI.
50 LPRINT CHR$(27)"x";CHR$(1); 'SETS LQ MODE
60 LPRINT "THIS IS LETTER QUALITY COURIER 10"
70 LPRINT CHR$(27)"M"; 'SETS 12 CPI.
80 LPRINT "THIS IS LETTER QUALITY COURIER 12"
90 'LOOK AT THE FRONT PANEL OF THE PRINTER THE
100 'FONT IS 12 AND THE MODE IS LQ.
110 LPRINT CHR$(27)"@" 'RESETS THE PRINTER
120 LPRINT "THIS IS STILL LETTER QUALITY 12"
130 LPRINT CHR$(27)"F"; 'SETS ENHANCED PRINT
140 LPRINT "THIS IS LETTER QUALITY 12 ENHANCED"
150 LPRINT CHR$(27)"@" 'RESET THE PRINTER
160 LPRINT "THIS IS LQ 12, ENHANCED CANCELED BY RESET"
```

```
THIS IS LETTER QUALITY COURIER 10
THIS IS LETTER QUALITY COURIER 12
```

```
THIS IS STILL LETTER QUALITY 12
THIS IS LETTER QUALITY 12 ENHANCED
```

```
THIS IS LQ 12, ENHANCED CANCELED BY RESET
```

**Printer  
initialized**

**FS @**

FS @ initializes or resets the printer. All printer characteristics are reset to the default values (including top of form) except the user-defined buffer.

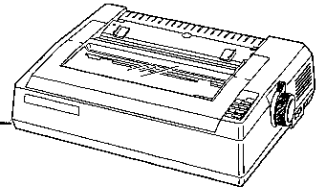
```
10 '----- CONTROL CODE FS @ -----
20 'FULL PRINTER RESET
30 '
40 'FIRST PRINT SOMETHING FANCY
50 LPRINT CHR$(27);"!";CHR$(232)
60 LPRINT "EVERY GOOD BOY DOES FUN"
70 'NOW WE'LL RESET THE PRINTER
75 'AND PRINT THE SAME THING
80 LPRINT CHR$(28)"@"
90 LPRINT "EVERY GOOD BOY DOES FUN"
100 END
```

**EVERY GOOD BOY DOES FUN**

EVERY GOOD BOY DOES FUN

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
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## Section 5



# Print Styles

The Pinwriter P6/P7 produces 256 different print styles, giving you a wide selection of character width, weight, and style. In addition, the Pinwriter offers several printing speeds, including a quiet mode which prints at a reduced speed and noise level. This section shows you how to select the print style and speed that is suitable to your needs.

### PRINT MODES

Two print modes are available with the Pinwriter: draft and letter-quality (LQ). Figure 5-1 shows examples of these modes.

THIS IS LETTER QUALITY MODE

THIS IS DRAFT MODE

**Figure 5-1 Example of Modes**

To select a mode, press the **FONT** button on the P6/P7 control panel. The selected font and mode (letter-quality or draft) appear on the font display located beneath the acrylic cover. Software can also be used to select the mode. The command ESC x(n) selects draft mode when n = 0, and letter-quality mode when n = 1. A BASIC programming line which selects the letter-quality mode would look like this.

```
LPRINT CHR$(27);"x";CHR$(1)
```

If you wish the Pinwriter to default to a certain mode at power-on, use switch SW1-4 located beneath the acrylic cover. The printer will default to draft 10 cpi (characters per inch) when SW1-4 is on, and letter-quality 10 cpi when SW1-4 is off.

## **CHARACTER WIDTH AND SPACING**

Now that you have chosen the mode you will be using, you may want to specify the spacing between characters and the width of the characters themselves.

The most commonly used pitches (characters per inch) are 10 cpi and 12 cpi. The Pinwriter also offers 15 cpi and a proportional spacing (PS) feature which allots space to a character depending upon the width of that character. Proportional spacing is used with the letter-quality mode only.

These pitches are selected by pressing the **FONT** button on the control panel or by software. ESC g selects 15 pitch, ESC M selects 12 pitch, and ESC P selects 10 pitch. ESC p(n) selects proportional spacing.

Figure 5-2 shows these pitches.

**THIS IS 10 PITCH**

**THIS IS 12 PITCH**

**THIS IS 15 PITCH**

**THIS IS PROPORTIONAL SPACING**

**Figure 5-2 Example of Pitches**

The Pinwriter also produces elongated and condensed printing. Elongated characters are double the current character width. Several control codes produce elongated printing — SO and ESC SO print elongated characters for one line only, and ESC W(n) prints elongated characters continuously until cancelled.

Condensed characters are printed at 17 or 20 characters per inch, and can be selected by ESC SI or SL.

Figure 5-3 shows condensed printing in relation to draft 10 and draft 12.

THIS IS 10 CPI DRAFT

THIS IS 12 CPI DRAFT

THIS IS 17 CPI DRAFT

THIS IS 20 CPI DRAFT

**Figure 5-3 Example of Condensed Printing**

### **CHARACTER WEIGHTS**

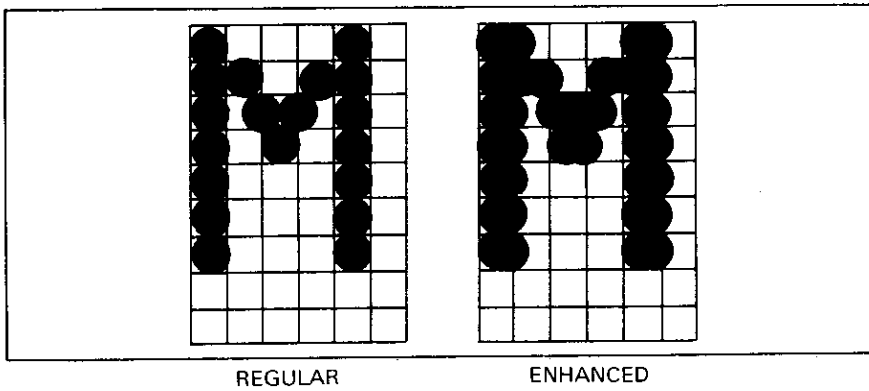
The Pinwriter P6/P7 produces several types of bold printing. In addition to regular bold, in which a character is printed twice, the Pinwriter can produce enhanced and double-strike printing.

With enhanced printing, the print head prints a character in a single pass.

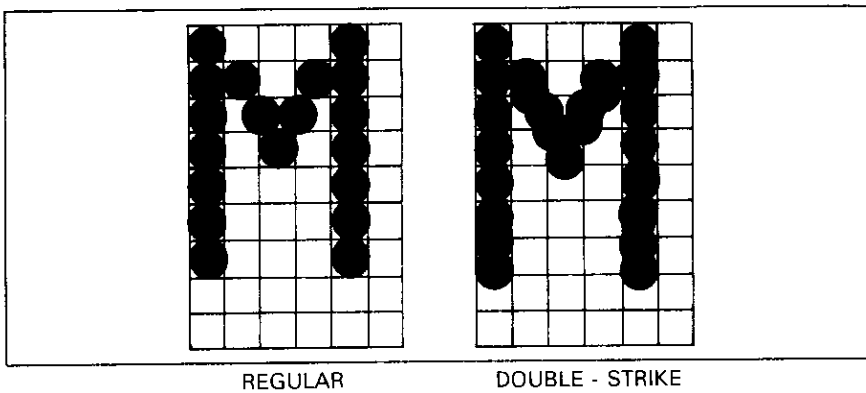
With double-strike printing, the print head prints a character once, then shifts up by half a column and prints the character again.

*Print Styles*

Figures 5-4 and 5-5 show examples of enhanced and double-strike characters.



**Figure 5-4 Regular Versus Enhanced Characters**



**Figure 5-5 Regular Versus Double-Strike Characters**

**PRINTING SPEEDS**

The Pinwriter can print at both full and half speed. The speed is selected by ESC s(n). Half-speed printing produces a noise level of 53 dBA and full-speed printing produces a noise level of 56 dBA.

The Pinwriter can also perform high-speed printing (up to 216 characters per second). High-speed printing can be selected by the FONT button or by FS S(1).

**COMBINING PRINT STYLES**

Combining the modes, widths, and weights mentioned earlier in this section produces a great number of print styles. When various special features such as underlining, subscripts and superscripts, and italic printing are added, the Pinwriter can produce a total of 256 print styles.

Most of these print styles can be produced through the command ESC!(n). All print styles can be used with either draft or letter-quality modes with the following exception: proportionally spaced characters cannot be printed in the draft mode. Table 5-1 shows the values for the different print styles.

**Table 5-1 Print Style Values**

PRINT STYLE	ASSIGNED VALUE	BIT
10 cpi	0	1
12 cpi	1	1
Proportional	2	2
Condensed*	4	3
Enhanced	8	4
Double-strike	16	5
Elongated	32	6
Italic	64	7
Underlined	128	8

\*10 cpi condensed becomes 17 cpi  
 12 cpi condensed becomes 20 cpi

---

### *Print Styles*

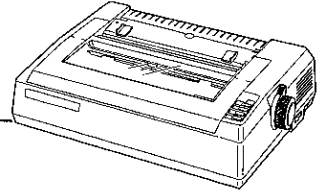
To calculate the value of n, add the values of the print styles you want. For example, if you want to select 10 cpi italic enhanced print, you would calculate the value of n like this.

10 cpi	0
Italic	64
Enhanced	<u>8</u>
n =	72

The BASIC programming line would read as follows.

