



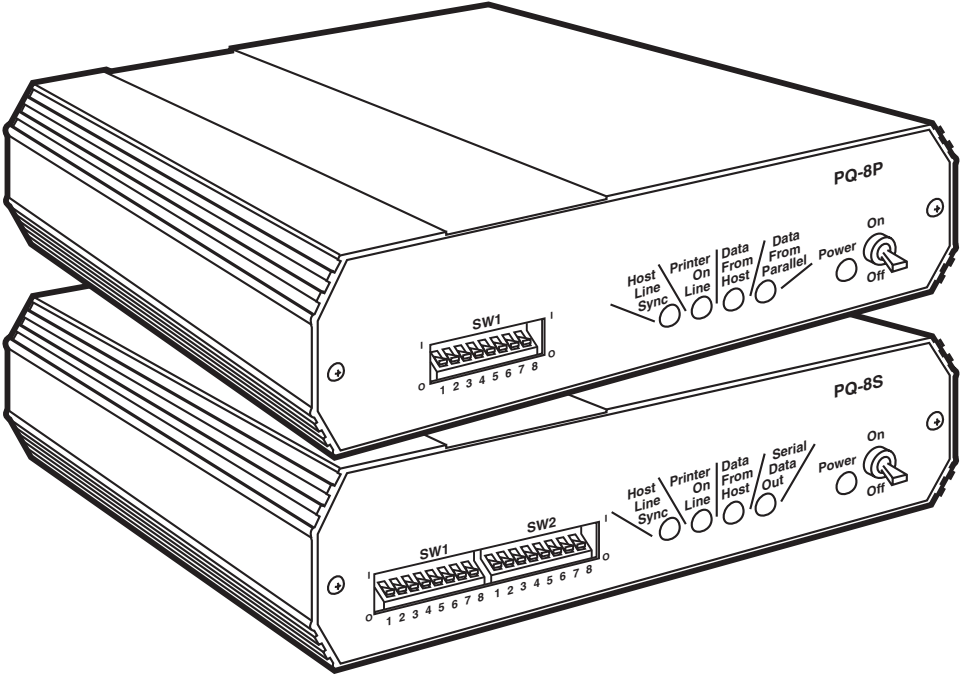
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# PQ-8P PQ-8S



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### NORMAS OFICIALES MEXICANAS (NOM) ELECTRICAL SAFETY STATEMENT

#### INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
  - A: El cable de poder o el contacto ha sido dañado; u
  - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
  - C: El aparato ha sido expuesto a la lluvia; o
  - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
  - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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# 1. Specifications

**Hardware Requirements**—ASCII printer, AS/400® or System/3X host

**Emulation**—IBM® 3812, 4214, 5224, 5225, and 5256 printers

**Systems Supported**—AS/400 or System/3X

**Indicators**—(5) LEDs: Power, Host Line Sync, Printer Online, Data from Host, Data Out

**Connectors**—PCA45A, PCA45AE:  
(1) DB9, (1) 36-pin Centronics,  
(1) DB25 female;  
PCA46A, PCA46AE: (1) DB9,  
(1) DB25 male, (1) DB25 female

**Power**—9 VAC wallmount transformer

**Size**—6.5"H x 2.1"W x 5.5"D  
(16.5 x 5.3 x 14 cm)

**Weight**—3 lb. (1.4 kg)

## 2. Introduction

The PQ-8P and PQ-8S are powerful, yet easy-to-operate external printer interfaces. The PQ-8 can easily be set up through on-board DIP switches, Host/PC download commands, or the setup software.

The PQ-8P and PQ-8S attach virtually any ASCII printer to an AS/400 or System/3X host. They offer reliable emulations of IBM 3812, 4214, 5224, 5225, and 5256 printers. When connected to a laser printer operating in PCL® mode, the PQ-8 allows Computer Output Reduction (COR) and Automatic

Print Orientation (APO). In addition, paper can be pulled from several sources, jobs can be printed on both sides of the paper, and a multitude of fonts (printer-resident or from optional cartridges) are supported.

The PQ-8P comes with a standard parallel sharing port that allows automatic sharing of the attached printer between the host and a PC or LAN. The PQ-8S comes with a standard serial sharing port.

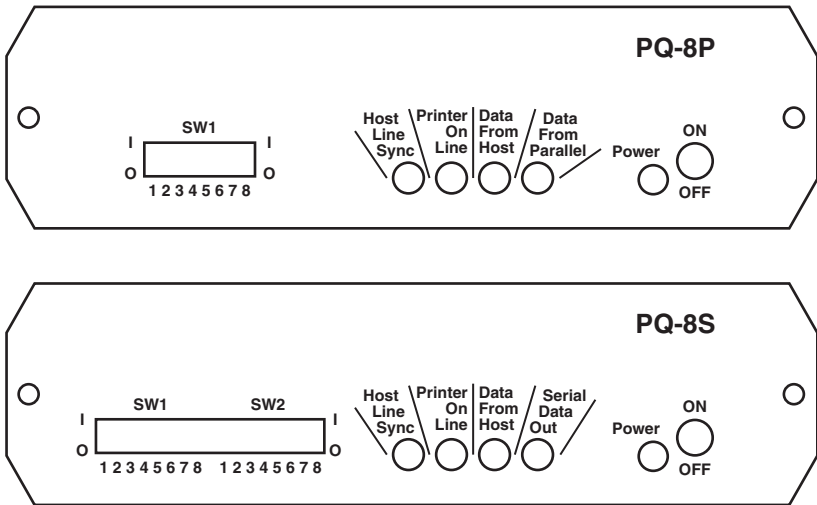


Figure 2-1. Front Panels of the PQ-8P and PQ-8S.

## 2.1 Description of Front Panels

### CONFIGURATION SWITCHES

The configuration switches are used to set the twinax address, output protocol, and to perform the available test and diagnostic functions. While the PQ-8P comes with only one bank of switches, the PQ-8S comes with two banks of eight switches. The left bank is labeled SW1; the right bank is labeled SW2.

### LEDs

The green LED lights indicate the following:

- *Host Line Sync*—Communication lines between the host and the PQ-8 are established.
- *Printer Online*—The printer is ready to receive data.
- *Data Out*—The PQ-8 is currently sending data to the printer.
- *Data From Host*—The PQ-8 is currently processing data received from the twinax host.
- *Power*—The PQ-8 is powered on.
- *On/Off Switch*—The On/Off switch is used to power on or power off the PQ-8. Use this switch when asked to cycle power.

## 2.2 About This User's Guide

This user's guide covers both the PQ-8P and the PQ-8S.

## 2.3 Unpacking

Check the packaging for water or physical damage, and notify the carrier immediately if there is any damage.

Keep the original packaging in case you need to move or ship the PQ-8.

The package should include the following:

- PQ-8P or PQ-8S
- Auto-terminating twinax V-cable
- Wallmount transformer (9V AC output)
- Standard parallel cable (PQ-8P only)
- Standard serial cable (PQ-8S only)
- This User's Manual

## 3. Installation

Before connecting the PQ-8 to the printer, verify that the printer functions properly by performing a printer self-test. Consult the printer's user's guide for instructions on how to start and evaluate the self-test. If the printer functions properly, proceed with the installation of the PQ-8.

### WARNING

**Electrical current from power lines and cables connecting the interface, the printer, and the PC can be hazardous. To minimize the danger, follow the instructions below.**

*To install the PQ-8P:*

1. Power off the printer and PC (if used) and disconnect the power cord(s).
2. Use the configuration switches located on the PQ-8P's front panel to select the desired output protocol and the device address for the PQ-8P. Refer to **Table 4-3** for switch settings. Make sure the host has been configured for the same device ID and cable address (see **Section 4.1, Host Configuration**).
3. Connect the parallel cable from the PQ-8P's "Parallel Out" connector to the printer's parallel port.
4. If the sharing port of the PQ-8P is used, attach the parallel cable now. Note that a PC or LAN connected to the PQ-8P's sharing port should always be powered on when the interface is operating.
5. Connect the wall mount transformer from the outlet to the interface's "9V" connector. Connect the power cord(s) to the printer and PC (if used).
6. Power on the PQ-8P, then the printer. The PQ-8P's green LED lights labeled "Power" and "Printer On Line" should be on.
7. Print a PQ-8P self-test. First, power off the PQ-8P. Then, set configuration switch SW1:8 (far right) to the "1" position. Power on the PQ-8P. After the two-page self-test prints, set switch SW1:8 back to the "o" position, then cycle the power one more time.
8. Refer to the self-test printout to determine which configuration parameters need to be altered. Change these parameters by using the setup software or Host/PC download commands.

9. With the PQ-8P powered off, attach the auto-terminating twinax V-cable to the PQ-8P.
10. Connect the twinax host cables to the V-connector. The twinax V-connector is automatically terminated when one cable is attached and automatically cables through when two cables are attached.
4. If the sharing port is used, attach a second serial cable to the PQ-8S's "Serial In" port. Note that a PC or LAN connected to the PQ-8S's sharing port should always be powered up when the PQ-8S is operating. In addition, the PC/LAN and the PQ-8S must be using the same serial parameters. Refer to **Section 5.2, Printer Sharing**, for more information.

*To install the PQ-8S:*

1. Power off the printer and the PC (if used), and disconnect the power cable(s).
2. Use the configuration switches on the PQ-8S's front panel to select the desired output protocol, the device address, and the serial output parameters for the interface. Refer to **Table 4-3** for switch settings. Make sure the host has been configured for the same device ID and cable address (see **Section 4.1, Host Configuration**).
3. Connect the serial cable from the PQ-8S's "Serial Out" connector to the printer's serial port.
5. Connect the wall mount transformer from the outlet to the interface's "9V" connector. Connect the power cord(s) to the printer and PC (if used).
6. Power on the PQ-8S, then the printer. The PQ-8's green LED lights labeled "Power" and "Printer On Line" should be lit. If the sharing port is used and handshaking requirements are met, the LED labeled "PC/LAN Ready" should also be on.

7. Print a PQ-8S self-test. First, power off the PQ-8S. Then, set configuration switch SW1:8 (far right of the first switch bank) to the “1” position. (If you are operating a label printer, put the printer in ASCII hex dump mode. Then power on the PQ-8S. If the label printer starts printing, the PQ-8S has passed the self-test. To obtain a print out of the current settings, connect the PQ-8S to a laser or dot-matrix printer.) Power on the PQ-8S. After the two-page self-test prints, set switch SW1:8 back to the “0” position, then cycle the power one more time.
8. Refer to the self-test printout to determine which configuration parameters need to be altered. Change these parameters by using the Setup Software or Host/PC download commands. Refer to **Chapter 4** for further information.
9. With the PQ-8S powered off, attach the auto-terminating twinax V-cable to the PQ-8S’s “Twinax In” port.
10. Connect the twinax host cable(s) to the V-connector. The twinax V-connector is automatically terminated when one cable is attached and automatically cables through when two cables are attached.

Sample self-test printouts for the PQ-8S and the PQ-8P are shown on the following pages. The printout you obtain may differ from the displayed samples, since only the configuration parameters associated with the active output protocol (e.g. HP PCL, IBM PPDS, etc.) and the IBM printer emulation (e.g. IBM 3812-1, 4214, etc.) are printed. The second page of the self-test printout is the same for both the PQ-8S and the PQ-8P.

### **Power-On/Off Sequence**

Follow the power-on and -off sequences exactly, or the print output may be garbled.

To power on:

1. Turn on the PQ-8.
2. Turn on the printer.

To power off:

1. Turn off the printer.
2. Turn off the PQ-8.



## Self-Test Printout - PQ-8P

PARALLEL TWINAX INTERFACE  
 COPYRIGHT (c) 1995 SDE CORP.  
 SOFTWARE VERSION 1.00

RAM OK

ROM OK

Address : 0

Output Printer Protocol : HP-PCL 3812

#01 - Alt. CPT Start Delimiters: - 50 6C

#02 - Alt. CPT End Delimiters : - 50 6C

#03 - Host Port Timeout : 08 - seconds

#05 - Host Language : 01 - U.S./Canada

#07 - Print Orientation : 0 - COR/Host override allowed

#08 - Auto Print Orientation : 1 - On

#09 - Paper Size : 0 - Host Selected

#10 - True LPI : 0 - Compress LPI

#13 - Paper Drawer 1 : 1 - Tray 1

#14 - Paper Drawer 2 : 4 - Tray 4

#15 - Paper Drawer 3 : 5 - Tray 5

#16 - Override Format Commands: : 0 - No Overrides

#17 - Character Set : 1 - Code Page 850

#18 - Starting Vertical Position : 00

#19 - Starting Horizontal Position : 00

#20 - Star Panel Overdrive : 0 - Inactive

#32 - 11 X 17 (A3) : 0 - Off

#33 - Duplexing : 0 - Off

#50 - Sharing Port Timeout : 08 - seconds

#11 - Host Port Initialization:

#56 - Parallel Port Initialization:

#04 - User Defined Strings:

U0:

U1:

U2:

U3:

U4:

U5:

U6:

U7:

U8:

U9:

Figure 3-1. Self-Test Printout—PQ-8P.