```
LPRINT CHR$(27);"!";CHR$(72)
```

## Section 6



# Character Sets

The Pinwriter has two character sets which are selected by printer switches or by software. Set 1 is the italic set, and Set 2 is the IBM set. Both are available in modified form as language character sets.

Tables 6-1 through 6-3 show character sets 1 and 2 and their modifications when a language character set is selected.

**Table 6-1 Language Character Sets**

HEX CODE	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E	SW3 -				ESCAPE SEQUENCE	
	DECIMAL CODE	35	36	64	91	92	93	94	96	123	124	125	126	1	2	3		4
USA	#	S	@		\		^	-				-	OFF	OFF	OFF	OFF	ESC R (0)	
France	#	S	à	°	ç	§	^	-	é	ù	è	-	ON	OFF	OFF	OFF	ESC R (1)	
Germany	#	S	§	Ä	Ö	Ü	^	-	ä	ö	ü	ß	OFF	ON	OFF	OFF	ESC R (2)	
England	£	S	@		\		^	-				-	ON	ON	OFF	OFF	ESC R (3)	
Denmark I	#	S	@	Æ	ϕ	Å	^	-	æ	ϕ	å	-	OFF	OFF	ON	OFF	ESC R (4)	
Sweden	#	O	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü	ON	OFF	ON	OFF	ESC R (5)	
Italy	#	S	@	°	\	é	^	-	ù	à	ò	è	ì	OFF	ON	ON	OFF	ESC R (6)
Spain	Pt	S	@	í	ñ	¿	^	-	-	ñ		-	ON	ON	ON	OFF	ESC R (7)	
Japan	#	S	@		¥		^	-				-	OFF	OFF	OFF	ON	ESC R (8)	
Norway	#	O	É	Æ	ϕ	Å	Ü	é	æ	ϕ	å	ü	ON	OFF	OFF	ON	ESC R (9)	
Denmark II	#	S	É	Æ	ϕ	Å	Ü	é	æ	ϕ	å	ü	OFF	ON	OFF	ON	ESC R (0A)	
Netherlands	£	S	@		⌋		^	-		ij		-	ON	ON	OFF	ON	ESC R (0B)	

Character Sets

Table 6-2 Character Set 1 (Italic Set)

SECOND HEX DIGIT	FIRST HEX DIGIT															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL 00		SP 32	0 48	P 64	P 80	p 96	p 112	NUL 128	144	SP 160	0 176	P 192	P 208	p 224	p 240
1	01	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	! 161	f 177	A 193	Q 209	a 225	q 241
2	02	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	" 162	2 178	B 194	R 210	b 226	r 242
3	03	ETX 19	# 35	3 51	C 67	S 83	c 99	s 115	ETX 131	DC3 147	\$ 163	3 179	C 195	S 211	c 227	s 243
4	04	DC4 20	% 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	% 164	4 180	D 196	T 212	d 228	t 244
5	05		% 37	5 53	E 69	U 85	e 101	u 117	133	149	% 165	5 181	E 197	U 213	e 229	u 245
6	06	ACK 22	& 38	6 54	F 70	V 86	f 102	v 118	ACK 134	150	& 166	6 182	F 198	V 214	f 230	v 246
7	07	BEL 23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	' 167	7 183	G 199	W 215	g 231	w 247
8	08	BS 24	CAN 40	( 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	( 168	8 184	H 200	X 216	h 232	x 248
9	09	HT 25	EM 41	) 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	10	LF 26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	* 170	: 186	J 202	Z 218	j 234	z 250
B	11	VT 27	ESC 43	+ 59	K 75	[ 91	k 107	l 123	VT 139	ESC 155	+ 171	: 187	K 203	[ 219	k 235	l 251
C	12	FF 28	FS 44	< 60	L 76	^ 92	l 108	m 124	FF 140	FS 156	< 172	< 188	L 204	^ 220	l 236	m 252
D	13	CR 29	- 45	= 61	M 77	_ 93	m 109	n 125	CR 141	157	- 173	= 189	M 205	_ 221	m 237	n 253
E	14	SO 30	. 46	> 62	N 78	` 94	n 110	o 126	SO 142	158	. 174	> 190	N 206	` 222	n 238	o 254
F	15	SI 31	/ 47	? 63	O 79	~ 95	o 111	DEL 127	SI 143	159	/ 175	? 191	O 207	~ 223	o 239	255



Table 6-3 Character Set 2 (IBM Set)

SECOND HEX DIGIT	FIRST HEX DIGIT															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL 00	16	SP 32	0 48	64	P 80	96	p 112	Ç 128	È 144	á 160	⋮ 176	Ł 192	ł 208	α 224	≡ 240
1	01	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	œ 145	í 161	⋮ 177	± 193	ƒ 209	β 225	± 241
2	02	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	⋮ 178	ƒ 194	ƒ 210	ƒ 226	∞ 242
3	03	DC3 19	35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	ı 179	ı 195	ı 211	π 227	∞ 243
4	04	DC4 20	36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	ı 180	ı 196	ı 212	Σ 228	ı 244
5	05	♣ 21	‰ 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	ı 181	ı 197	ı 213	σ 229	ı 245
6	06	♠ 22	& 38	6 54	F 70	V 86	f 102	v 118	â 134	ô 150	đ 166	ı 182	ı 198	ı 214	μ 230	÷ 246
7	07	BEL 23	39	7 55	G 71	W 87	g 103	w 119	ç 135	û 151	ö 167	ı 183	ı 199	ı 215	ı 231	∞ 247
8	08	BS 24	CAN 40	( 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	ç 168	ı 184	ı 200	ı 216	Φ 232	ı 248
9	09	HT 25	EM 41	) 57	I 73	Y 89	i 105	y 121	ë 137	Û 153	ı 169	ı 185	ı 201	ı 217	θ 233	• 249
A	10	LF 26	‡ 42	: 58	J 74	Z 90	j 106	z 122	è 138	Û 154	ı 170	ı 186	ı 202	ı 218	Ω 234	ı 250
B	11	VT 27	ESC 43	+ 59	K 75	91	k 107	123	ı 139	ç 155	½ 171	ı 187	ı 203	ı 219	ø 235	√ 251
C	12	FF 28	FS 44	< 60	L 76	92	l 108	124	ı 140	£ 156	¼ 172	ı 188	ı 204	ı 220	∞ 236	η 252
D	13	CR 29	— 45	= 61	M 77	93	m 109	125	ı 141	¥ 157	ı 173	ı 189	ı 205	ı 221	φ 237	ı 253
E	14	SO 30	· 46	> 62	N 78	94	n 110	126	Ä 142	Pt 158	« 174	ı 190	ı 206	ı 222	ε 238	ı 254
F	15	SI 31	/ 47	? 63	O 79	— 95	o 111	DEL 127	Å 143	f 159	» 175	ı 191	ı 207	ı 223	∩ 239	SP 255

ASCII CHARACTER



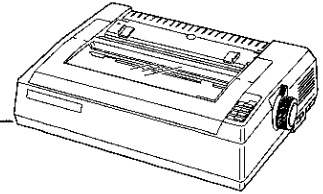
DECIMAL CODE



MODIFIED ACCORDING TO LANGUAGE CHARACTER SETS CHART



## Section 7



# Dot Graphics

The Pinwriter has the ability to use all 24 pins in the print head to produce high-resolution dot graphics. By addressing the individual pins, you can print whatever graphics you want.

In the graphics mode, none of the predefined characters or symbols in the printer's memory are used. You create the patterns of dots that are printed by controlling each dot position.

This section explains how to address the pins on the print head to produce your own dot graphics, and introduces you to some of the graphics escape sequences used with the Pinwriter P6/P7.

### ADDRESSING THE PINS

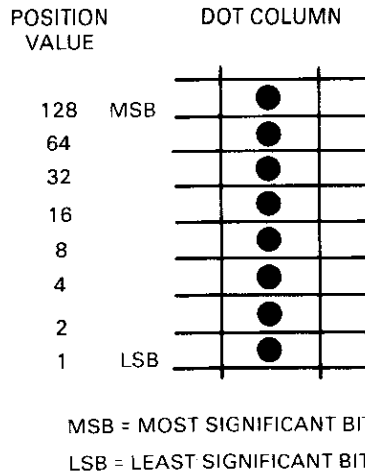
In the graphics mode, data received by the printer controls the pins for only one vertical column of dots at a time, instead of controlling the selection of an entire character as in regular printing. Although you must send more information to the printer, you have full control over what each pin is doing.

### 8-Pin Graphics

The Pinwriter may use all 24 pins to produce graphic designs, or it may use only 8 pins. With the 8-pin graphics modes, the printer prints with every third pin.

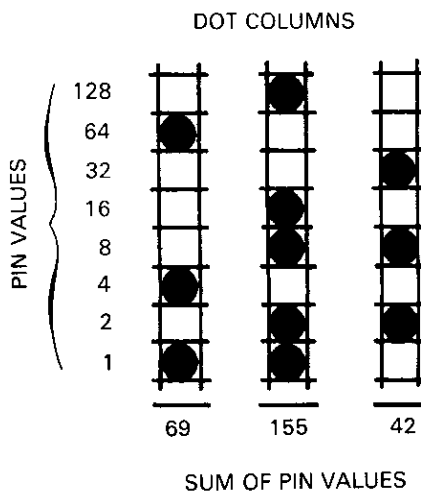
A byte of data contains eight bits, and each bit controls one of eight print head pins used for 8-pin graphics. These pins print a vertical dot column of up to eight dots. Each pin and its corresponding position in the dot column have an assigned value. Figure 7-1 shows a dot column and the value of each position.

*Dot Graphics*



**Figure 7-1 Dot Column Position Values for 8-Pin Graphics**

Since 8 bits (or dot column positions) make up a data byte, the value of a data byte is the sum of the values of the dots that you want to print. Figure 7-2 shows what the result would be if you sent the printer the values of 69, 155, and 42.



**Figure 7-2 Data Byte Values for 8-Pin Graphics**

**24-Pin Graphics**

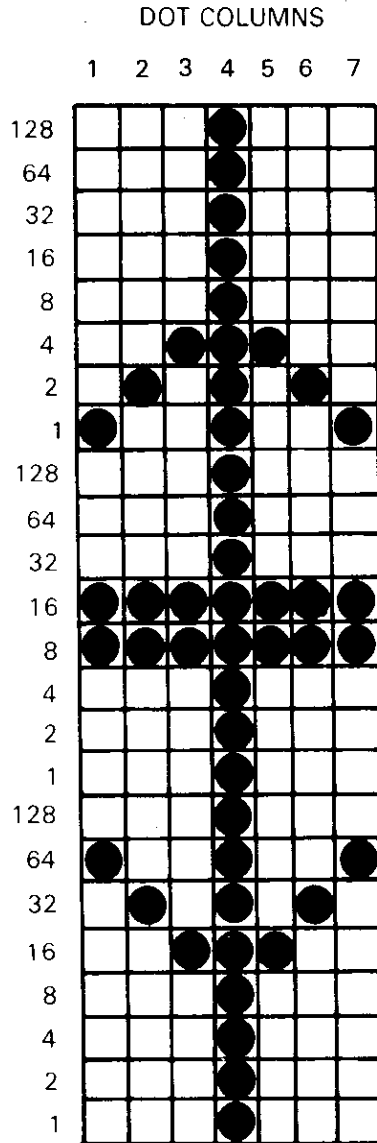
With the 24-pin graphics modes, the printer may use all 24 pins on the print head. The 24 pins print as 3 eight-bit bytes stacked vertically. This means that for each dot column of 24-pin graphics, you must send 3 bytes of graphics data.

Figure 7-3 shows what the printer would produce given the data bytes listed in Table 7-1.

**Table 7-1 Graphics Data Bytes**

<b>DOT COLUMN</b>	<b>DATA BYTES SUPPLIED TO PRINTER</b>
1	1,24,64
2	2,24,32
3	4,24,16
4	255,255,255
5	4,24,16
6	2,24,32
7	1,24,64

*Dot Graphics*



**Figure 7-3 Example of 24-Pin Graphics**

The Pinwriter prints an entire 24-pin vertical dot column at a time. In the example in Figure 7-3, the printer would print the dots for the values 1, 24, and 64, return to the top of the second column and print 2, 24, and 32, and so on.

## GRAPHICS ESCAPE SEQUENCES

### Graphics Densities

Eight-pin dot graphics can be selected by using one of the following four escape sequences.

**Table 7-2 Dot Graphics Density Escape Sequences**

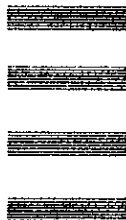
ESCAPE SEQUENCE	FUNCTION
ESC K (n1)(n2)	Single density (60 dots per inch)
ESC L (n1)(n2)	Double density (120 dots per inch)
ESC Y (n1)(n2)	High-speed double density (120 dots per inch)
ESC Z (n1)(n2)	Quadruple density (240 dots per inch)

The following BASIC program shows how to use ESC Z (n1)(n2) to produce quadruple-density graphics.

```

10 '--- CONTROL CODE ESC Z N1 N2 ---
20 '--- SELECTS GRAPHIC QUAD DENSITY AT 240 DPI ---
30 'WE'LL PRINT 4 LINES OF QUAD DENSITY GRAPHICS
35 WIDTH "LPT1:",151
40 FOR M=1 TO 4
50 LPRINT CHR$(27);"Z";CHR$(150);CHR$(0);
60 FOR Z=1 TO 150
70 LPRINT CHR$(255);
80 NEXT Z
85 LPRINT
90 NEXT M
100 END

```



## Dot Graphics

Twenty-four-pin dot graphics can be selected by FS Z(n1)(n2). The following BASIC program shows how to use FS Z(n1)(n2) to produce 360 dpi graphics.

```
10 '--- CONTROL CODE FS Z N1 N2 ---
20 '--- SELECTS HIGH DENSITY GRAPHICS AT 360 DPI ---
30 'WE'LL PRINT 4 LINES OF HIGH DENSITY GRAPHICS
35 WIDTH "LPT1:",151
40 FOR M=1 TO 4
50 LPRINT CHR$(28);"Z";CHR$(150);CHR$(0);
60 FOR Z=1 TO 150
70 LPRINT CHR$(255);CHR$(255);CHR$(255);
80 NEXT Z
85 LPRINT
90 NEXT M
100 END
```



### Graphics Modes

The command ESC \*(m)(n1)(n2) allows you to use any one of the 10 graphics modes. The value m represents the graphics mode as listed in Table 7-3.

Table 7-3 Graphics Modes

OPTION	NUMBER OF PINS	m	DOTS PER INCH
Single density	8	0	60
Double density	8	1	120
High speed, double density	8	2	120
Quadruple density	8	3	240
CRT screen	8	4	80
Other CRT screens	8	6	90
Single density	24	32	60
Double density	24	33	120
Other CRT screens	24	38	90
Triple density	24	39	180

The values  $n1$  and  $n2$  represent the number of bytes of graphics data that follow the escape sequence. The Pinwriter uses the formula  $n1 + (n2 \times 256)$  to determine how many bytes of graphics data to expect. Use the following formulas to determine the values of  $n1$  and  $n2$ , given the number of dot columns of graphics data that you want to send.

$n2 = \text{number of dot columns} / 256$  where  $n2$  is always a whole number

$n1 = \text{number of dot columns} - (n2 \times 256)$

For example, if you want to send 1072 columns of graphics data,  $n2$  would be 4 and  $n1$  would be 48. Thus,  $48 + (4 \times 256) = 1072$ .

Once the Pinwriter receives the values of  $n1$  and  $n2$  and calculates how many bytes to expect, it interprets all bytes as graphics data. Therefore, you must supply enough bytes of graphics data or the printer will stop and wait for more data. If you supply too much graphics data, the excess will be interpreted and printed as regular text.

## Dot Graphics

It is important to be aware of the maximum number of dot columns that you can specify. This depends upon the graphics density and is determined by the following formula.

$$\text{maximum number of dot columns} = \text{dots per inch} \times \text{paper width}$$

Table 7-4 shows the maximum number of dot columns at different dot densities using the standard 13.7-inch paper width of continuous form paper.

**Table 7-4 Maximum Dot Columns**

DPI	MAXIMUM NUMBER OF DOT COLUMNS
60	816
120	1632
180	2448
240	3264
360	4896

Likewise, the following formula determines the maximum value of n2.

$$n2 \text{ max} = \text{maximum number of dot columns} / 256$$

Once the maximum value of n2 has been calculated, you can determine the maximum value of n1 by using this formula.

$$n1 \text{ max} = \text{maximum number of dot columns} - (\text{maximum whole number of } n2 \times 256)$$

Table 7-5 shows what the maximum values of n1 and n2 would be at different graphics densities. All calculations are based upon a 13.7-inch paper width.

**Table 7-5 Calculations of Maximum Values**

DPI	MAXIMUM DOT COLUMNS	n2 MAX	n1 MAX
60	816	3	48
120	1632	6	96
180	2448	9	144
240	3264	12	192
360	4896	19	32

In our discussion of 24-pin graphics, we said that the 24 pins are mapped as 3 eight-bit bytes stacked vertically. Therefore, with the 24-pin graphics modes, you must send 3 bytes of data for each dot column. You refer to dot columns instead of bytes of graphics data when calculating n1 and n2.


The following example shows how ESC\*(m)(n1)(n2) is used in a BASIC program.


```


10 '--- CONTROL CODE ESC * (M) ---
20 '--- SELECTS GRAPHIC DENSITY ACCORDING TO (M) ---
30 'WE'LL SELECT ALL TEN AVAILABLE
40 FOR M=0 TO 4
50 GOSUB 160
60 NEXT M
70 M=6:GOSUB 160
90 M=32:GOSUB 160
110 M=33:GOSUB 160
130 M=38:GOSUB 160
140 M=39:GOSUB 160
150 END
160 LPRINT "THIS IS GRAPHICS MODE ";M;
165 WIDTH "LPT1:",253
170 LPRINT CHR$(27);"*";CHR$(M);CHR$(50);CHR$(0);
180 FOR Z=1 TO 253
190 LPRINT CHR$(255);
200 NEXT Z
210 LPRINT
220 RETURN


```


## Dot Graphics

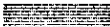
THIS IS GRAPHICS MODE 0 


THIS IS GRAPHICS MODE 1 


THIS IS GRAPHICS MODE 2 


THIS IS GRAPHICS MODE 3 


THIS IS GRAPHICS MODE 4 

THIS IS GRAPHICS MODE 6 

THIS IS GRAPHICS MODE 32 

THIS IS GRAPHICS MODE 33 

THIS IS GRAPHICS MODE 38 

THIS IS GRAPHICS MODE 39 


### Reassigning Graphic Densities

ESC?(s)(m) takes any one of the 10 graphics modes and assigns it to ESC K, L, Y, or Z. The value s is the letter of the ESC sequence K, L, Y, or Z. The value m is the number of the graphics mode as shown in Table 7-3.

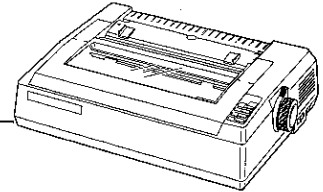
Remember that when assigning a 24-pin graphics mode to ESC K, L, Y, or Z, three bytes of data are required for each dot column.

The following example illustrates how ESC?(s)(m) is used in a BASIC program.

```
10 '---- CONTROL CODE ESC ? (m) (n) ---
20 '---- ASSIGNS EQUIVALENT GRAPHIC RESOLUTIONS ----
40 'SET UP THE GRAPHICS MODE "L" AS DOUBLE DENSITY
50 LPRINT CHR$(27);"?";"K";CHR$(39);
55 LPRINT CHR$(27)"K";CHR$(70);CHR$(0);
60 FOR Z=1 TO 70
70 LPRINT CHR$(255);CHR$(255);CHR$(255);
80 NEXT Z
85 LPRINT
100 END
```



## Section 8



# User-Defined Characters

A user-defined character is a special character which you design. There may be times when you want to use a character that does not exist in the printer's resident character sets. You may want a mathematical symbol or a specially-designed letter of the alphabet. The Pinwriter lets you create up to 128 of these special characters.

### SETTING UP THE USER-DEFINED CHARACTER SET

At power-up, the user-defined area is blank except for control code locations 00 through 32. There are two ways to set up this area.

1. Copy the printer's internal character set to the user-defined area. This is done by the following escape sequence.