## Self-Test Printout - PQ-8S

SERIAL TWINAX INTERFACE  
COPYRIGHT (c) 1995 SDE CORP.  
SOFTWARE VERSION 1.00

RAM OK  
ROM OK

Address : 0  
Output Printer Protocol : I-O 8215 Emulation  
Serial Out Baud Rate : 9600 Baud  
Serial Out Word Length : 8 Bits  
Serial Out Stop Bits : 1 Bit  
Serial Out Parity: : None

#03 - Twinax Port Timeout : 08 - seconds  
#20 - Star Panel Overdrive : 0 - Inactive  
#24 - IBM Printer Emulated : 0 - 5224  
#25 - IBM Motion Commands: 0 - FF (when possible)  
#44 - Command Pass-Thru : 0 - Enabled  
#50 - Sharing Port Timeout : 08 - seconds  
#76 - Serial In Baud Rate : 2 - 9600 Baud  
#77 - Serial In Word Length : 8 - 8 Bits  
#78 - Serial In Stop Bits : 1 - 1 Bit  
#79 - Serial In Parity : None

#11 - Host Port Initialization:

#58 - Serial Port Initialization:

#84 - 6 LPI String:

#85 - 8 LPI String:

#86 - 10 CPI String:

#87 - 15 CPI String:

#04 - User Defined Strings:

U0:  
U1:  
U2:  
U3:  
U4:  
U5:  
U6:  
U7:  
U8:  
U9:

**Figure 3-2. Self-Test Printout—PQ-8S.**

## EBCDIC to ASCII Translate Table

40	50	60	70	80	90	A0	B0	C0	D0	E0	F0	&-øØ°μø{ } \ 0	
0:	20	26	2D	9B	9D	F8	E6	BD	7B	7D	5C	30	é / Éaj ~ £AJ~1
1:	20	82	2F	90	61	6A	7E	9C	41	4A	00	31	âêÂÊbks¥BKS2
2:	83	88	B6	D2	62	6B	73	BE	42	4B	53	32	äëÄËclt · CLT3
3:	84	89	8E	D3	63	6C	74	FA	43	4C	54	33	àèÀÈdmufDMU4
4:	85	8A	B7	D4	64	6D	75	9F	44	4D	55	34	áíÁÍenv\$ENV5
5:	A0	A1	B5	D6	65	6E	76	F5	45	4E	56	35	âïÃîfow¶FOW6
6:	C6	8C	C7	D7	66	6F	77	F4	46	4F	57	36	âïÃîgpx1/4GPX7
7:	86	8B	8F	D8	67	70	78	AC	47	50	58	37	çïÇîhgy1/2HQY8
8:	87	8D	80	DE	68	71	79	AB	48	51	59	38	ñßÑ`irz3/4IRZ9
9:	A4	E1	A5	60	69	72	7A	F3	49	52	5A	39	[ ] ! : « » ¡ ¬ - 123
A:	5B	5D	7C	3A	AE	A6	AD	AA	2D	FB	FD	FC	. \$ , # » ° ¿ ¡ ó ú Ô Û
B:	2E	24	2C	23	AF	A7	A8	B3	93	96	E2	EA	< * % @ ð æ ð ¯ ö ü Ö Ü
C:	3C	2A	25	40	D0	91	D1	EE	94	81	99	9A	( ) _ ' ý , Ý ¨ ò ù Ò Ù
D:	28	29	5F	27	EC	F7	ED	F9	95	97	E3	EB	+ ; > = þ Æ þ ´ ó ú Ó Ú
E:	2B	3B	3E	3D	E8	92	E7	EF	A2	A3	E0	E9	! ^ ? " ± ® _ ð ÿ Ö
F:	21	5E	3F	22	F1	CF	A9	F2	E4	98	E5	20	

Figure 3-3. Page 2 of Self-Test Printouts.

## 4. Configuration

### 4.1 Host Configuration

Before operating the PQ-8 in twinax mode, the IBM host must be configured with a device address and device ID for the printer. See your system operator or system manual for details. With the correct address selected, an AS/400 will automatically configure itself according to the active IBM printer emulation on the PQ-8.

1. Make sure you have selected and permanently stored the desired IBM emulation on the PQ-8. This can be done through the setup software or Host/PC download command Z24 (to select emulation) followed by command Z99,0 (to save).

2. Make sure the PQ-8 is properly connected to the twinax host and the correct device address is set.

3. Power on the PQ-8. The AS/400 will auto-configure the printer address according to the PQ-8 settings.

If you are using an S/3X host, you must configure the host manually. **Table 4-1** shows the recommended emulation and device ID for the different host systems.

**Table 4-1. Recommended Emulation and Device ID for the Host Systems.**

<b>Host System</b>	<b>Printer Used</b>	<b>Emulation</b>	<b>Device ID</b>
S/38, S/36	Laser printer (using HP PCL commands)	3812	5219
S/38, S/36	Matrix printer (printing NLQ)	4214	4214-2
S/38, S/36, (S/34)	Matrix printer	5224	5224 (2P)
S/38, S/36, S/34	Specialty printer (e.g. label printer)	5256	5256

## **NOTE**

**Check the device description. Host Print Transform must be turned “Off” in OS/400 V2R3 and later.**

## **4.2 PQ-8 Configuration**

The PQ-8 can be configured through its on-board configuration switches, user-friendly PC setup software, or by sending download commands from the host or from a PC/LAN. To ensure proper functioning of the PQ-8, you should review all available setup parameters.

### **4.2.1 SWITCH SETTINGS**

Use the PQ-8’s configuration switches to select the twinax address, the output protocol, and to perform the available test and diagnostic functions. The PQ-8S has a second bank of eight switches (referred to as SW2) to change the serial parameters. Use a pointed object, such as a ball-point pen, to change the switch settings.

When operating, the PQ-8 will only recognize EBCDIC Hex Dump and ASCII Hex Dump settings. All other settings are only read at power-up. Whenever one of these settings is changed, remember to cycle power to activate them.

If an invalid switch setting is encountered at power-up, all LED lights will blink and the PQ-8 cannot operate.

**Table 4-2. Twinax Address Switch Settings.**

<b>Twinax Address</b>	<b>SW1:1</b>	<b>SW1:2</b>	<b>SW1:3</b>
0	o	o	o
1	o	o	
2	o		o
3	o		
4		o	o
5		o	
6			o

Table 4-3. Output Protocol Switch Settings.

Output Protocol	SW1:4	SW1:5	SW1:6	SW1:7
Hewlett-Packard PCL (PJM on)	o	o		o
Hewlett-Packard PCL (PJM off)	o		o	o
IBM Proprinter	o		o	
IBM PPDS (dot matrix)	o	o	o	o
Epson ESC/P2	o	o	o	
Epson DFX+	o			
Epson LQ (24-pin)	o			o
Epson 9-pin (DFX)		o	o	o
Generic		o	o	
Hewlett-Packard LinePrinter		o		o

To obtain the default IBM printer emulation associated with the selected output protocol, you should restore factory defaults. Then proceed with the configu-

ration of the PQ-8. Refer to page 38 (Host Download Command 24) for more information on IBM printer emulations.

**Table 4-4. Tests/Diagnostic Switch Settings.**

<b>Tests/Diagnostic</b>	<b>SW1:1</b>	<b>SW1:2</b>	<b>SW1:3</b>	<b>SW1:8</b>
Twinax Diagnostic				
Restore Factory Defaults				o
Self-Test	Any setting corresponding to a twinax address 0-6			
EBCDIC Hex Dump				
Operating Mode				o
<b>Tests/Diagnostic</b>	<b>SW1:4</b>	<b>SW1:5</b>	<b>SW1:6</b>	<b>SW1:7</b>
ASCII Hex Dump				

The first three functions (Twinax Diagnostics, Restore Factory Defaults, Self-Test) are only performed if the configuration switches are set as indicated when the PQ-8 is powered up. In the case of the self-test, the PQ-8 prints a self-test at power-up and then should be powered off. Refer to **Chapter 7** for more information.



The second (right) bank of switches is used to set up the PQ-8S for communication with the printer.

**Table 4-5. Serial Out Baud-Rate**

**Switch Settings.**

<b>Serial Out Baud Rate</b>	<b>SW2:1</b>	<b>SW2:2</b>	<b>SW2:3</b>
38,400	o	o	o
19,200	o	o	
9,600	o		o
4,800	o		
2,400		o	o
1,200		o	
600			o
300			

**Table 4-6. Serial Out Word-Length Switch Settings.**

<b>Serial Out Word Length</b>	<b>SW2:4</b>
7 bits	o
8 bits	

**Table 4-7. Serial Out Stop Bits Switch Settings.**

<b>Serial Out Stop Bits</b>	<b>SW2:5</b>
1 bit	o
2 bits	

**Table 4-8. Serial Out Parity Switch Settings.**

<b>Serial Out Parity</b>	<b>SW2:6</b>	<b>SW2:7</b>
None	o	o
Odd	o	
Even		o

**Table 4-9. Serial Out X-On/X-Off Switch Settings.**

<b>Serial Out X-On/X-Off</b>	<b>SW2:8</b>
Send	
Don't send	o

### 4.2.2 SETUP SOFTWARE

All configuration parameters not already covered through configuration switches can be changed through the setup software. Before configuring the PQ-8, you should print a self-test. A self-test printout shows all active configuration settings. Refer to this printout to determine which parameters may need to be changed through the setup software. To run this software, attach a PC or LAN printer server to the parallel sharing (PQ-8P) or to the serial sharing port (PQ-8S).

## NOTE

**A printer must be connected to the PQ-8 and in “Ready” mode in order for the PQ-8 to receive data from any of the ports.**

Start your PC and go to the DOS prompt. Insert the setup software into the PC. At the DOS prompt, type A:SETUP and press Enter. The setup program will appear on the screen. Follow the instructions shown on the screen.

### 4.3 Host/PC Download Commands

By sending download commands from the Host/PC to the PQ-8, you can change all configuration parameters not already covered through the configuration switches.

Most Host/PC download commands are placed in a Host/PC document or on the screen. Regardless of whether the incoming print job is a screen print, a spreadsheet, or a word-processing document created on either the host or PC, the PQ-8 will recognize the Host/PC download command.

The command itself will not be printed if it was entered correctly. If any part of the command is printed, the PQ-8 did not recognize the command because of a problem in the format. Check the syntax of the command and send the command again.

Most Host/PC download commands sent to the PQ-8 take effect immediately and stay only in the PQ-8's active memory. To save the changed configuration beyond a power off, Host/PC download command Z99,0 must be sent.

**Tip:** Save the Host/PC download commands in a separate file. If you need to re-configure the PQ-8 at a later time, or if you need to configure more than one PQ-8, just “print” the file containing the Host/PC download commands.

Take the following steps to enter a host download command.

1. Type the Command Pass-Thru delimiter &% (or alternate CPT start delimiter) in the document at the point where the command is to take effect.
2. Type an upper-case "Z".
3. Type the command number for the command to be used, as shown in the table. Always use two digits for the command number (for example, &%Z05).
4. Type a comma.
5. Type the value representing the desired selection. No spaces are allowed. A space or invalid character in a command causes the PQ-8 to ignore the command and resume printing from the point the error occurred.
6. A space or control character (NL, FF, CR, or LF) signals the end of the download command.
7. Multiple commands can be chained together by using a slash (/) or backslash (\) to separate the commands (no spaces allowed). For example, to set the Default Print Quality (Command 22) to NLQ (Value 1), Draft Printing (Command 23) to Fast Draft (Option 1), and the Wrap/Truncate Text selection (Command 26) to Truncate (Option 1), type:
 

&%Z22,1/Z23,1/Z26,1

**HOST/PC DOWNLOAD COMMAND OVERVIEW**

**Table 4-10** shows the Host/PC Download commands for the PQ-8 and corresponding command numbers in alphabetical order.

Table 4-10. Host/PC Download Commands.