```
ESC :(NUL)(NUL)(NUL)
```

You can now replace any of the characters in this set with a character of your own design.

#### NOTE

Control functions replaced by user-defined characters will not be available for use.

2. Instead of replacing a character in an existing character set, you can simply create your own character and load it into the user-defined area. Keep in mind that this is the only character in the user-defined area, so you must select another character set to print any other characters. If you attempt to print a character that has not been defined or loaded, the printer will ignore the command.

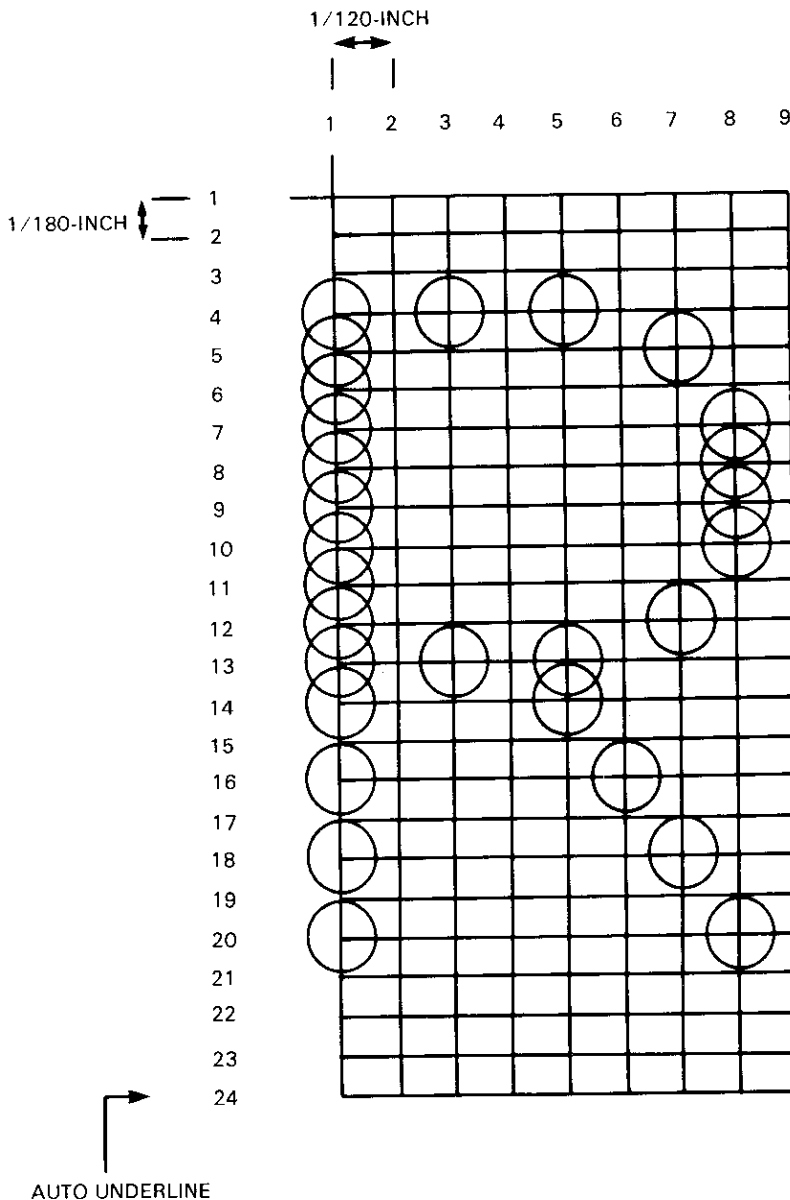
The two BASIC programs at the end of this section demonstrate both ways of setting up the user-defined area.

### DEFINING A CHARACTER

The first step in defining a character is to plot the dots on a matrix. To do this, it is important to understand how to set up a print matrix for normal printing. The Pinwriter P6/P7 series printers use different dot matrixes for different types of printing. Draft 10 and draft 12 use a 17x9 matrix. Each dot is 0.2 mm (0.008 inches) in diameter. Standard spacing between characters is 3 dot positions. Figure 8-1 illustrates a draft 10 and draft 12 dot matrix.

*User-Defined Characters*

Letter-quality 10 printing uses a 17x32 matrix, letter-quality 12 uses a 15x26 matrix, and letter-quality PS uses a 17x37 matrix. Each dot is 0.2 mm (0.008 inches) in diameter. Standard spacing between characters for all 3 types of letter-quality printing is 4 dot positions. Figure 8-2 illustrates the letter-quality printing dot matrixes.



**Figure 8-1 Draft 10 and Draft 12 Dot Matrix**

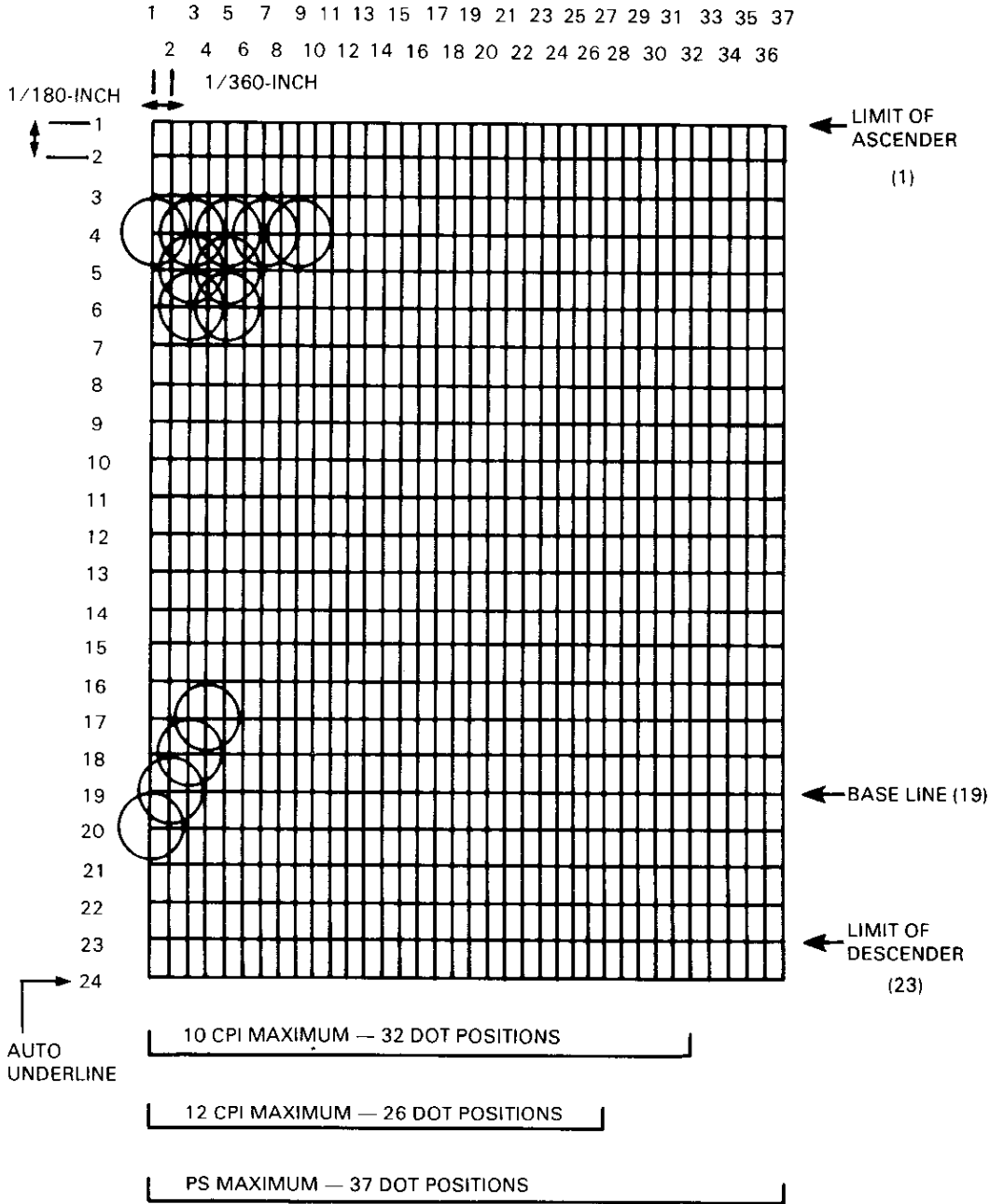


Figure 8-2 Letter-Quality Dot Matrix

## User-Defined Characters

For user-defined characters, the maximum height of the matrix is always 24 dots—one dot for each pin on the print head. The width of the matrix depends upon the print mode you are using. Table 8-1 shows the maximum width of a matrix where

- A = the number of dot columns to the left of the character
- B = the number of dot columns that make up the character
- C = the number of dot columns to the right of the character.

**Table 8-1 Maximum Dot Column Values for Print Modes**

PRINT MODE	B (MAXIMUM)	A+B+C MUST =
Draft	9	12
Letter-quality 10	29	36
Letter-quality 12	25	30
Proportional spacing	37	—

On a draft, letter quality and proportional spacing matrix, dots may not be plotted in adjacent columns. Therefore, on a matrix 12 dots wide, a maximum of 6 dots may be plotted in any one row. There is no restriction to plotting dots vertically.

Next you must translate the dot pattern to a numeric format that the printer can read. As discussed in Section 7, each print column of 24 dots is divided into 3 bytes of 8 dots. Each dot position has an assigned value, as shown in Figure 8-3.

To calculate the value of each byte, you must go down the column, adding the values of the dots within the byte. For example, the values of the 3 bytes in the first dot column in Figure 8-3 would be 31, 253, and 80.

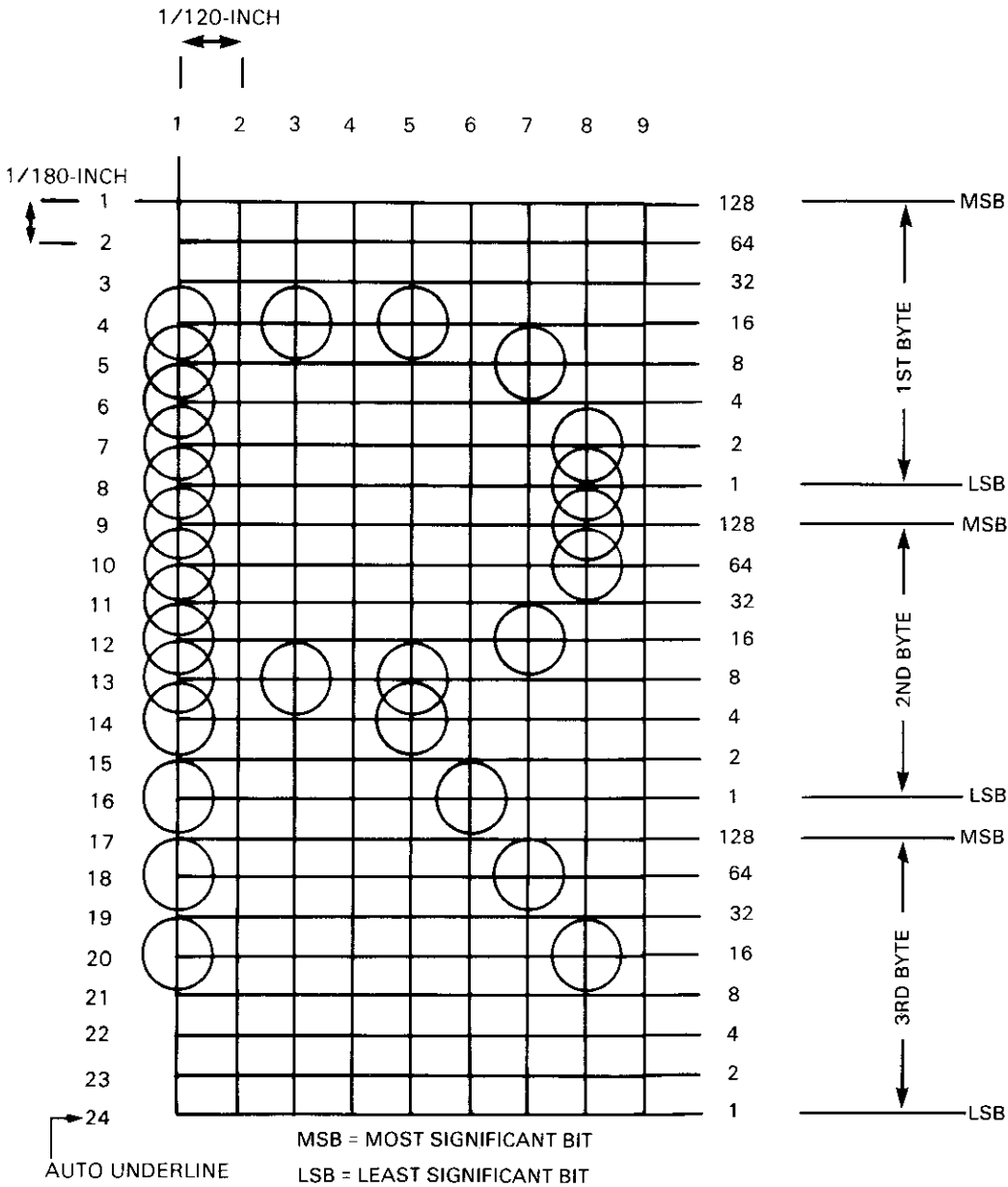


Figure 8-3 Dot Position Values

---

## *User-Defined Characters*

### **LOADING A CHARACTER INTO THE USER-DEFINED CHARACTER SET**

Now that you have defined a special character, you must load it into the user-defined area so that it can be printed. To do this, use the following escape sequence.

```
ESC & NUL(n1)(n2)
```

The values *n1* and *n2* specify the range of characters that will be defined or redefined. For example, to redefine the characters between J and P, *n1* would be J and *n2* would be P. The BASIC line would read as follows.

```
LPRINT CHR$(27);"&";CHR$(0);"JP"
```

To define or redefine only one character, *n1* and *n2* would be the same.

The values *n1* and *n2* must be followed by the data that defines the characters. The data must be in the following format.

```
A,B,C,D1,D2,D3,E1,E2,E3,...
```

The first 3 bytes (A, B, and C) specify the width of the character and the space on either side of it as follows.

A = the number of dot columns to the left of the character

B = the number of dot columns that make up the character

C = the number of dot columns to the right of the character

These first 3 bytes are followed by the values of each dot column that makes up the character. Since it takes 3 bytes to specify the dots in one dot column, the printer expects the number of columns  $\times$  3 bytes of data to follow C.

Figure 8-4 again shows you the character we defined earlier. The value of A is 2, the value of B is 9, and the value of C is 1. Table 8-2 gives the values of the data bytes that follow.

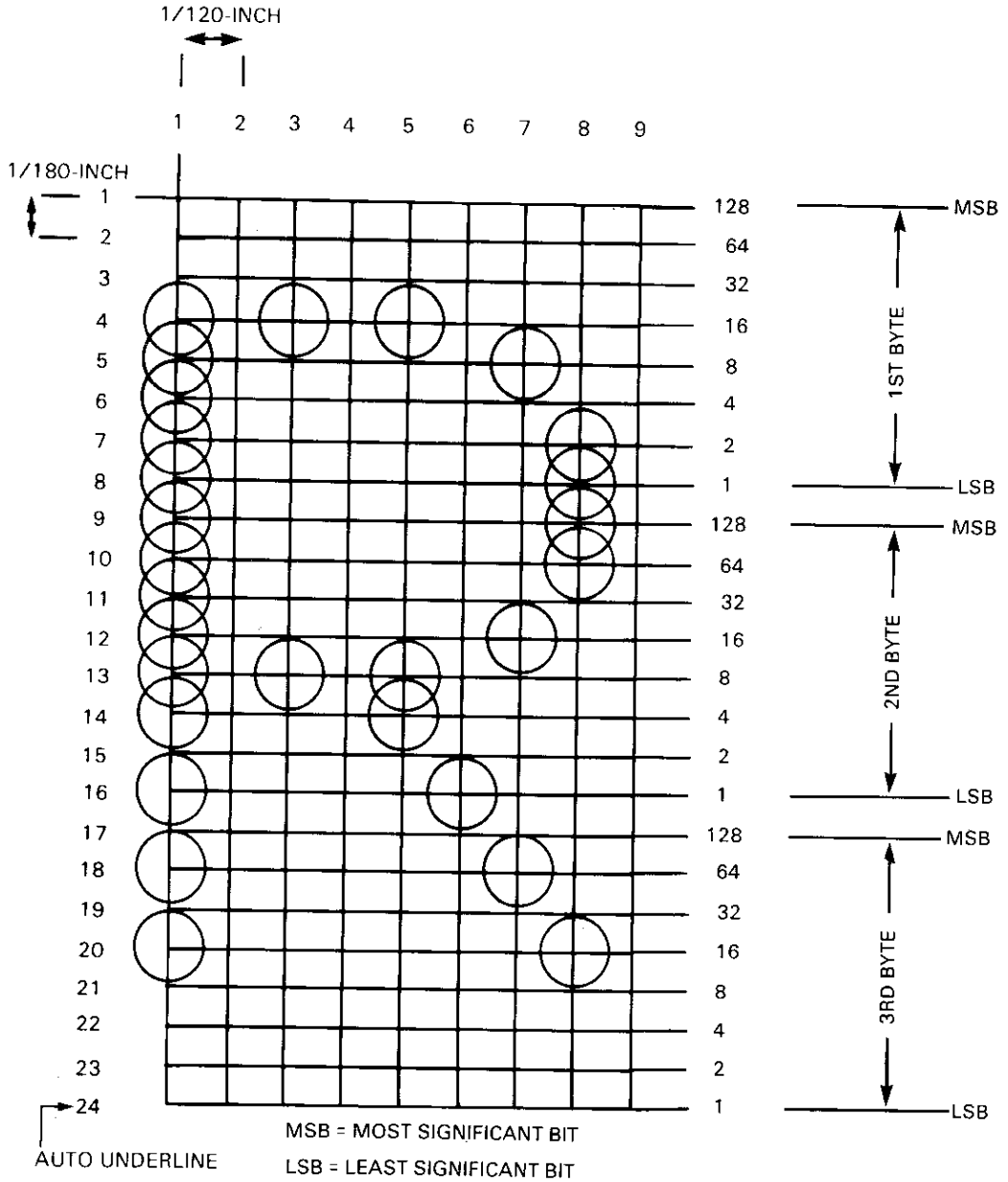


Figure 8-4 User-Defined Character with Dot Position Values

**Table 8-2 Data Byte Values**

COLUMN	DATA BYTE VALUES
1	31,253,80
2	0,0,0
3	16,8,0
4	0,0,0
5	16,12,0
6	0,1,0
7	8,16,64
8	3,192,16
9	0,0,0

**Mixing Print Modes**

Mixing the three print modes with user-defined characters is not permitted. For example, you may not define characters in the draft mode, select the letter-quality mode, and then define more characters. All the characters defined in the draft mode will be destroyed. Only one print mode may be stored in the user-defined memory location at one time.

User-defined characters may only be printed in the print mode in which they were defined. If you define characters in the draft mode, then switch to proportional spacing and select the user-defined character set, printing will not occur. You must return to the draft mode to select and print the user-defined characters.

Be aware that once a character is loaded into the user-defined character set, it does not remain there permanently. Whenever the printer is turned off, all the user-defined characters are destroyed.

**SELECTING THE USER-DEFINED CHARACTER SET**

Now that you have created a user-defined character set, you must inform the printer whether to use the user-defined character set or the printer's internal character set. There are two ways of doing this.

You can send the command ESC  $\% (n)$  where  $n=0$  selects the internal character set and  $n=1$  selects the user-defined character set. Or you can select the user-defined character set from the printer's control panel. Press the **FONT** button so that A is displayed on the FONT indicator. The user-defined character set is now selected.

Note that the user-defined character set must be loaded before you can select it from the control panel.

The following is a BASIC programming line used to select the user-defined character set.

```
LPRINT CHR$(27);"%";CHR$(1)
```

**PROGRAMMING EXAMPLES**

The following two programs show how the user-defined escape sequences are used to define, load, select, and print the user-defined character illustrated in this section.

**Program 1**

Lines 15 through 30 copy the printer's internal character set to the user-defined area, load the user-defined character set, and define the character(s) to be redefined (in this case, the letter *A*). Line 40 gives the values of A, B, and C. The values of the data bytes are specified in the last 9 lines of the program. Note that 3 bytes of data are specified for each column.

Lines 90 through 130 select between the internal character set and the user-defined character set and instruct the printer to print data. Note in the printout that when the user-defined character set is selected, the character *A* is replaced by the newly-defined character.

```
5 '----USER DEFINED CHARACTER + COPIED CHARA. SET----
10 LPRINT CHR$(27) "x" CHR$(0); 'SETS DRAFT PRINT MODE
15 LPRINT CHR$(27) ":" CHR$(0)CHR$(0)CHR$(0); 'COPIES CHARA. SET
20 LPRINT CHR$(27) "&" CHR$(0); 'LOADS UD CHARA.DEF.
30 LPRINT "AA"; 'DEFINES RANGE
40 LPRINT CHR$(2) CHR$(9) CHR$(1); 'DEFINES MATRIX
50 FOR I=1 TO 9*3
60   READ A
```

## User-Defined Characters

```
70  LPRINT CHR$(A);
80  NEXT
90  LPRINT "AAAAA"
100 LPRINT CHR$(27) "% " CHR$(1); 'SELECTS UD SET
110 LPRINT "AAAAA ABCDEF AabccBAa"
120 LPRINT CHR$(27) "% " CHR$(0); 'SELECTS INTERNAL SET
130 LPRINT "AAAAA"
140 END
150 DATA 31,253,80
160 DATA 0,0,0
170 DATA 16,8,0
180 DATA 0,0,0
190 DATA 16,12,0
200 DATA 0,1,0
210 DATA 8,16,64
220 DATA 3,192,16
230 DATA 0,0,0
```