<b>Host/PC Download Command</b>	<b>Command Number</b>
10 CPI String	86
12 CPI String	88
15 CPI Printing (Proprinter Mode only)	28
15 CPI String	87
16.7 CPI String	89
6 LPI String	84
8 LPI String	85
11" x 17" (A3) Printing	32
Alternate CPT Start Delimiter	01
Alternate CPT End Delimiter	02
Automatic Print Orientation	08
Character Set	17
Command Pass-Thru	44
Default Print Quality	22
Draft Printing	23

**Table 4-10 (continued). Host/PC Download Commands.**

<b>Host/PC Download Command</b>	<b>Command Number</b>
Duplex Printing	33
Host Language	05
Host Port Timeout	03
Host Port Initialization	11
IBM Printer Emulated	24
IBM Motion Commands	25
Override Format Commands	16
Paper Drawer 1	13
Paper Drawer 2	14
Paper Drawer 3	15
Paper Size	09
Parallel Port Initialization String (PQ-8P only)	56
Print Orientation	07
Print Setup Parameters	98
Restore Factory Defaults	98

Table 4-10 (continued). Host/PC Download Commands.

<b>Host/PC Download Command</b>	<b>Command Number</b>
Restore Previously Saving Configuration	98
Save All Current Settings	99
Serial In Baud Rate (PQ-8S only)	76
Serial In Word Length (PQ-8S only)	77
Serial In Stop Bits (PQ-8S only)	78
Serial In Parity (PQ-8S only)	79
Serial Port Initialization String (PQ-8S only)	58
Sharing Port Timeout	50
Star Panel Overdrive	20
Starting Horizontal Position	19
Starting Vertical Position	18
True LPI	10
Truncate/Wrap	26
User Defined Font Strings	21
User Defined Strings	04
Wrap/Truncate	26

## 4.4 Configuration Options

Asterisks (\*) identify factory-default settings. Invalid commands are ignored. The last valid setting will be unchanged.

### COMMAND 01: ALTERNATE CPT START DELIMITER

Creates an alternate Command Pass-Thru (CPT) start delimiter. This delimiter is also an alternate Host/PC download delimiter. It may be one or two characters long. The first character may be any printable character other than “&.” Only one alternate CPT start delimiter is allowed. The default “&%” will always be recognized as CPT delimiter.

<u>VALUE</u>	<u>DESCRIPTION</u>
New characters	Alternate CPT start delimiter
Two spaces	Deletes alternate CPT start delimiter

Example: &%Z01,#\* creates the alternate CPT start delimiter #\*.

### COMMAND 02: ALTERNATE CPT END DELIMITER

Creates an alternate CPT end delimiter as above. This delimiter cannot be used as an alternate Host/PC download delimiter.

<u>VALUE</u>	<u>DESCRIPTION</u>
New characters	Alternate CPT end delimiter
Two spaces	Deletes the alternate delimiter

**\*Factory-default setting**

### COMMAND 03: HOST PORT TIMEOUT

Selects a new timeout value for the interface to wait for data from the host before allowing the printer to honor PC print jobs. Each digit equals one second.

<u>VALUE</u>	<u>DESCRIPTION</u>
04 to 60	Sets new timeout value
*8	

Example: &%Z03,05 selects 5 seconds.

### COMMAND 04: USER-DEFINED STRINGS

Creates up to ten user-defined strings to send to the printer later. Place the hex codes representing the desired printer command inside the parentheses (up to 25 hex pairs). Spaces between hex pairs are allowed to aid in readability. Consult the printer’s user’s guide for proper hex codes. The user-defined string is stored in the interface’s memory under the selected value number (0 to 9). To activate the command, place a &%UX (where X is the value number) in the document.

<u>VALUE</u>	<u>DESCRIPTION</u>
0 to 9 (hex codes)	Assigns the hex command to a one digit delimiter (0-9)
0 to 9()	Deletes the specified user-defined string from memory.



Example:  
 &%Z04,3(1B26643044) creates a user-defined string for a Lexmark™ 4039 printer to start underlining as command 3. The string is represented by the value 3. To use this function, place &%U3 in the document.

**COMMAND 05: HOST LANGUAGE**

Selects the host language to be used by the twinax host, when the command “Use Default Language” is received.

<u>VALUE</u>	<u>DESCRIPTION</u>
00	Multinational
*01	USA/Canada
02	Austria/Germany
03	Belgium
04	Brazil
05	Canada/French
06	Denmark/Norway
07	Finland/Sweden
08	France
09	Italy
10	Japan
11	Japan (U.S.)
12	Portugal
13	Spain
14	Spanish speaking
15	United Kingdom

Example: &%Z05,00 selects the multinational character set.

**COMMAND 07: PRINT ORIENTATION**

HP® PCL and HP LinePrinter only. Determines the print orientation if it is not already determined through the host or the interface’s APO feature (Command 08).

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	COR, but host override through Print Quality setting allowed
1	Portrait
2	Landscape
3	COR

Example: &%Z07,2 selects landscape

**COMMAND 08: AUTOMATIC PRINT ORIENTATION**

HP PCL only. Selects or deselects Automatic Print Orientation (APO).

<u>VALUE</u>	<u>DESCRIPTION</u>
0	APO Off
*1	APO On

Example: &%Z08,1 turns the Automatic Print Orientation on.

\*Factory-default setting

**COMMAND 09: PAPER SIZE**

HP PCL only. Selects paper-size setting.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	Paper size specified by host software
1	A4 size paper
2	Paper size selected through printer's front panel

Example: `&%Z09,1` selects A4 size paper.

**COMMAND 10: TRUE LPI**

HP PCL only. Selects compressed or true LPI (lines per inch) printing.

<u>VALUE</u>	<u>DESCRIPTION</u>
0	No, compressed LPI
1	Yes, true LPI
2	Xpoint Twinax Controller Compatibility

Example: `&%Z10,1` selects true LPI.

**NOTE**

If you are using one of the popular Electronic Forms packages from companies like XPoint, Eclipse, Formula One, or others, use the true LPI selection. Use the last selection only if you want to run the software setup for the XPoint Twinax Controller.

**COMMAND 11: HOST PORT****INITIALIZATION STRING**

Enters a twinax port initialization string (in hex code, up to 25 pairs) that is sent to the printer after the interface has reconfigured the printer for host printing. Consult the printer's user's guide for the available commands and proper hex values.

<u>VALUE</u>	<u>DESCRIPTION</u>
0 (hex codes)	Stores the hex command as a host port initialization string

Example:  
`&%Z11,0(1B266C3844)` sets LPI to 8 LPI on a Lexmark 4039 laser printer.

**COMMAND 13: PAPER DRAWER 1 COMMAND**

HP PCL only. Matches the host's Paper Drawer 1 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 1, the printer will feed from the paper source assigned to paper drawer 1. Consult the printer's user's guide for the available paper sources and respective numbers.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 to 6	Paper sources available on the printer
*1	Default

Example: `&%Z13,5` assigns the optional 500-sheet cassette on an HP LaserJet 4 Plus to the host's paper drawer 1 command.

\*Factory-default setting

**COMMAND 14: PAPER DRAWER 2 COMMAND**

HP PCL only. Matches the host's Paper Drawer 2 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 2, the printer will feed from the paper source assigned to paper drawer 2. Consult the printer's user's guide for the available paper sources and respective numbers.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 to 6	Paper sources available on the printer
*4	Default

Example: &%Z14,5 assigns the optional 500-sheet cassette on an HP LaserJet 4 Plus to the host's paper drawer 2 command.

**COMMAND 15: PAPER DRAWER 3 COMMAND**

HP PCL only. Matches the host's Paper Drawer 3 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 3, the printer will feed from the paper source assigned to paper drawer 3. Consult the printer's user's guide for the available paper sources and respective numbers.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 to 6	Paper sources available on the printer
*5	Default

Example: &%Z15,6 assigns the optional 500-sheet cassette on an HP LaserJet 4 Plus to the host's paper drawer 3 command.

\*Factory-default setting

**COMMAND 16: OVERRIDE  
FORMAT COMMANDS**

Allow operator settings on the printer's front panel to override format commands coming from the host.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	No, do not override IBM format commands
1	Yes, override all IBM format commands
2	Yes, override NLQ commands
3	Yes, override CPI commands

Example: `&%Z16,1` enables the front panel to override all IBM format commands.

**COMMAND 17: CHARACTER SET**

Selects which character set will be used when both are available for the desired font. The character set selected is used as the underlying ASCII table for EBCDIC to ASCII translations. Consult the printer's user's guide to verify that the character set selected is also used by the printer and the selected font is supported.

<u>VALUE</u>	<u>DESCRIPTION</u>
0	Roman 8 (HP PCL only)
*1	Code Page 850
2	Code Page 437 (not valid for HP PCL)

Example: `&%Z17,0` selects the Roman 8 character set.

**COMMAND 18: STARTING  
VERTICAL POSITION**

HP PCL only. Adjusts the upper-left-corner starting vertical position for printing on the page in 1/60 of an inch.

<u>VALUE</u>	<u>DESCRIPTION</u>
-127 to 127	Adjustment of vertical position in 1/60 of an inch
*0	Default

Example: `&%Z18,-20` moves printing on the page up 1/3 inch or 2 lines at 6 LPI

**COMMAND 19: STARTING  
HORIZONTAL POSITION**

HP PCL only. Adjusts the upper-left-corner starting horizontal position for printing on the page in 1/60 of an inch.

<u>VALUE</u>	<u>DESCRIPTION</u>
-127 to 127	
*0	Default

Example: `&%Z19,12` moves printing on the page 1/5 inch right or 2 characters at 10 CPI.

\*Factory-default setting

**COMMAND 20: STAR PANEL OVERDRIVE**

Activates star-panel overdrive to add to the signal strength when problems occur with passive star panels.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	Overdrive inactive
1	Overdrive active

Example: &%Z20,1 activates star-panel overdrive.

**NOTE**

**Do not activate the star-panel overdrive when using twinax cabling.**

**COMMAND 21: USER FONT STRINGS**

HP PCL only. Assigns a font ID to a font. The first number (0-9) is one of 10 available strings, the second number (0-65535) is the host font number. The characters shown in parentheses are sent to the printer when the host font number is received. Refer to the printer’s user’s guide or the documentation accompanying the font cartridge for a list of available fonts and their respective strings. Use the < character to indicate the ESCape character.

<u>VALUE</u>	<u>DESCRIPTION</u>
0-9,	One of ten available strings
0-65535 (ASCII Char.)	Host font number Up to 25 ASCII characters representing the desired font

Example:  
&%Z21,3,12345(<(12U<(s0p12h10v1s3b6T)

This selects font #12345 as the third font string and selects for a Lexmark 4039 printer:

12U =	code page 850
0p =	fixed spacing
12h =	12 pitch
10v =	10 point
1s =	italic
3b =	bold
6T =	letter gothic

**COMMAND 22: DEFAULT PRINT QUALITY**

Printers without HP PCL only. Defines the print quality when the host sends “default print quality” commands.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	Draft
1	NLQ

Example: &%Z22,1 sets NLQ printing as the default.

\*Factory-default setting

**COMMAND 23: DRAFT PRINTING**

Non-HP PCL only. Selects the Draft Printing mode when a draft print command comes from the host or from the PQ-8.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	Normal draft
1	Fast draft

Example: &%Z23,1 sets the printer to print fast draft.

**COMMAND 24: IBM PRINTER EMULATION**

Selects the IBM printer emulation. The IBM printer emulation is closely related to the selected output protocol (set by DIP switches; see **Section 4.2.1**). **Table 4-11** summarizes this relationship. When changing the output protocol, the PQ-8 only loads the default IBM printer emulation if the active IBM emulation is invalid. To obtain the default IBM printer emulation, you need to restore factory defaults.

Example: Your PQ-8 is set to the Generic output protocol and IBM 5256 printer emulation. You now switch to the I-O 8215 output protocol. Since the currently active IBM 5256 printer emulation is valid (see table below), the interface will honor this emulation and not change.

Had you selected the HP line printer emulation, the IBM 5256 printer emulation would not be a valid selection. The interface would have switched to the default IBM 5224 printer emulation.