```
AAAAA
RRRRR RBCDEF RabccBRa
AAAAA
```

### Program 2

Instead of first copying the internal character set to the user-defined area, Program 2 loads only the character *A* into the area. Line 40 gives the values of *A*, *B*, and *C*, and the last 9 lines of the program define the data bytes.

Lines 90 through 130 select between the internal and user-defined character sets and instruct the printer to print the character *A*. Note that when the user-defined character set is selected, the newly-defined character is the only character that can be printed. You must select the internal character set to print any other characters.

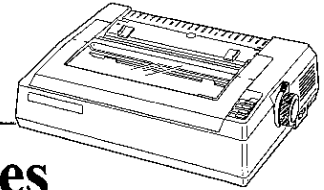
```
5  '----USER DEFINED CHARACTER----
10 LPRINT CHR$(27) "x" CHR$(0); 'SETS DRAFT PRINT MODE
20 LPRINT CHR$(27) "&" CHR$(0); 'LOADS UD CHARA.DEF.
30 LPRINT "AA"; 'DEFINES RANGE
40 LPRINT CHR$(2) CHR$(9) CHR$(1); 'DEFINES MATRIX
50 FOR I=1 TO 9*3
```

```
60  READ A
70  LPRINT CHR$(A);
80  NEXT
90  LPRINT "AAAAA"
100 LPRINT CHR$(27) "% " CHR$(1); 'SELECTS UD SET
110 LPRINT "AAAAA"
120 LPRINT CHR$(27) "% " CHR$(0); 'SELECTS INTERNAL SET
130 LPRINT "AAAAA"
140 END
150 DATA 31,253,80
160 DATA 0,0,0
170 DATA 16,8,0
180 DATA 0,0,0
190 DATA 16,12,0
200 DATA 0,1,0
210 DATA 8,16,64
220 DATA 3,192,16
230 DATA 0,0,0
```

```
AAAAA
RRRRR
AAAAA
```



## Appendix A



# Control Codes and Sequences by Function

Tables A-1 through A-6 allow you to reference control codes and sequences by function. The codes and sequences are divided into the following categories of functions: print styles, horizontal spacing, vertical spacing, graphics, character sets, and miscellaneous.

**Table A-1 Quick Reference to Print Style Commands**

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
SO	Selects one-line elongated printing. Same as ESC SO.	LPRINT CHR\$(14)
SI	Selects condensed printing. Same as ESC SI.	LPRINT CHR\$(15)
DC2	Cancels condensed printing, returning the printer to the previously set mode.	LPRINT CHR\$(18)
DC4	Cancels elongated printing.	LPRINT CHR\$(20)
ESC 4	Selects italic printing.	LPRINT CHR\$(27);"4"
ESC 5	Cancels italic printing.	LPRINT CHR\$(27);"5"
ESC E	Selects enhanced printing.	LPRINT CHR\$(27);"E"
ESC F	Cancels enhanced printing.	LPRINT CHR\$(27);"F"
ESC G	Selects double-strike printing.	LPRINT CHR\$(27);"G"
ESC H	Cancels double-strike printing.	LPRINT CHR\$(27);"H"
ESC M	Selects 12 cpi printing.	LPRINT CHR\$(27);"M"
ESC P	Selects 10 cpi printing.	LPRINT CHR\$(27);"P"

*Control Codes and Sequences by Function*

**Table A-1 Quick Reference to Print Style Commands**

<b>CONTROL CODE OR SEQUENCE</b>	<b>FUNCTION</b>	<b>PROGRAMMING LINE</b>
ESC S(n)	Selects superscripts or subscripts. n=0 selects superscripts. n=1 selects subscripts.	LPRINT CHR\$(27);"S";CHR\$(1)
ESC T	Cancelles superscripts or subscripts.	LPRINT CHR\$(27);"T"
ESC W(n)	Selects or cancels elongated printing. n=1 selects elongated printing. n=0 cancels elongated printing.	LPRINT CHR\$(27);"W";CHR\$(1)
ESC g	Selects 15 cpi printing.	LPRINT CHR\$(27);"g"
ESC p(n)	Selects or cancels proportional spacing. n=1 selects proportional spacing. n=0 cancels proportional spacing.	LPRINT CHR\$(27);"p";CHR\$(0)
ESC x(n)	Selects the draft or letter-quality mode. n=0 selects draft mode. n=1 selects letter-quality mode.	LPRINT CHR\$(27);"x";CHR\$(0)
ESC!(n)	Selects any print style or combination according to the value of n (n = 0 to 255). See Table 4-4 to calculate the value of n.	LPRINT CHR\$(27);"!";CHR\$(72)
ESC SI	Selects condensed printing. Same as SI.	LPRINT CHR\$(27);CHR\$(15)
ESC SO	Selects one-line elongated printing. Same as SO.	LPRINT CHR\$(27);CHR\$(14)

Table A-2 Quick Reference to Horizontal Spacing Commands

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
Backspace (BS)	Moves the print head one space to the left (backspace).	LPRINT CHR\$(8)
Horizontal Tab (HT)	Advances the paper to the next preset horizontal tab.	LPRINT CHR\$(9)
ESC D(n1)(n2) (n...) NUL	Sets horizontal tabs where n is the character column. The maximum value of n depends upon the pitch. Tabs must be set in ascending order. Up to 32 tabs may be set.	LPRINT CHR\$(27);"D";CHR\$(15); CHR\$(10);CHR\$(15);CHR\$(10)
ESC Q(n)	Sets right margin where n = 1 to 255 character columns. Maximum value of n depends upon the pitch.	LPRINT CHR\$(27);"Q";CHR\$(10)
ESC a(n)	Selects justification. n = 0 selects left justification. n = 1 selects center justification. n = 2 selects right justification. n = 3 selects full justification.	LPRINT CHR\$(27);"a";CHR\$(1)
ESC e 0(n)	Sets horizontal tabs at every column n, based upon the current pitch. The value of n ranges from 1 to 255.	LPRINT CHR\$(27);"e";CHR\$(48); CHR\$(50)
ESC f 0(n)	Moves print head n columns after printing data in buffer. The value of n ranges from 1 to 255.	LPRINT CHR\$(27);"f";CHR\$(48); CHR\$(30)
ESC l(n)	Sets left margin where n = 0 to 255 character columns.	LPRINT CHR\$(27);"l";CHR\$(40)
ESC \$(n1)(n2)	Moves the print head to an absolute horizontal position. The position, in inches, is determined by the formula $(n1+n2 \times 256) / 60$ .	LPRINT CHR\$(27);"\$";CHR\$(50); CHR\$(80)

*Control Codes and Sequences by Function*

**Table A-2 Quick Reference to Horizontal Spacing Commands**

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
ESC \ (n1)(n2)	Moves the print head a specified distance in either direction. The distance, in inches, is determined by the following formulas.  Draft $(n1+n2 \times 256) / 120$ LQ $(n1+n2 \times 256) / 180$ PS $(n1+n2 \times 256) / 180$	LPRINT CHR\$(27);"\ ";CHR\$(60); CHR\$(0)
ESC SP(n)	Sets space between characters at n dots where n = 0 to 127.	LPRINT CHR\$(27);CHR\$(32); CHR\$(12)
FS E(n)	Selects horizontal enlargement.  n=0 cancels enlargement. n=1 selects double horizontal enlargement. n=2 selects triple horizontal enlargement.	LPRINT CHR\$(28);"E";CHR\$(2)

**Table A-3 Quick Reference to Vertical Spacing Commands**

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
Line Feed (LF)	Advances the paper one line.	LPRINT CHR\$(10)
Form Feed (FF)	Advances the paper one page length.  With sheet feeder installed, ejects a sheet already in the printer to the stacker and inserts the next sheet from the hopper.	LPRINT CHR\$(12)
Vertical Tab (VT)	Advances the paper to the next vertical tab.	LPRINT CHR\$(11)
ESC 0	Sets line spacing at 8 lines per inch.	LPRINT CHR\$(27);"0"
ESC 2	Sets line spacing at 6 lines per inch.	LPRINT CHR\$(27);"2"

Table A-3 Quick Reference to Vertical Spacing Commands

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
ESC 3(n)	Sets line spacing at n/180-inch where n = 0 to 255.	LPRINT CHR\$(27);"3";CHR\$(40)
ESC A(n)	Sets line spacing at n/60-inch where n = 0 to 127.	LPRINT CHR\$(27);"A";CHR\$(20)
ESC B(n1)(n2) (n...)NUL	Sets vertical tabs where n = 1 to 255. Up to 32 tabs may be set. Tabs must be set in ascending order.	LPRINT CHR\$(27);"B";CHR\$(6); CHR\$(20);CHR\$(35);CHR\$(0)
ESC C(n)	Sets page length at n lines per page where n = 1 to 127.	LPRINT CHR\$(27);"C";CHR\$(40)
ESC C NUL(n)	Sets page length at n inches per page where n = 1 to 22.	LPRINT CHR\$(27);"C";CHR\$(0); CHR\$(10)
ESC J(n)	Advances the paper n/180-inch where n = 0 to 255. Line spacing is not changed.	LPRINT CHR\$(27);"J";CHR\$(90)
ESC N(n)	Selects skip-over perforation function where n = 1 to 127 lines.	LPRINT CHR\$(27);"N";CHR\$(20)
ESC O	Cancel skip-over perforation function.	LPRINT CHR\$(27);"O"
ESC b(c)(n1)(n2) (n...)NUL	Sets vertical tabs in tab channels.	LPRINT CHR\$(27);"b";CHR\$(2); CHR\$(2);CHR\$(4);CHR\$(7);CHR\$(0)
ESC e l(n)	Sets vertical tabs at every line n, based upon the current line spacing. The value of n ranges from 1 to 255.	LPRINT CHR\$(27);"e";CHR\$(49); CHR\$(7)
ESC f l(n)	Advances the paper n lines after printing data in buffer. The value of n ranges from 1 to 255.	LPRINT CHR\$(27);"f";CHR\$(49); CHR\$(10)
ESC j(n)	Reverses the paper n/180-inch where n=0 to 255. Line spacing is not changed.	LPRINT CHR\$(27);"j";CHR\$(90)
ESC / (n)	Selects a vertical tab channel where n = 0 to 7.	LPRINT CHR\$(27);"/";CHR\$(4)

*Control Codes and Sequences by Function*

**Table A-3 Quick Reference to Vertical Spacing Commands**

<b>CONTROL CODE OR SEQUENCE</b>	<b>FUNCTION</b>	<b>PROGRAMMING LINE</b>
FS F	Selects forward line feed.	LPRINT CHR\$(28);"F"
FS R	Selects reverse line feed. This command is ignored when cut sheet feeder is installed.	LPRINT CHR\$(28);"R"
FS V(n)	Selects vertical enlargement. n=0 cancels enlargement. n=1 selects double vertical enlargement.	LPRINT CHR\$(28);"V";CHR\$(1)

**Table A-4 Quick Reference to Graphics Commands**

<b>CONTROL CODE OR SEQUENCE</b>	<b>FUNCTION</b>	<b>PROGRAMMING LINE</b>
ESC K(n1)(n2)	Sets 8-bit single-density dot mode (60 dots per inch).	LPRINT CHR\$(27);"K";CHR\$(48);CHR\$(4)
ESC L(n1)(n2)	Sets 8-bit double-density dot mode (120 dots per inch).	LPRINT CHR\$(27);"L";CHR\$(48);CHR\$(4)
ESC Y(n1)(n2)	Selects high-speed double-density dot graphics (120 dots per inch).	LPRINT CHR\$(27);"Y";CHR\$(48);CHR\$(4)
ESC Z(n1)(n2)	Selects quadruple-density dot graphics (240 dots per inch).	LPRINT CHR\$(27);"Z";CHR\$(48);CHR\$(4)
ESC ?(s)(m)	Assigns any graphics mode to any one of the four other graphics commands (ESC K,L,Y,Z).	LPRINT CHR\$(27);"?";CHR\$(32)
ESC *(m)(n1)(n2)	Prints selected-density dot graphics. See Table 4-3 for the value of m.	LPRINT CHR\$(27);"*";CHR\$(3);CHR\$(48);CHR\$(4)
FS Z(n1)(n2)	Selects high-density dot graphics (360 dpi).	LPRINT CHR\$(28);"Z";CHR\$(48);CHR\$(4)

Table A-5 Quick Reference to Character Set Commands

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
ESC R(n)	Selects the language character set.	LPRINT CHR\$(27);"R";CHR\$(8)
ESC %(n)	Selects either the internal or user-defined character set.  n=0 selects internal set. n=1 selects user-defined set.	LPRINT CHR\$(27);"%";CHR\$(1)
ESC & NUL(n1) (n2)	Loads user-defined characters into user-defined character set.	LPRINT CHR\$(27);"&";CHR\$(0); CHR\$(32);CHR\$(33)
ESC :(NUL)(NUL) (NUL)	Copies the currently active character set to the user-defined character set.	LPRINT CHR\$(27);":";CHR\$(0); CHR\$(0);CHR\$(0)
FS I(n)	Selects italic or IBM character set.  n=0 selects italic set. n=1 selects IBM set.	LPRINT CHR\$(28);"I";CHR\$(1)

Table A-6 Quick Reference to Miscellaneous Commands

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
Carriage Return (CR)	Moves the print head to the left margin.	LPRINT CHR\$(13)
Cancel (CAN)	Cancels current line of data. Cancels elongated printing mode.	LPRINT CHR\$(24)
Delete (DEL)	Deletes the preceding character.	LPRINT CHR\$(127)
DC1	Places the printer in the active state. SW2-7 must be off.	LPRINT CHR\$(17)
DC3	Places the printer in the inactive state. SW2-7 must be off.	LPRINT CHR\$(19)

**Table A-6 Quick Reference to Miscellaneous Commands**

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
ESC U(n)	Selects unidirectional or bidirectional printing in text or graphics. n=0 selects bidirectional printing. n=1 selects unidirectional printing.	LPRINT CHR\$(27);"U";CHR\$(0)
ESC V(n)	Repeats data n times where n = 1 to 255. Defines beginning of data to be repeated. Data must directly follow ESC V(n). Amount of data cannot exceed size of input buffer. ESC V NUL indicates end of data to be repeated.	LPRINT CHR\$(27);"V";CHR\$(12)
ESC V NUL	Indicates end of data to be repeated.	LPRINT CHR\$(27);"V";CHR\$(0)
ESC r(n) *See note.	Selects the print color where n = 0 to 7. n=0 black n=1 magenta n=2 cyan n=3 violet n=4 yellow n=5 orange n=6 green n=7 brown	LPRINT CHR\$(27);"r";CHR\$(5)
ESC s(n)	Selects half-speed (quiet mode) or full-speed printing. n=1 selects half-speed printing. n=0 selects full-speed printing.	LPRINT CHR\$(27);"s";CHR\$(1)
ESC -(n)	Selects or cancels continuous underlining.	LPRINT CHR\$(27);"-" ;CHR\$(1)
ESC #	Cancels control of the eighth data bit.	LPRINT CHR\$(27);"#"

\* Used with models configured for color printing.

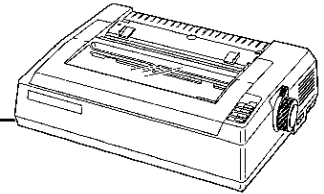
**Table A-6 Quick Reference to Miscellaneous Commands**

CONTROL CODE OR SEQUENCE	FUNCTION	PROGRAMMING LINE
ESC <	Returns the print head to the left side of the printer (one line unidirectional printing).	LPRINT CHR\$(27);"<"
ESC =	Sets the eighth data bit to 0.	LPRINT CHR\$(27);"="
ESC >	Sets the eighth data bit to 1.	LPRINT CHR\$(27);">"
ESC EM(R)	Ejects a sheet from the sheet feeder.	LPRINT CHR\$(27);CHR\$(25);"R"
ESC @	Initializes the printer to default values except for control-panel-selectable features, subscript and superscript, user-defined buffer, character sets, and unidirectional printing in graphics mode.	LPRINT CHR\$(27);"@"
FS @	Initializes the printer to default values except for user-defined buffer.	LPRINT CHR\$(28);"@"
FS C(n)	Selects an optional font cartridge. n=0 selects resident font. n=1 selects font cartridge in slot 1. n=2 selects font cartridge in slot 2.	LPRINT CHR\$(28);"C";CHR\$(2)
FS S(n)	Selects 12 cpi printing. n=0 selects draft 12. n=1 selects high-speed 12.	LPRINT CHR\$(28);"s";CHR\$(1)



# Appendix B

## Special Features



### PRINT HEAD HEAT SENSOR

The Pinwriter P6/P7 printer has a heat sensor to guard against print head overheating. This safety feature works as follows.

The printer can normally print bidirectionally or unidirectionally. If the operating temperature of the print head reaches 194°F (90°C), the printer prints unidirectionally only. When the print head cools to below 194°F, the printer can print bidirectionally.

If the print head temperature reaches 221°F (105°C), printing stops completely and the FONT display indicates H. When the head cools down, printing resumes automatically and the FONT display shows the current font. Figure B-1 illustrates how this feature works.

This feature activates only in extreme printing conditions, such as when printing solid black for an extended period of time.

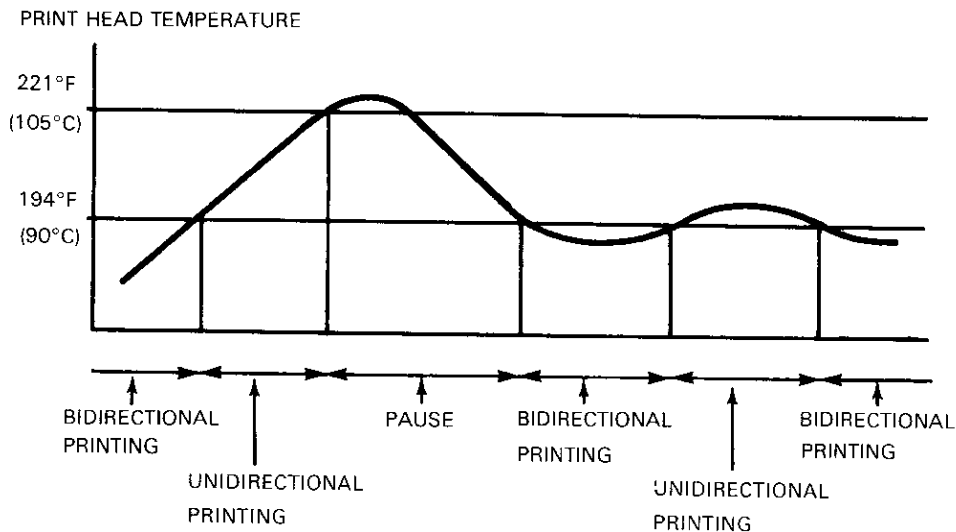


Figure B-1 Print Head Heat Sensor Function

## *Special Features*

### **HEX DUMP FEATURE**

The Pinwriter P6/P7 has a hex dump feature which is useful in interface troubleshooting and program debugging. The hex dump feature prints out, in hexadecimal form, data that is sent to the printer. In addition, it enables you to check the revision level of both the firmware and character generator (CG) and verify the switch settings. This information is contained in the first two lines of the printout.

Figure B-2 shows an example of the first two lines of a typical hex dump. An explanation follows.