\*Factory-default setting

Table 4-11. IBM Printer Emulation.

<b>Output Protocol</b>	<b>Default IBM Printer Emulation</b>	<b>Other Valid Printer Emulations</b>
Hewlett-Packard PCL*	3812-1 (SCS)	—
IBM Proprinter	4214	5224, 5225, 5256
IBM PPDS (dot-matrix)	4214	5224, 5225, 5256
Epson ESC/P2	4214	5224, 5225, 5256
Epson DFX+	4214	5224, 5225, 5256
Epson LQ (24 pin)	4214	5224, 5225, 5256
Generic	5256	5224, 5225
Hewlett-Packard Line Printer*	5224	—
I-O 8215*	5224	5225, 5256

\*Factory-default setting

<u>VALUE</u>	<u>DESCRIPTION</u>
0	5256 Model 3
1	5224 Model 1
2	5225 Model 1
*3	4214 Model 2

Example: &%Z24,2 sets the active printer emulation to 5225 Model 1.

**NOTE**

An AS/400 will auto-configure when the PQ-8 is powered on. Therefore, you should save the new IBM emulation and then cycle the power on the interface to communicate the new emulation to the AS/400.

**COMMAND 25: IBM MOTION COMMAND**

Manipulates the IBM motion command.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	Use FF (when possible)
1	Substitute multiple LF for FF
2	Suppress FF
3	Suppress CR, LF and FF

**NOTE**

The Generic output protocol is strongly recommended when using a selection other than the default.

\*Factory-default setting

Example: &%Z25,1 sets the PQ-8 to count the lines specified through LPI settings and replace FF with multiple LF.

**COMMAND 26: WRAP/TRUNCATE TEXT**

Printers without HP PCL only. Sets the printer to wrap or truncate text lines longer than 8 inches.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	Wrap text
1	Truncate text at 8 inches

Example: &%Z26,1 Sets the printer to truncate at 8 inches. Text beyond 8 inches will be lost.

**COMMAND 28: 15 CPI PRINTING**

IBM Proprinter only: Determines how host commands for 15-CPI printing should be executed.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	No, prints 15 CPI as 17.1 CPI
1	Yes, prints 15 CPI as 15 CPI



**NOTE**

IBM Proprinters cannot print 15 CPI. The PQ-8 has the ability to “artificially” print 15 CPI by printing 17.1 CPI and adjusting the spacing through insertion of a space in graphics mode. Although this option allows users to effectively print 15 CPI (e.g. when using pre-printed forms) it significantly slows down the printer.

Example: &%Z28,1 sets the printer interface to “artificially” produce 15 CPI printing.

**COMMAND 32: 11" x 17" (A3) PRINTING**

HP PCL only. Forces the printer to print on 11 x 17 inch or A3 size paper, even when the host sends requests for smaller paper sizes (i.e. letter, legal, A4, Executive). This only applies to printers capable of printing on 11 x 17 inch or A3 size paper (like the HP LaserJet 4V printer).

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	11 x 17 (A3) selection is OFF
1	11 x 17 (A3) selection is ON

**NOTE**

With the 11 x 17 (A3) selection ON, the PQ-8’s APO feature (if turned ON) will automatically rotate all documents/reports with dimensions of 11 x 17 inches or smaller. To achieve COR in this case, the document/report has to be larger than 11 x 17 inches.

Example: &%Z32,1 Forces printing on large paper. The PQ-8 will request the printer to load A3 size paper when the host requests A4 or A3, and 11 x 17 inch paper in all other cases.

**COMMAND 33: DUPLEX PRINTING**

HP PCL only. Sets the interface to duplexing mode. This applies only when a printer with duplexing capability is attached.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	Off
1	Long-edge duplexing
2	Short-edge duplexing

Example: &%Z33,2 Instructs the interface to duplex all host print jobs along the short edge of the paper.

\*Factory-default setting

**COMMAND 42: START AND STOP EBCDIC HEX DUMP**

After receiving a start command the interface, starting with the next buffer received, sends all host data directly to the printer as hexadecimal printing until a stop command is received or the printer is powered off.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	No action taken
1	Start EBCDIC hex dump
2	Stop EBCDIC hex dump

**NOTES**

This command enables the user to print only the section of the document that is in question in buffer hex dump format.

Hex printing starts with the buffer after the start command and stops with the buffer after the stop command.

Example: &%Z42,1 starts buffer hex dump printing.  
&%Z42,2 stops buffer hex dump printing.

**COMMAND 44: COMMAND PASS-THRU**

I-O 8215 Emulation only. Enables or disables Command Pass-Thru (CPT) and host download. When CPT is disabled, the active CPT delimiters are not recognized as flags, but are treated as regular printed characters.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	CPT enabled
1	CPT disabled

Example: &%Z44,1 disables Command Pass-Thru.

**NOTE**

Command Z44,1 disables all subsequent host download commands received by the I-O 8215 emulation. If you want to save this setting in permanent memory, send the Z99,0 command. If you want to re-enable 8215 host download commands, either restore the factory defaults using the DIP switches, or change the emulation (to Generic, for example), send the &%Z44,0/Z99,0 command, then change back to the 8215 emulation.

\*Factory-default setting

**COMMAND 50: SHARING PORT TIMEOUT**

Selects the sharing port timeout value. This is the time interval before the interface automatically switches from the parallel or serial sharing port to check for data from the host.

<u>VALUE</u>	<u>DESCRIPTION</u>
4 to 60	4 to 60 seconds
*8	Default

Example: `&%Z50,10` sets the time interval to 10 seconds.

**COMMAND 56: PARALLEL PORT INITIALIZATION STRING**

Allows the user to define a parallel-port initialization string of up to 25 ASCII bytes, which is stored in the memory of the interface card. The string is sent to initialize the printer for parallel-port printing after host printing has occurred. To aid in readability, a single space is allowed between hex bytes. Refer to **Section 5.3** for more information.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 (up to 25 hex bytes)	Defines the init string
1()	Deletes init string

Example: `&%Z56,1()` deletes the hex strings previously defined as the parallel-port initialization string.

**COMMAND 58: SERIAL PORT INITIALIZATION STRING**

Allows the user to define a serial-port initialization string of up to 25 ASCII bytes, which is stored in the memory of the PQ-8 card. The string is sent to initialize the printer for serial-port printing after host printing has occurred. To aid in readability, a single space is allowed between hex bytes. Refer to **Section 5.3** for more information.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 (up to 25 hex bytes)	Defines the init string
1()	Deletes init string

Example: `&%Z58,1()` deletes the hex strings previously defined as the serial port initialization string.

**COMMAND 76: SERIAL-IN BAUD RATE**

Selects the Baud Rate for data received at the serial-in port. A new setting will not be effective immediately. To activate the new setting, cycle power on the PQ-8.

<u>VALUE</u>	<u>DESCRIPTION</u>
0	38,400 baud
1	19,200 baud
*2	9,600 baud
3	4,800 baud
4	2,400 baud
5	1,200 baud
6	600 baud
7	300 baud

Example: `&%Z76,0` sets the receiving baud rate to 38,400

\*Factory-default setting

**COMMAND 77: SERIAL-IN WORD LENGTH**

Selects the Word Length of data received at the serial-in port. A new setting will not be effective immediately. To activate the new setting, cycle power on the interface.

<u>VALUE</u>	<u>DESCRIPTION</u>
7	7 Bits
*8	8 Bits

Example: `&%Z77,7` sets the word length to 7 bits

**COMMAND 78: SERIAL-IN STOP BITS**

Selects the number of Stop Bits of a data stream received at the serial-in port. A new setting will not be effective immediately. To activate the new setting, cycle power on the interface.

<u>VALUE</u>	<u>DESCRIPTION</u>
*1	1 Bit
2	2 Bits

Example: `&%Z78,2` sets the number of Stop Bits to 2

**COMMAND 79: SERIAL-IN PARITY**

Selects the Parity of a data stream received at the serial-in port. A new setting will not be effective immediately. To activate the new setting, cycle power on the PQ-8.

<u>VALUE</u>	<u>DESCRIPTION</u>
*0	None
1	Odd
2	Even

Example: `&%Z79,2` sets the parity to even.

**COMMAND 84: 6 LPI STRING**

Used with Generic output protocol to define the 6 LPI string. This string represents the printer-specific command to set the printer to 6 LPI. Consult the printer's user's guide for the appropriate ASCII hex value representing the 6 LPI command. Whenever the interface receives a 6 LPI command from the host, it sends the string specified through Host/PC download command 84. If no string is specified, it will send the standard 6 LPI command for the active output protocol.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 (up to 25 hex bytes)	Defines the 6 LPI string
1 ( )	Deletes the 6 LPI string

Example: `&%Z84,1(1B 32)` assigns the 6 LPI command for an Epson LQ-2500 printer (hex value 1B 32) in the PQ-8's memory.

**\*Factory-default setting**

**NOTE**

If the active output protocol is generic and no 6 LPI string is specified, the PQ-8 will ignore all 6 LPI requests from the host.

**COMMAND 85: 8 LPI STRING**

Used with Generic output protocol to define the 8 LPI string. See command 84.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 (up to 25 hex bytes)	Defines the 8 LPI string
1()	Deletes the 8 LPI string

Example: &%Z85,1(1B 30) stores the 8 LPI command for an Epson LQ-2500 printer (hex value 1B 30) in the PQ-8's memory.

**COMMAND 86: 10 CPI STRING**

Used with Generic output protocol to define the 10 CPI string. See command 84.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 (up to 25 hex bytes)	Defines the 10 CPI string
1()	Deletes the 10 CPI string

Example: &%Z86,1(1B 50) stores the 10 CPI command for an Epson LQ-2500 printer (hex value 1B 50) in the PQ-8's memory.

**COMMAND 87: 15 CPI STRING**

Used with Generic output protocol to define the 15 CPI string. See command 84.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 (up to 25 hex bytes)	Defines the 15 CPI string
1()	Deletes the 15 CPI string

Example: &%Z87,1(1B 67) assigns the 15 CPI command for an Epson LQ-2500 printer (hex value 1B 67) in the PQ-8's memory.

**COMMAND 88: 12 CPI STRING**

Used with Generic output protocol to define the 12 CPI string. See command 84.

<u>VALUE</u>	<u>DESCRIPTION</u>
1 (up to 25 hex bytes)	Defines the 12 CPI string
1()	Deletes the 12 CPI string

Example: &%Z88,1(1B 4D) stores the 12 CPI command for an Epson LQ-2500 printer (hex value 1B 4D) in the PQ-8's memory.

**COMMAND 89: 16.7 CPI STRING**

Used with Generic output protocol to define the 16.7 CPI string. See command 84.

VALUE	DESCRIPTION
1 (up to 25 hex bytes)	Defines the 16.7 CPI string
1()	Deletes the 16.7 CPI string

Example: &%Z89,1(1B 10) stores the 16.7 (actually: 17 CPI normal draft) CPI command for an IBM Proprinter X24E (hex value 1B 10) in the PQ-8's memory.

**COMMAND 98: RESTORE DEFAULTS OR PRINT CONFIGURATION**

Restores the factory-default configuration selections, prints out a copy of the active configuration selections, or restores the permanent memory selections to the active setup status.

<u>VALUE</u>	<u>DESCRIPTION</u>
0	Restores the factory setup
1	Prints out the active setup selections
2	Restores the setup selections stored in the permanent memory to active status

**NOTES**

If a document is printed using temporary host download commands (commands not stored using the Z99,0 command), value 2 will restore the permanent memory selections.

Put a &%Z98,2 at the end of the document to restore the standard setup parameters for the next user of the printer.

The active setup and permanent memory setup selections are the same after a Command Z99,0 or a Command Z98,2 is sent to the printer.

Example: &%Z98,1 prints out the active setup selections for review.

**COMMAND 99: SAVE ALL CURRENT SETTINGS**

Saves all current settings specified through Host/PC download commands or Setup Software into permanent memory.

<u>VALUE</u>	<u>DESCRIPTION</u>
0	Save all current settings

Example: &%Z99,0 saves all current settings to permanent memory.