```
REV  XX  XX      CG  XX  XX  XX  XX
SW1  00000000    SW2  00000010      SW3  XXXXXXXX
```

**Figure B-2 Sample of Hex Dump**

```
REV  XX  XX
```

The first set of XXs represents the revision level of the Master Firmware, and the second set of XXs represents the revision level of the Slave Firmware.

```
CG  XX  XX  XX  XX
```

The first set of XXs represents the revision level of the resident character generator. The following sets of XXs represent the check sums of the resident CG.

```
SW1  00000000    SW2  00000010      SW3  XXXXXXXX
```

This line represents the switch settings for the three printer switches. SW1 and SW2 are located beneath the acrylic cover. SW3 is located inside the printer and is used by service technicians only. Note that 0 represents the OFF position and 1 represents the ON position.

To perform the hex dump, hold down the **QUIET** button while turning on the printer. The Pinwriter prints out the two lines shown in Figure B-2. Any data sent to the printer will be printed out in hexadecimal form. A full line of data (20 bytes for the P6 and 34 bytes for the P7) must be in the print buffer in order to print a hex dump. If there is less than this, you must deselect the printer before it will print those bytes.

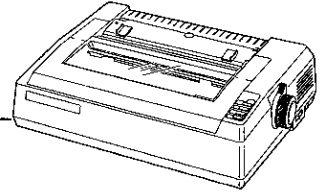
**NOTE**

Be sure to hold down the **QUIET** button until printing begins.

In addition, firmware revision levels and switch settings, plus a full self-test can be printed. This is done by holding down the **FONT** button while turning on the printer.

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## Appendix C



# Order Numbers and Specifications

### P6/P7 Series Printers\*

- 80 column
  - P660 (parallel)
  - P665 (serial)
- 136 column
  - P760 (parallel)
  - P765 (serial)

### Paper Handling Options

- Cut Sheet Guide
  - P6 – No. 4201
  - P7 – No. 4301
- Bidirectional Tractor
  - P6 – No. 4202
  - P7 – No. 4302
- Cut Sheet Feeder
  - P6 – No. 4203
  - P7 – No. 4303
- Unidirectional Tractor
  - P6 – No. 4209
  - P7 – No. 4309

### Ribbons

- Black fabric endless loop cartridge
  - P6 – No. 50-053
  - P7 – No. 50-054

---

## *Order Numbers and Specifications*

### **Print Speed**

- High speed draft – 216 cps
- Regular draft – 180 cps
- Letter-quality – 60 cps

### **Acoustic Noise**

- Regular mode – 56 dBA
- Quiet mode – 53 dBA

### **Print Head**

- Impact 24 wire
- 200 million character life
- 0.2 mm diameter
- 2x12 staggered array

### **Vertical Line Spacing**

- 3, 4, 6, 8 lines per inch
- n/60, n/180, n/360 programmable

### **Special Features**

- Triple width characters
- Double width characters
- Double height characters
- Hex data dump
- Automatic paper loading
- Operator panel with font selection
- Digital font display

### **Resident Font Types**

- Draft 10 Gothic/Italic 10 Gothic
- Draft 12 Gothic/Italic 12 Gothic
- Draft 15 Gothic/Italic 15 Gothic
- Draft 17 Gothic/Italic 17 Gothic
- Draft 20 Gothic/Italic 20 Gothic
- Draft HS Gothic/Italic HS Gothic
- Letter Quality 10/Italic Letter Quality 10
- Letter Quality 12/Italic Letter Quality 12
- Letter Quality 15/Italic Letter Quality 15
- Letter Quality Proportional Bold
- True Superscript/Subscript

**Character Sets**

- ASCII Standard
- IBM Graphic
- Italic
- 12 Language character sets

**Interface**

- Centronics parallel  
P6 – No. P660  
P7 – No. P760
- Serial RS-232C and 20 mA current loop  
P6 – No. P665  
P7 – No. P765

**Input Buffer**

- 8 K standard

**Graphic Resolution**

- Up to 360x360 dpi

**Ribbon Reliability**

- P6 – 2.2 million character life
- P7 – 3.0 million character life

**Multiple Copies Capacity**

- Original and three copies

**Paper Width**

- P6 – 4.5 in. (114 mm) to 10 in. (254 mm)
- P7 – 5 in. (127 mm) to 16 in. (406 mm)

**Printer Dimensions**

- P6 – Width 16.1 in. (410 mm)  
Depth 13.1 in. (335 mm)  
Height 4.9 in. (125 mm)  
Weight 18.7 lb (8.5 kg)
- P7 – Width 22.4 in. (570 mm)  
Depth 13.1 in. (335 mm)  
Height 4.9 in. (125 mm)  
Weight 25.4 lb (11.5 kg)

---

*Order Numbers and Specifications*

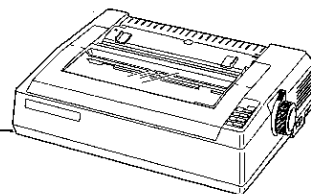
**Reliability**

- MTBF - 5000 hours
- MTTR - 20 minutes

**Administrative Compliance**

- UL 478
- CSA C 22.2
- FCC Class B
- VDE 0806 (IEC 380)

## Appendix D



# Proportional Spacing Table

Table D-1 gives the character spacing for ASCII characters 32 through 126. The values are given in 360ths of an inch. For example, a value of 24 is 24/360-inch. You may need to enter these values into a special table for your word processing program so that it can calculate the number of proportional characters that fit on each line.

**Table D-1 Proportional Spacing Table**

CHARACTER	ASCII VALUE	LEFT SPACE	BODY	RIGHT SPACE	TOTAL WIDTH
	32	30	0	0	30
!	33	10	6	10	26
"	34	6	13	6	25
#	35	4	33	4	41
\$	36	5	21	5	31
%	37	4	33	4	41
&	38	3	33	3	39
'	39	6	4	6	16
(	40	6	12	5	23
)	41	5	12	6	23
*	42	7	12	7	26
+	43	5	30	5	40
,	44	6	6	6	18
—	45	6	26	6	38
.	46	6	6	6	18
/	47	2	20	2	24
0	48	4	24	4	32

*Proportional Spacing Table*

**Table D-1 Proportional Spacing Table (cont'd)**

<b>CHARACTER</b>	<b>ASCII VALUE</b>	<b>LEFT SPACE</b>	<b>BODY</b>	<b>RIGHT SPACE</b>	<b>TOTAL WIDTH</b>
1	49	8	16	8	32
2	50	4	23	5	32
3	51	4	23	5	32
4	52	4	24	4	32
5	53	4	24	4	32
6	54	5	22	5	32
7	55	5	22	5	32
8	56	4	23	5	32
9	57	5	22	5	32
:	58	6	6	6	18
;	59	6	6	6	18
<	60	5	20	5	30
=	61	5	30	5	40
>	62	5	22	5	23
?	63	4	19	3	26
@	64	4	31	4	39
A	65	3	34	3	42
B	66	3	27	3	33
C	67	4	26	4	34
D	68	3	29	4	36
E	69	3	28	4	35
F	70	3	28	3	34
G	71	4	29	3	36

Table D-1 Proportional Spacing Table (cont'd)

CHARACTER	ASCII VALUE	LEFT SPACE	BODY	RIGHT SPACE	TOTAL WIDTH
H	72	3	30	3	36
I	73	3	14	3	22
J	74	3	23	3	29
K	75	3	31	2	36
L	76	3	26	3	32
M	77	3	34	3	40
N	78	3	31	3	37
O	79	4	30	4	38
P	80	3	26	3	32
Q	81	4	30	4	38
R	82	3	27	3	33
S	83	3	24	3	30
T	84	3	30	3	36
U	85	3	30	3	36
V	86	3	32	3	38
W	87	2	36	2	40
X	88	3	34	3	40
Y	89	2	30	2	34
Z	90	3	24	3	32
[	91	6	8	5	19
\	92	2	20	2	24
]	93	5	8	6	19
≡	94	5	18	5	28

*Proportional Spacing Table*

**Table D-1 Proportional Spacing Table (cont'd)**

<b>CHARACTER</b>	<b>ASCII VALUE</b>	<b>LEFT SPACE</b>	<b>BODY</b>	<b>RIGHT SPACE</b>	<b>TOTAL WIDTH</b>
-	95	0	36	0	36
'	96	5	9	5	19
a	97	4	25	3	32
b	98	3	25	4	32
c	99	4	20	4	28
d	100	4	25	3	32
e	101	4	22	4	32
f	102	3	21	-1	23
g	103	3	24	3	32
h	104	3	28	3	34
i	105	3	14	3	22
j	106	-3	14	6	17
k	107	3	27	3	33
l	108	3	14	3	22
m	109	2	37	2	41
n	110	3	28	3	34
o	111	4	22	4	30
p	112	3	25	4	32
q	113	4	25	3	32
r	114	3	20	2	25
s	115	4	20	4	28
t	116	3	19	3	25
u	117	3	28	3	34

**Table D-1 Proportional Spacing Table (cont'd)**

<b>CHARACTER</b>	<b>ASCII VALUE</b>	<b>LEFT SPACE</b>	<b>BODY</b>	<b>RIGHT SPACE</b>	<b>TOTAL WIDTH</b>
v	118	3	29	3	35
w	119	3	34	3	42
x	120	3	27	3	33
y	121	2	29	2	33
z	122	3	22	3	28
{	123	6	9	5	22
	124	6	4	6	16
}	125	5	9	6	20
~	126	5	16	5	36



# Glossary

---

**ASCII** American Standard Code for Information Interchange; this standard defines character set codes that are used for data interchange between data terminal equipment. This code defines 96 displayed characters (64 without lowercase) and 32 nondisplayed control codes in terms of 7 bits plus an eighth bit for parity check.

**baud** The rate of data transmission, measured in bits per second. Print baud rates are adjustable.

**BS** Backspace command. Moves the print head one space to the left.

**buffer** An electronic memory where text is stored for processing by the printer.

**CAN** Cancel command. Cancels data printing back to the last carriage return.

**condensed printing** 17 or 20 pitch printing.

**control code** A nonprintable ASCII code that is used to control a printer function.

**dpi** Characters per inch. Also known as pitch.

**eps** Characters per second.

**CR** Carriage return command. Moves the print head to the left margin.

**dBA** Decibel adjusted. Used for measuring noise levels.

**DC1** Device control 1 command. Places the printer in the active state.

**DC2** Device control 2 command. Cancels condensed printing.

**DC3** Device control 3 command. Places the printer in the inactive state.

**DC4** Device control 4 command. Cancels elongated printing.

**DEL** Delete command. Deletes the preceding character.

**deselected** A mode in which the printer cannot receive data from the host computer. Also called local mode.

---

*Glossary*

- dot mode** A mode in which each dot pin is individually addressed by software.
- double-strike printing** A way of printing boldface characters. Each line is printed once, then the paper is shifted up 1/180-inch, and the line is printed again.
- elongated printing** Double-width printing of characters.
- enhanced printing** Shadowed printing.
- escape sequence** A combination of codes (with ESC as the first code) used to program printer functions.
- FF** Form feed command. Advances the paper one page length.
- FS sequence** A combination of codes (with FS as the first code) used to program printer parameters.
- horizontal enlargement** Double- or triple-width printing of characters.
- HT** Horizontal tab command. Advances the paper to the next preset horizontal tab.
- Hz** Hertz.
- IC** Integrated circuit.
- Kg** Kilogram.
- LF** Line feed command. Advances the paper one line.
- LQ** Letter-quality.
- LSB** Least significant bit, the rightmost position in a binary number.
- MSB** Most significant bit, the leftmost position in a binary number.
- MTBF** Mean Time Between Failures.
- MTTR** Mean Time To Repair.
- parity bit** The bit added to each group of bits sent to make the group always odd or always even. Used to detect errors in the printer and host communication.

**pitch** The number of characters per inch in a line.

**PS** Proportional spacing. A printing method in which the distance between characters varies according to the width of the characters.

**quiet mode** The mode in which the Pinwriter prints at a reduced noise level and at half-speed.

**selected** A mode in which the printer can receive data from the host computer. Also called remote mode.

**Vac** Volts, alternating current.

**VT** Vertical tab command. Advances the paper to the next preset vertical tab.

**vertical enlargement** Double-height printing of characters.

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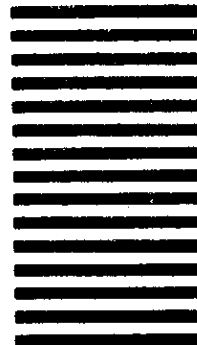
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