## 4.5 Restoring Factory Defaults

The factory-default configuration can be restored either by sending Host/PC Download Command “Z98,0” or by taking the following steps:

1. Power off the printer and the PQ-8.
2. Disconnect the host and PC sharing cables from the PQ-8.
3. Set configuration switches SW1:1, SW1:2 and SW1:3 to the “l” position, and switch SW1:8 (far right of the first bank of switches) to the “o” position if it is not already there.
4. Power on the PQ-8. The factory defaults are restored. The LED lights labeled “Host Ready” and “Printer Ready” will blink continuously, indicating the PQ-8 is not in operating mode.
5. Power off the PQ-8 and return configuration switches SW1:1, SW1:2 and SW1:3 to the correct twinax address. Switch SW1:8 should be in the “o” position.

## 5. Operation

### 5.1 Serial Printing

By default, the PQ-8S sends data at 96N81 (9,600 baud; parity = none; word length = 8 bits; stop bits = 1). Make sure that the printer and the PQ-8S are using the same serial parameters. The PQ-8S's Serial-Out parameters can be changed using the second (right) bank of switches located on the front panel.

### 5.2 Printer Sharing

The PQ-8P and PQ-8S allow the printer to be shared automatically between an attached PC/LAN and an IBM twinax host. Simply connect the PC/LAN printer server to the parallel (PQ-8P) or serial (PQ-8S) port. The PQ-8P can supply external devices attached to its parallel sharing port with 5V up to 350 mA. See **Appendix F** for information on how to transfer power to pin 18 of the PQ-8P.

The PQ-8 uses a timeout after each print job before it honors print jobs from another port. At the end of a host print job, the PQ-8 waits for the specified Twinax Port Timeout period before it honors data streams coming in through the sharing port. The Twinax Port Timeout period is set through Host/PC download command 03 or through the setup software.

After a parallel or serial print job is completed, the PQ-8 will again wait for a period of time before it honors

host print jobs. The Sharing Port Timeout is set through Host/PC download command 50 or through the setup software.

By default, the PQ-8S receives PC data at 96N81 (9,600 baud; parity = none; word length = 8 bits; stop bits = 1). Make sure the PC/LAN and the PQ-8S are using the same serial parameters. In addition, the PQ-8's Serial-In settings should be compatible with its Serial-Out settings. When printing from the PC/LAN, the lowest baud rate (Serial-In/Serial-Out) will determine the print speed. The PQ-8's Serial-In parameters can be changed through Host/PC download commands 76 through 79, or through the setup software.

If the PC print job is sent while a host job is printing, the printer responds as "busy" to the PC print request. The print job can be spooled through a spool program, sent to the printer when the host job is finished, or if the PC's printer port is set for infinite retry through the DOS "Configure Printer" command (described in the DOS manual), the print job waits for the printer to be available to receive the data.

The output protocol specified in the PQ-8's configuration (through configuration-switch settings) is irrelevant for printing from the shared port. For PC/LAN printing, select the appropriate printer driver on the PC/LAN printer server.



### 5.3 Parallel/Serial-Port Initialization

If you want to change the printer's configuration for shared printing (e.g. set it to PostScript mode), use the parallel/serial-port initialization string (Host/PC download command 56 or 58). Consult the printer's user's guide for the ASCII hex values representing the desired configuration commands. Then store these commands in the PQ-8's memory using Host/PC download command 56 or 58 or the setup software.

After host printing is completed and before the print job from the shared port is sent to the printer, the PQ-8 will send this initialization string to the printer and configure it according to your instructions. However, the print job coming through the shared port might contain other printer instructions, thus overriding the parallel/serial-port initialization string.

### 5.4 Host Printing

Based on the IBM printer emulation selected, you will have access to all the features inherent in the respective IBM printer the PQ-8 is emulating. In addition to the features of the emulated IBM printer, ASCII printers will often have other capabilities that you can take advantage of using Command Pass-Thru.

### 5.5 Host-Port Initialization

After shared printing, the PQ-8 reconfigures the printer according to the active configuration settings. If you want to further modify the printer configuration (e.g. select a different font for all host printing), take advantage of the host-port initialization string. Unlike the parallel/serial-port Initialization String, which is usually overridden by commands coming with the PC/LAN print job, the host-port initialization string is not sent to the printer until after the PQ-8 has reconfigured the printer for host printing. In 3812 emulation, the Init String is sent at the beginning of each printed page. In all other emulations, the Init String is sent at the beginning of the first host print job.

### 5.6 Star-Panel Overdrive

For installations using twinax cabling, the Star-Panel Overdrive option should be set to OFF (Host/PC download command 20 or the setup software).

If you have problems dropping off-line when using a passive star panel and twisted pair cabling, set the Star Panel Overdrive to ON. This increases the signal-driving capability of the interface.

## 5.7 Laser Printer Operation

The PQ-8 lets you emulate an ASCII laser printer as an IBM 3812 printer. This feature-rich emulation is automatically active when you select the HP PCL output protocol. You can also run an ASCII laser printer under an IBM 5256 emulation. The following section describes how to access the many features of emulation of the IBM 3812 printer.

The IBM 3812-1 printer is a laser-type printer that has font-changing capability, plus text-rotation and compression features called Automatic Print Orientation (APO) and Computer Output Reduction (COR).

The PQ-8's emulation of the 3812 provides bolding, underlining, superscripts, and subscripts by recognizing the host commands for these features in the document. A shadow print for bolding is performed automatically on fixed-pitch fonts. For proportionally spaced (typographic) fonts, the user must specify the font that is to be printed.

Like an IBM 5219 printer, the 3812 printer is configured with a default font ID on the host. Configure the most commonly used font as the system default, then change as necessary with a printer override or OCL command.

**Table 5-1** shows which fonts can be used as system defaults for a System/36 or System/38 host.

Table 5-1. Data Processing Fonts - S/36 and S/38.

<b>Typestyle Number</b>	<b>Font ID (Hex)</b>	<b>Pitch (CPI)</b>	<b>Description</b>
05	05	10	Presentation
11	0B	10	Courier
80	50	12	Courier
85	55	12	Courier
86	56	12	Prestige Elite
87	57	12	Letter Gothic
91	5B	12	Courier Italic
158	9E	Prop.	Times Roman
159	9F	Prop.	Times Roman Bold
160	A0	Prop.	Helvetica
162	A2	Prop.	Helvetica Italic
223	DF	15	Letter Gothic

### 5.7.1 CHANGING TYPESTYLES

The typestyle number (FGID) selected determines the font to be used. The system operator selects a default typestyle when the printer is configured on the host; however, a word-processing program may also have a default typestyle. Since the default typestyle can vary depending on the system setup, ask the system operator if you have questions about the default typestyle on the system.

There are two ways to change typestyles:

- Select a typestyle number within the program or document
- Use font-change commands in the document

Refer to the manuals for the program (for example, OfficeVision/400) to change typestyles in the program. Font Change commands are placed in the document by the user (see **Section 5.7.2**). The four-character font command changes the text to the new font until another Font Change command is entered.

The host does not know that a font change has taken place, and may send the original font number to the printer at the beginning of each page. Therefore, the user may have to put a Font Change command at the beginning of each new page. If the pitch is changed, there may be formatting problems, since the host is still formatting each line according to the pitch of the original

typestyle number. Text Management/38 does not allow more than one font per line of text, so Font Change commands must be used in such cases.

### 5.7.2 FONT-CHANGE COMMANDS

Font-change commands allow fonts to be changed in the document without using host commands. The commands can be used in either data processing (RPG, BASIC programs, etc.) or in word-processing documents.

Two types of font-change commands exist. Both commands can be placed anywhere within a document. The command consists of the “logical not” (¬) symbol, and either a capitalized “Q” or “F” followed by the typestyle number corresponding to the desired font. The “^” symbol can be used in place of the “¬” for non-US applications.

The font-change command occupies space in the program or text; however, the command does not print.

- ¬Q—Font-change commands using the capital letter “Q” allow the user to access a vast number of printer-resident and optional cartridge fonts. **Appendix A** shows the typestyle numbers assigned to the supported fonts. Each typestyle number describes a particular font with particular attributes. For example, typestyle number 88 represents Courier Bold, 12 pitch, 10 point.

To change a font, insert a font-change command at the beginning of the text where the change is to take place. For example, to bold the word “saves” in the following sentence (assuming the current font is Courier, 12 CPI or pitch, 10 point), type:

Quality -Q88**saves**-Q85 you time and money.

Here’s how the print will look:

Quality saves you time and money.

The -Q85 following “saves” returns the printing to the original font.

- -F—Font change commands using the capital letter “F” allow the user to access all of the scalable fonts available on a printer. Appendix B shows the typestyle numbers assigned to the supported fonts. Notice that unlike the typestyle numbers used with -Q commands, the typestyle numbers in **Appendix B** describe only the typestyle of the supported font. The size of the desired font is entered separately in the font change command. For example, to increase the size of the word “saves” in the following sentence to 30 points (assuming the current font is Times, 12 point), type:

Quality -F6199,30**saves**-F6199,12 you time and money.

Here’s how the print will look:

Quality **saves** you time and money.

The -F6199,12 following “saves” returns the printing to the original font. The numbers following the comma (-F6199,30 and -F6199,12) set the point size of a proportional font (such as Times) and the pitch size of a fixed pitch (such as Courier).

To print fonts that are not already supported through your PQ-8, refer to **Section 6.3**.

### 5.7.3 PAGE LENGTH

The printer prints up to 66 lines at 6 LPI in HP emulation mode (the line spacing will be compressed slightly to fit). The System/36 only allows 65 lines per page. If there are one or two lines at the top of a new page, more lines per page have been formatted than can print.

**5.7.4 PAPER SIZE**

Configure the printer's setup to the paper size used most. The PQ-8 only recognizes these paper sizes:

- Letter Paper: 8.5 x 11 in. (215.9 x 279.4 mm)
- A4 Paper: 8.27 x 11.69 in. (210 x 297 mm)
- Legal Paper: 8.5 x 14 in. (215.9 x 355.6 mm)
- Executive Paper: 7.25 x 10.5 in. (184.2 x 266.7 mm)
- 11" x 17" Paper: 11 x 17 in (279.4 x 431.8 mm)
- A3 Paper: 1.69 x 16.54 in (297 x 420 mm)

If the PQ-8's paper-size menu is set to the default "Host selected," it will look for one of the paper sizes mentioned above. If the host sends one of these paper sizes, the PQ-8 will instruct the printer to load that paper. Otherwise, it will instruct the printer to load the previously used paper size; or, if the host print job is the first after power-on, it will request letter-size paper.

With the "A4 only" selection active, the PQ-8 will always instruct the printer to load A4-size paper. If the "Printer selected" option is chosen, the PQ-8 will not send any paper requests, and the paper size selected through the printer's front panel will be used.

The following describes how to select legal-size paper in DisplayWrite/36 or OfficeVision/400.

1. Press F20 for "Format options."
2. Select 1 for "Document options" then another 1 for "Document format." Select 4 for "Page layout/paper options."
3. Scroll to the second screen and enter 8.5 as the paper width and 14 as the paper length. Press ENTER to activate the selection.
4. Press F12 until the menus have been exited.
5. Print the document.
6. The printer's operator panel displays "Load paper, Tray #, Legal." Install the legal-size paper tray in the printer, and the printer will start printing.
7. Press Continue on the printer's operator panel to print on currently loaded paper and not wait for the legal-size tray.

The System/38 only sends margins and other format specifications to a printer when they are different from the previous document or when the printer has been turned off. To choose a different size paper, you must:

1. Select a paper size in the program.

2. Install the correct paper size into the printer.
3. Power the printer off for about five seconds, then power it back on again.
4. Release the job for printing at the printer's controlling workstation.

The line format screens in DisplayWrite/36 (Command 20) also permit you to select "Justify," which aligns the right margin. The PQ-8 supports justification for fixed fonts only. For best results using justification, change the zone width to 1 (instead of 6).

#### **5.7.5 PRINTING ON 11" x 17" OR A3 SIZE PAPER**

Some printers, such as the HP LaserJet 4V printer, allow printing on 11" x 17" and A3 size paper. The PQ-8 automatically recognizes these larger paper sizes. However, at times it might be advantageous to force the printer to print on 11 x 17 inch or A3 size paper, even when the host sends requests for smaller paper sizes (letter, legal, A4, Executive). If this is desired, the PQ-8's 11 x 17 (A3) selection should be turned ON through Host/PC download command 32 or through the setup software.

With this selection turned ON, the PQ-8 will request the printer to load A3 size paper when the host requests

A4 or A3, and 11 x 17 inch paper in all other cases. In addition, the PQ-8's APO feature (if turned ON) will automatically rotate all documents/reports with dimensions of 11 x 17 inches or smaller. To achieve COR in this case, the document/report has to be larger than 11 x 17 inches.

#### **5.7.6 PAPER-DRAWER SELECTION**

OfficeVision/400 and DisplayWrite/36 allow the user to direct the print output to one of several paper sources regardless of whether the printer actually has 1, 2, 3 or more trays to pull paper from. On the host, several of these theoretical paper sources are called paper drawers. On the printer, the actual paper sources are usually called trays. The PQ-8 acts as the matchmaker between theoretical paper drawers and physical trays available on the printer.

The paper-drawer feature of the PQ-8 can be accessed through Host/PC download commands 13, 14, and 15 or through the setup software.

To change the physical tray assigned to the theoretical paper drawer (#1, #2, or #3):

1. Select the paper drawer # through Host/PC download command 13, 14, or 15, or through the setup software;
2. Select the number representing the physical tray listed in the printer's manual.

By changing the paper drawer on the host, up to three different paper sources on the printer can be accessed.

**Table 5-2** shows the default values and, as an example, lists the corresponding paper tray used for HP LaserJet 4Si and 4 Plus printers:

**Table 5-2. Default Values for Paper Drawers.**

<b>Host/PC Download</b>	<b>Paper Drawer Number</b>	<b>Default Value</b>	<b>HP 4Si Paper Tray</b>	<b>HP 4 Plus Paper Tray</b>
Z13	1	1	Upper	Cassette
Z14	2	4	Lower	MP tray
Z15	3	5	Not Used	500-sheet Cassette



To change the assigned paper tray, type the respective command followed by a comma (,) and the corresponding number of the chosen paper source.

If you have an HP LaserJet 4 Plus connected to the PQ-8 and the host is requesting paper to be fed through paper drawer #1, the HP printer would, by default, feed from the Paper Cassette. To assign the 500-sheet Cassette to the paper drawer #1 through the setup software, input 5 (from ESC&l5H, as found in the printer's user's guide) as the value for Paper Drawer # 1, or send the Host/PC download command Z13,5 to the printer.

## 5.8 Print Orientation

When operating the printer and printer interface in IBM 3812-1 emulation mode, the print orientation of the host document or report is determined by a variety of factors. These factors are in order of their impact on the final print orientation:

1. Page Rotation specified in the print file of a data processing document or in the document format menu of a word processing document.
2. Automatic Print Orientation (APO) setting on the printer interface.
3. Print Orientation setting on printer interface.

As you read the following explanation, refer to **Figure 5-1** for an illustration of the print orientation logic.

### 5.8.1 PAGE ROTATION

Degrees of page rotation can be specified through the print file of a data-processing document or in the document format menu of a word-processing document. See **Section 5.8.4** for a description on how to access the print file and the document format menu. The available settings are 0, 90, 180, 270 degrees and AUTO (AS/400 only). The print file also offers DEVD and COR (AS/400 only).

- a. With 0, 90, 180, and 270 degrees you can specify the desired rotation directly from the host.
- b. The COR setting will always print COR, unless the print quality (AS/400 and S/38) is set to NLQ or STD, or Text (S/36) is set to YES. If the page rotation is set to COR and print quality/text is one of the above mentioned settings, the print job will print in portrait in the requested font.
- c. With the DEVD and AUTO settings, the host does not influence the print orientation. Rather, the print orientation is determined by the settings on the PQ-8.

**5.8.2 AUTOMATIC PRINT ORIENTATION**

If no page rotation was specified on the host, the PQ-8's Automatic Print Orientation (APO) feature is the first setting to determine the final print orientation. This feature automatically rotates print jobs with dimensions of 8.5 x 14 inches or smaller to portrait or landscape orientation.

- a. With the APO feature ON, the PQ-8 first checks the dimensions of the host print job. If the print job is larger than 8.5 x 14 inches, the PQ-8 cannot fit the print job on one page. In this case the orientation of the print job is determined by the print orientation setting on the interface (BLOCK 3).
- b. If the dimensions of the print job are 8.5 x 14 inches or smaller, the PQ-8 compares the width to the height and automatically rotates the print job to portrait if the height is larger than the width or landscape if the width is larger than the height.

The dimensions of a word-processing document are specified directly through the document format menu. The dimensions of a data processing report are calculated in the following manner:

Width = Page Width (in number of columns) / CPI

Length = Page Length (in number of lines) / LPI

**5.8.3 PRINT-ORIENTATION SETTINGS**

The PQ-8's print-orientation settings determine the orientation of the host document/report *after* the host's page-rotation setting and the PQ-8's APO setting have been obeyed.

The available print-orientation settings are portrait, landscape, and two COR options. The COR feature rotates documents to landscape orientation and compresses the font as needed to fit the complete document on a standard 8.5" x 14" page. This allows the user to print a report initially designed to fit on 14 7/8" x 11" green bar paper onto a standard letter- or legal-size page without redesigning the report.

When used together, the APO and COR features can be a powerful tool to print host jobs in portrait, landscape, or if required in landscape with reduced font (COR) without user intervention.

The PQ-8's first COR option is not a true IBM 3812 emulation. This COR setting was added to give the user a more straightforward way of obtaining COR. The COR setting ignores print-quality settings and always prints COR (unless the host's page rotation or the PQ-8's APO setting determine the print orientation).

- a. The PQ-8 has a second COR option. This COR option is a true 3812-1 emulation. With certain page-rotation settings on the host, the IBM 3812-1 printer allows the user to manipulate the final print orientation through the print-quality setting. Note though, that this "override" only applies if the PQ-8's print orientation is set to COR, host override allowed.

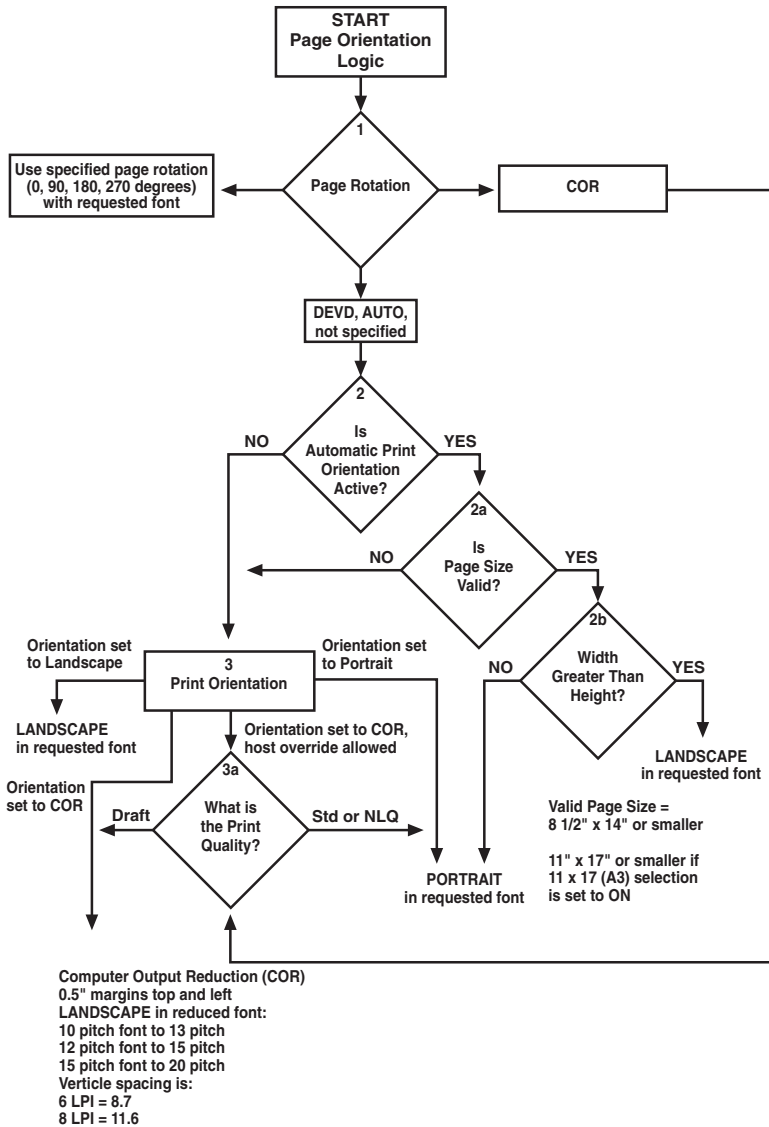


Figure 5-1. Flowchart.

Tables 5-3 through 5-5 show what page-rotation settings can be manipulated through print-quality settings and how the combination of page rotation and print quality affects the final print orientation.

**Table 5-3. Page-Rotation Settings.**

<b>Host System</b>	<b>Page-Rotation Setting</b>	<b>Print Quality Setting Causing Portrait Orientation</b>
AS/400	*DEVD (print file)	*NLQ, *STD
AS/400	*AUTO (Office Vision/400)	NLQ, Test
S/36	not specified	Text - Yes
S/38	not specified	*NLQ, *STD

**Table 5-4. Host CPI.**

<b>Host CPI</b>	<b>Reduced to:</b>
10	13.3
12	15
15	20

**Table 5-5. Host LPI.**

<b>Host LPI</b>	<b>Reduced to:</b>	<b>Maximum Rows (Lines)/Page</b>
6	8.7	66
8	11.6	88

**Table 5-6** shows the print-orientation results desired and recommends a combination of settings required to obtain that result. Most print-orientation results can be achieved with different setting combinations. Refer to **Figure 5-1**.

**Table 5-6. Settings for Different Print Orientations.**

<b>Result</b>	<b>Host Setting</b>	<b>APO</b>	<b>PQ-8 Setting for Print Orientation</b>
<p><i>Data processing:</i>                      Print reports with a width of 80 columns or less (at 10 CPI) in portrait <u>AND</u> print reports with a width of 132 (at 10 CPI) or 198 (at 15 CPI) columns in landscape with reduced font (COR)</p>	<p>Degree of Page Rotation...                      *AUTO</p>	<p>ON</p>	<p>COR</p>
<p><i>Word processing:</i>                      Print documents of up to 8.5 x 14 in portrait, 14 x 8.5 in landscape, and anything larger in landscape with reduced font (COR)</p>	<p>Rotate Paper...=1                      (Automatic)</p>	<p>OFF</p>	<p>COR</p>
<p>Print all reports/documents in landscape with requested font</p>	<p>Degree of Page Rotation...                      *AUTO; Rotate Paper...=1                      Automatic</p>	<p>OFF</p>	<p>COR</p>

**Table 5-6 (continued). Settings for Different Print Orientations.**

<b>Result</b>	<b>Host Setting</b>	<b>APO</b>	<b>PQ-8 Setting for Print Orientation</b>
Print all reports/documents in portrait with requested font	Degree of Page Rotation... *AUTO; Rotate Paper...=1 (Automatic)	OFF	Portrait

#### **5.8.4 CHANGING PAGE-ROTATION SETTINGS**

Before changing page-rotation settings, first verify the current settings. In Office Vision/400 and DisplayWrite/36, page rotation settings can be viewed and changed in the following manner:

1. Press F20 "Format options."
2. Press 1 "Document options" then ENTER.
3. Press 1 "Document format" then ENTER.
4. Press 4 "Page layout/paper options" then ENTER.
5. Press Page Down to scroll to the second screen.
6. Locate the "Rotate Paper ...." option.
7. Move the cursor to the currently selected rotation setting and type in the desired selection.

To permanently change the page-rotation setting for a data processing report the print file must be changed. This should be done by an MIS staff member, since a changed print file most likely affects many printers. The page-rotation setting can be changed temporarily by overriding the print file. The print file must be changed or overridden before the host creates the print job. An overridden print file applies only to print jobs created on the host session that was active when the print file was overridden.

To view the current print file settings, type CHGPRTF followed by a space and the name of the print file on the command line of the host. Press F4. Do not change any settings unless authorized by the IS director.



To change the print file:

1. Type CHGPRTF on the command line of the host, and press Enter.
2. Type in the name of the print file to be changed.
3. Press F10 to display additional parameters.
4. Press Page Down to scroll to the fourth screen.
5. Locate the "Degree of page rotation ....." option.
6. Move the cursor to the beginning of the dashed line and enter the desired selection.
7. Press ENTER to activate the selection and exit the print file menu.

To override the print file:

1. Type OVRPRTF on the command line of the host, and press Enter.
2. Type the name of the print file to be changed.
3. Press Page Down to scroll to the third screen.
4. Locate the "Degree of page rotation....." option.
5. Move the cursor to the beginning of dashed line and enter the desired selection.
6. Press ENTER to activate the selection and exit the print file menu.

## 5.9 Envelope Printing

To print envelopes, set the PQ-8 to landscape orientation (Host/PC download command 7, Value 2) or activate the Auto Print Orientation feature (Host/PC download command 8, Value 1). The following example shows how to print envelopes from a word-processing program, using the printer's optional envelope feeder.

1. Select line 1 as the first typing line.
2. Specify Envelope size in the program.
3. Select Feed Envelope in the program. Then choose the font desired.
4. Set the left margin to 1.
5. Type the return address, starting at line 1, column 1.
6. Type the mailing address. The appropriate space for the address will vary with the envelope size. For a Commercial 10 envelope, the address starts at about line 10, column 55.
7. Print the envelope.

The following envelope sizes are supported by the PQ-8:

- Monarch: 3 7/8" x 7 1/2"
- Commercial 10: 4 1/8" x 9 1/2"
- International DL: 110 mm x 220 mm
- International D5: 162 mm x 229 mm

## 5.10 Document/Envelope Printing

A letter and an envelope can be printed from DisplayWrite/36 or OfficeVision/400 in the same document by following this procedure:

1. Set the format for the letter and enter the letter file. On the first typing line, press CMD20 for Format options.
2. Select 1 for Document options, then another 1 for Document format. Select 3 for Typestyle/color.
3. Select the font ID number for the letter, such as No. 11, 86, etc., then press ENTER.
4. From the Document Format screen, select option 4 for Page layout/paper options. Scroll to the second screen of these options and select a paper size of 8.5 (width) x 11 (length) inches and paper source 1. If the letter is more than one page, select paper source of 1 for the following pages. Press ENTER to return to the Document format screen, then CMD 12 to return to the Document options screen.
5. Now set up the Alternate Format for the envelope. Select 2 for Alternate format, then 3 for Typestyle/color. Select the font ID for the envelope and press ENTER to return to the Alternate Format screen.
6. Select 4, Page layout/paper options. Choose a first typing line of 1, then scroll down to the second screen of the options and choose a paper width of 7.5 (monarch size) or 9.5 (commercial, or #10 size) and a paper length of 4 inches. For a paper source, select 5 for Envelope Feed. Press ENTER to return to the Alternate Format screen.
7. Select option 1 for Margins and Tabs and make the left margin 1. Press ENTER and CMD3 until you are back in the document.
8. Type in the letter. When done, add a page end by pressing ALT P.
9. Now load in the Alternate Format for the envelope. To do this, press the CMD5 key, Goto, and type in rf for Resetting Format. Press ENTER. Select option 4 on the Alternate Format screen, Begin Alternate Format. Press ENTER.
10. You will now be back in the document, with the Alternate Format. If these instructions have been followed, the cursor will be on the first typing line of 1, with the left margin of 1. Type in the envelope address, and send the file to print. The letter will print out first, followed by the envelope.

**NOTE**

**The printer may eject a blank page when printing orientation has been changed. If the buffer and ready light remain steady, press the Print/Check button on the printer's operator panel to eject the last page.**

**5.11 Duplex Printing**

Some printers can perform both simplex (single-sided) and duplex (double-sided) printing. Duplex printing can be accomplished in four ways:

- In OfficeVision/400, select duplex printing in the print options menu for that document (\*Type of page printing. . . Double-sided or Double-sided Tumble)
- In OS/400 V2 R3 and later, select duplex printing in the printer file (\*Print on both sides. . . \*Yes or \*Tumble)
- Place Duplexing commands in the document
- Set the PQ-8 to duplexing mode through host download command 33 or the setup software

For most documents, select duplex printing through the host's print options menu (OfficeVision/400) or through the printer file (OS/400 V2 R3). Refer to page 64 for a description on how to change the printer file.

I-O duplexing commands are similar to the I-O Font Change commands. These commands are placed on the first line of the document (if not on the first line, the commands do not take effect until the second page of the document). The commands are:

- D0 for simplex printing
- D1 for long-edge duplex printing
- D2 for short-edge duplex printing

When the printer receives a duplexing command, it prints in that mode until another printing command is received. Place the simplex command at the end of the document to return the printer to simplex mode. Envelope printing between documents does not change the printer's mode.

The PQ-8 can also be set to duplexing mode through host download command 33. The options are:

- 0 = Simplex
- 1 = Duplex, long-edge
- 2 = Duplex, short-edge (tumble)

Type &%Z33,1 or &%Z33,2 into the document or on the screen and print the document or the screen to set the interface to duplex printing (long-edge or short-edge). To return to simplex printing, type and print &%Z33,0.

On some duplex printing, if the last page is single-sided, it may remain in the printer. The form feed light remains on. When the next print job is sent, this page will be ejected. To manually eject the last page, take the printer off-line by pressing the ONLINE button, then press the FORM FEED button to eject the last page. Put the printer back on-line by pressing the ONLINE button once more.

## **5.12 Other Printer Commands**

**Table 5-7** is a summary list of special commands that the laser printer emulation will obey if they are imbedded in a user's document.

Table 5-7. Summary List of Special Commands.

Command	Function
<code>␣E</code>	Sends an ASCII ESC command to the printer
<code>␣TY</code>	Enables true 6 LPI printing
<code>␣TN</code>	Disables True 6 LPI printing
<code>␣I</code>	Ignores all host formatting commands
<code>␣S</code>	Stop ignoring host formatting commands

The `␣E` command allows an “Esc” command to be sent to the printer to control the printing. Simple “escape” commands eliminate the need for putting in hex codes using Command Pass-Thru. These commands allow use of some of the special features of the laser printer.

Check the printer’s manual or any optional technical manual for a description of the feature and the escape commands needed to access the feature. These commands consist of characters which are all found on the IBM twinax keyboard except for the Escape character. For example, `␣E` (s3B would begin bold printing on an HP LaserJet printer.

The printer will slightly compress line spacing to fit 66 lines onto the page. This may be undesirable (as when you are using pre-printed forms that must align correctly).

In these cases, the `␣TY` command prevents the printer from compressing the line spacing.

Use the `␣I` and `␣S` commands to remove unwanted host commands from a print file. For example, when printing with electronic forms software, these files are recognized by the host as text files, which causes the host to format the files with unwanted carriage returns and line feeds. Placing the `␣I` at the end of a line and `␣S` at the front of the next line causes the PQ-8 to remove the host carriage-return and line-feed commands and send only the data to the printer.

I-O’s laser printer emulation is compatible with the many popular electronic forms software applications. If the PQ-8 replaces XPoint’s Twinax Controller, set the PQ-8’s True LPI menu to “XPoint Controller.”

## 5.13 HP Line Printer

The HP Line Printer protocol allows printing of dot-matrix output on a PCL laser printer. When selecting the HP Line Printer protocol, the PQ-8 emulates an IBM 5224-1 line printer. Other IBM printers cannot be emulated.

The HP Line Printer protocol automatically prints all output in COR mode. However, portrait or landscape print orientation with the requested font is also possible. In addition, the PQ-8 offers the choice between compressed (default) and true LPI (useful when printing on pre-printed forms). When driving the attached laser printer with the HP Line Printer protocol, reports can be printed at high print speeds and with superior print quality.

## 5.14 Matrix/Specialty Printer Operation

### 5.14.1 IBM MATRIX-PRINTER EMULATIONS

The PQ-8 offers the following IBM matrix-printer emulations in addition to the IBM 4214 emulation that is used as the default for most of the output protocols:

- IBM 5224 Model 1
- IBM 5225 Model 1
- IBM 5256 Model 3

These IBM matrix-printer emulations can be selected through Host/PC download command 24 or through the setup software. The PQ-8 allows access to all the capabilities of the emulated IBM printer.

The IBM 4214 printer offers 5, 10, 12, 15, 16.7, and 20 CPI; 3, 4, 6, and 8 LPI; and print qualities of draft, fast draft, or NLQ.

The IBM 5224 and 5225 printers offer 10 and 15 CPI; 6 and 8 LPI; and only a draft print quality. The IBM 5256 printer only offers 10 CPI printing. These printer emulations are often used when connecting a specialty printer, such as a barcode printer, to an IBM host.

The PQ-8 offers the following output protocols for matrix and specialty printers:

- IBM PPDS
- IBM Proprinter® 4201/4202
- Epson®, 9 pin (FX, DFX)
- Epson, 9 pin (DFX+)
- Epson, 24 pin (LQ)
- Generic

### 5.14.2 CHARACTER SET

By default, the PQ-8 uses the CP 850 character set. You also have the option to select the CP 437 character set, which is often used in PC applications. Please be aware that CP 437 has 41 fewer characters than CP 850.

Although the PQ-8 artificially produces these missing characters, at times the “reproduction” may not satisfy your quality requirements.

#### 5.14.3 PRINT QUALITY

The PQ-8’s IBM 4214 printer emulation offers Draft, NLQ (Near Letter Quality), or Default print quality for print-quality options. If a default-print-quality command is sent from the host, the interface allows you to specify whether this default is Draft or NLQ. Set the desired default print quality through Host/PC download command 22 or through the setup software.

If the printer has the capability, the PQ-8 allows you to further specify if Draft printing should be Fast Draft or Normal Draft (Host/PC download command 23). Request for Draft printing can come directly from the host or from the PQ-8 (host sends Default print quality and PQ-8’s 4214 Default Print Quality is set to Draft). If the printer only offers one draft printing mode, the setting of the Draft Printing option is ignored.

Another way to modify the print quality is to set the printer to a certain value through its front panel. When you activate the Override Format Commands option of the interface through Host/PC download command 16 or through the setup software, the printer’s front panel settings are “locked in” and remain valid until the Override Format Command is disabled.

#### 5.14.4 PITCH CONTROL

The PQ-8’s 4214 emulation permits the printer to print 5, 10, 12, 15, 17.1 and 20 CPI (pitch). The pitch can vary, depending on the CPI selected in the host document or the printer’s front panel.

The 5224/5225 emulation only allows 10 and 15 CPI printing, and the 5256 emulation only allows 10 CPI printing, unless the CPI is overridden at the printer’s front panel.

#### 5.14.5 GRAPHICS PRINTING

The PQ-8 will print the same Advanced Printer Functions (APF) and Business Graphics Utility (BGU) graphics as the IBM 4214, 5224, and 5225 printers using All Points Available (APA) bit-image graphics. This method is for printing continuous patterns such as bar codes and logos that come from the twinax host. This is the method of graphic printing that IBM used before IPDS was developed.

Graphics are printed on IBM System/34, /36, /38 from the APF and BGU programs and programmer-defined characters using the command Load Alternate Character (LAC).

This capability is supported by 5224, 5225 printers in spacing of 10 and 15 CPI and 4214 printers in spacing of 10, 12, and 15 CPI.

The PQ-8 implements the LAC command by taking the dot pattern received from the twinax host and then printing that exact dot pattern using the printer's APA bit-image graphics at high-density 240 dots/inch. This permits the printer to print APF and BGU graphic output using exactly the same spacing as the IBM 4214/5224/5225 printers.

#### **5.14.6 TRUNCATE/WRAP**

For normal or wide paper (14 7/8" wide) printing, select Wrap through Host/PC download command 26 or the setup software. This allows printing to extend the full width of the wide paper. The printer wraps printing beyond the margin to the next line on narrow paper when it is configured for narrow paper.

When using narrow paper (8 1/2" wide), you can also select Truncate. This ignores any printing beyond 8". Documents must be formatted to fit the narrow paper, since the text beyond an 8" margin will truncate (not print).

#### **5.14.7 TRUE 15 CPI**

Epson 9-pin printers, IBM Proprinters, and similar printers do not have the capability to print at 15 CPI. When the host sends a 15 CPI command, the PQ-8 is able to produce an "artificial" 15 CPI on the printer. This is accomplished by printing 17.1 CPI and adjusting for the spacing difference. In this manner, 15 CPI fonts sent from the host can fit on preprinted forms that must align correctly.

When using the Epson 9-pin printer driver, this is done automatically. Since the Epson DFX 5000+ is able to print 15 CPI, make sure to select the Epson DFX+ driver when operating the DFX 5000+ printer.

When using the IBM Proprinter driver, the user may manually select whether 15 CPI host commands should simply be printed as 17.1 CPI, or as 17.1 CPI with space adjustments (see Host/PC download command 28). Printing the "artificial" 15 CPI through the IBM Proprinter driver significantly reduces print speed.



### 5.14.8 GENERIC MODE

The Generic output protocol should be used when the other output protocols of the PQ-8 are inappropriate. This could be the case with printers such as certain barcode label printers or embossers, but also with printers from Okidata, Mannesmann-Tally, or others. Refer to the printer's user's guide to find out if the printer operates with one of the PQ-8's output protocols.

In Generic mode, the PQ-8 does not pass on the LPI and CPI commands from the host. Rather, it allows you to match the printer-specific CPI or LPI command with the CPI or LPI command from the host (through Host/PC download commands 84-89).

For example, assume the printer protocol the printer requires is not available on the PQ-8. To change the printer to 10 CPI, the printer's user's manual provides the hexadecimal value of 1B 50. Use the Host/PC download command 86 to assign the value 1B 50 to the 10 CPI string: type **&%Z86,1(1B 50)**. From now on, when the interface receives a request for 10 CPI from the host, it will send the value 1B 50 to the printer and thereby set it to 10 CPI.

If nothing is assigned to the CPI or LPI string, the PQ-8 will send

nothing to the printer—it will ignore the CPI or LPI command from the host.

The PQ-8 stores commands for the following CPI and LPI values:

- 6 LPI: Host/PC download command 84
- 8 LPI: Host/PC download command 85
- 10 CPI: Host/PC download command 86
- 15 CPI: Host/PC download command 87
- 12 CPI: Host/PC download command 88
- 16.7 CPI: Host/PC download command 89

## 6. Advanced Features

### 6.1 Command Pass-Thru™

The Command Pass-Thru feature allows access to all of the built-in features of the printer, even if these features aren't normally available through the host software.

Command Pass-Thru lets you place printer-specific command sequences into the data sent to the printer. The PQ-8 recognizes these special sequences and "passes the command through" to the printer. The steps below describe how to use Command Pass-Thru.

1. Find the command for the print feature in the printer's user's guide.
2. Convert the printer command to hexadecimal.
3. Place &% (or the alternate CPT start delimiter), in the document at the point where the feature is to take effect. This signals the start of the print feature.

Enter the beginning printer command, then enter &% or the alternate CPT end delimiter. A space may be entered between hexadecimal code pairs to make the command easier to read, but do not put spaces between the delimiter and the hexadecimal characters.

4. Move the cursor to the point in the text where the print feature ends. Enter &% or the alternate CPT start delimiter, followed by the ending printer command and then &% or the alternate CPT end delimiter again, into the document.

For example:

The command ESC &d0D begins underlining and ESC &d@ ends underlining on an HP LaserJet printer. First convert the start command to the hexadecimal 1B 26 64 30 44 and the ending command to 1B 26 64 40.

If the delimiter is the default &% (hex 50 6C), then enter the commands as follows:

This is an  
&%1B26643044&%word&%1B266440&% word.

to print on the printer as:

This is an word.

Only characters from 00 to FF are recognized (alphabetic characters must be in upper case). Errors in the Command Pass-Thru sequence will cause the PQ-8 to ignore the command, and printing will resume at the point where the error occurred.

Command Pass-Thru may change the horizontal spacing.

Although the command is displayed on the screen, the PQ-8 treats it as a command and does not print it. If part of the sequence is printed, an error has been made entering the codes. Check the document and make sure the correct format and EBCDIC hexadecimal characters are being used.

Avoid sending codes that would move the print position during Command Pass-Thru. Since the PQ-8 does not process these commands, it cannot keep track of the print position changes. This may affect the position of characters that follow the command and the page layout.

## 6.2 User-Defined Strings

To avoid keying in frequently used printer commands (which would appear in the document as hex values imbedded in Command Pass-Thru delimiters), you should take advantage of the User-Defined Strings feature.

Using Host/PC download command 04, assign the numbers 0 through 9 to frequently used printer command strings.

After a command string has been defined, activate it by typing the

delimiter (&% or alternate CPT start delimiter) followed by the string number (U0 through U9) into the document or on the screen. When the document or screen is printed, the PQ-8 will recognize the &%U and send the command assigned to the string number to the printer.

For example, if command number U1 is assigned to a command string to turn on shadowed printing (hex codes 1B 28 73 31 32 38 53) for a Lexmark 4039 printer, then simply enter &%U1 in the document at the point where shadow printing is to begin.

Some commands (such as emphasized (bold) printing) may continue until another string is encountered that returns printing to normal, or for some host systems, until the next page is sent to the printer.

The PQ-8 self-test prints out a list of command numbers and the command strings assigned to them.

### 6.3 User-Defined Fonts (HP PCL only)

The PQ-8P supports a vast variety of fonts. For a list of the supported fonts, refer to **Appendixes A and B**. In addition, the User-Defined Fonts feature allows assignment of new or existing font IDs to different printer resident fonts or fonts from an optional font cartridge. Up to 10 new pairs of font IDs and fonts can be created.

The following example assumes an HP 4Si is connected to the PQ-8P and the default font is specified as font 11. The font ID 11 represents the font Courier 10 CPI. If you want to change the default font but maintain the font ID 11, simply assign a new font to font ID 11 (for example, Courier bold 10 CPI). This is done by sending the Host/PC download command `&%Z21,0,11(<(12U<(s0p10h12v0s3b4099T)` to the printer. Font ID 11 has now been redefined as Courier bold 10 CPI. Consult the printer's user's guide for the information needed to write the string.

In the same manner, personalized font IDs can be assigned to printer resident fonts or to fonts from an optional font cartridge. These fonts can then be called up by using the newly assigned font ID, the same way the standard printer resident fonts are called up.

User defined fonts cannot be used with the -F font change commands.

### 6.4 Color Printing

The PQ-8 allows printing of color on PCL5C-compatible printers such as the HP Color LaserJet, DeskJet 1200C, or DeskJet 1600C printer. Simply insert the color command in front of the text you want to colorize. Return to the "normal" black color by inserting -C00. The color commands are:

- C00 - Black
- C01 - Blue
- C02 - Red
- C03 - Magenta
- C04 - Green
- C05 - Turquoise/Cyan
- C06 - Yellow
- C07 - White
- C08 - Black
- C09 - Dark Blue
- C10 - Orange
- C11 - Purple
- C12 - Dark Green
- C13 - Dark Turquoise
- C14 - Mustard
- C15 - Grey
- C16 - Brown

For example, to print the word "red" in the color red in the following sentence, type:

This prints -C02red-C00 in red.

Alternately, you can select a color through the Typestyle/color menu of Office Version/400 (V3R1 or later). This menu is accessed by selecting F20 (Format Options), 1 (Document Options), 1 (Document Format), and finally 3 (Typestyle/color).

You can also create one or more additional colors using the User-Defined String feature described in **Section 6.2**.

To print a customized color, you need to follow these steps:

1. Set up a color palette.
2. Define the color.
3. Print the color.

For detailed information on this process, consult HP's PCL5 Color Technical Reference Manual. Here is a quick overview of how to define and print colors using the User-Defined Command String feature.

1. To set up a color palette, send the following string to the printer (using the Host/PC download command 04).

```
&%Z04,0(1B 2A 76 36 57 00 00 08
08 08)
```

## NOTE

**The &%Z04,0(...) stores the actual command string (1B 2A ...) in the interface and assigns it the macro identifier U0.**

2. To define and print a color, send the following string to the printer:

```
&%Z04,1(1B 2A 76 30 61 30 62 30
63 31 69 31 53).
```

## NOTE

The first 30 (preceding the value 61) identifies the amount of red of the color. Values can range from 0 (hex 30) to 255 (hex 32 35 35). The second 30 (preceding the value 62) identifies the amount of green. The third 30 (preceding the value 63) identifies the amount of blue you are adding to the color. The color of your choice is created by mixing these three colors (red, blue, green). The number 31 (preceding the value 69) assigns your customized color the value 1. The second 31 (preceding the value 52) calls up this number again and prints it.

3. Once you have sorted the color command strings in the interface's memory as described above, you can switch to the defined color any time by simply inserting the commands &%U0 (to set up the color palette) and &%U1 (to print the color) in the data stream.

Example:

1. To define the color red and store the customized “red” command in the interface under the macro name U3 type the following:

```
&%Z04,0(1B 2A 76 36 57 00 00 08 08 08)
```

[This string sets up the color palette.]

```
&%Z04,3(1B 2A 76 32 35 35 61 30 62 30 63 31 69 31 53)
```

[This command defines and prints the color red. Notice that the defined color consists of red (255) only. Green and blue components have been given the value 0 (hex 30).]

2. To print the word “red” in this sentence red, type:

To print the word&%U0  
&%U3”red”-C08 in this sentence red, type:

### NOTE

The -C08 in the above example returns the print color back to black.

## 6.5 Printing Bar Codes

When generating bar codes on an IBM AS/400 or S/3X, the PQ-8 must be attached to a PCL laser printer and emulate an IBM 3812-1 printer, or to a dot-matrix printer operating in either Epson or IBM Proprinter mode and emulate an IBM 4214 or 5224/25/56 printer.

The following applies to printing bar codes on laser printers as well as on dot-matrix printers, unless specified otherwise.

Using the bar-code feature, the following bar codes can be easily printed:

**Table 6-1. Bar Codes.**

Type	Bar Code
1	Code 3 of 9
2	Code 128
3	Interleaved 2 of 5
4	POSTNET
5	UPC A
6	EAN 8
7	EAN 13

To print any of these bar codes, use the following format:

```
-B<type>,<height>,<width>,<hr>,<chkd>,<ast>,<data>-B
```

The bar-code command string must contain all of these parameters, even if the parameter is irrelevant for the type of bar code being printed. For example, POSTNET comes in only one size, so, any height or width specifications are ignored. But the parameters for height and width must be included anyway.

-B: Identifies the strings as a bar code command string. -B must be placed at the beginning and at the end of the string.

<type>: Specifies the bar code type according to **Table 6-1**.

<height>: Specifies the height of the bar code. Height is expressed in multiples of 2.5 mm (approximately 1/10 inch). The height of the bar code can range from 1 (2.5 mm) to 9 (22.5 mm) inclusive.

Height values are ignored if a POSTNET bar code is being printed, since POSTNET uses one standard height. However, a valid value (1-9) must be entered for the height parameter to ensure the bar-code command string is complete.

<width>: Specifies the width of a bar-code module. A module is defined as a specific combination of bars and spaces used to represent a human-readable character.

By changing the width parameter, you can determine the width of the module and the thickness of the bars and spaces.

Width parameters can range from 1 to 9.

To determine the total length of the bar code, simply multiply the module length (found in the table on the following page) by the number of bar-code characters.

## NOTE

**Be aware that the table gives rounded values only.**

Example: Using Code 3 of 9, you want to bar code the word "PRINTERS." Assume the PQ-8 also generates a check digit and the start/stop characters. Setting the width parameter to 2 will yield a total bar code length of approximately 4 cm or about 1-1/2 inches.

Number of characters: 11 (8 letters (PRINTERS) + 2 start/stop characters + 1 check digit)

Module width (from **Table 6-2**):  
 3.6 mm (0.14 inches). Calculation:  
 11 x 3.6 mm = 39.6 mm = 3.96 cm;  
 or 11 x .14 in = 1.54 inches.

**Table 6-2. Module Width in mm (inches): PCL Laser.**

<b>Width</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Code 3 of 9	2.6 (.1)	3.6 (.14)	4.5 (.18)	5.5 (.22)	6.5 (.25)	7.5 (.29)	8.4 (.33)	9.4 (.37)	10.4 (.41)
Code 128	2.2 (.09)	3.1 (.12)	3.9 (.15)	4.7 (.19)	5.6 (.22)	6.4 (.25)	7.3 (.29)	8.1 (.32)	8.9 (.35)
Inter- leaved 2 of 5	2.3 (.09)	3.2 (.12)	4 (.16)	4.9 (.19)	5.8 (.23)	6.6 (.26)	7.5 (.3)	8.4 (.33)	9.3 (.36)
Postnet	5.7 (.23)								
EAN-13	1.5 (.06)	2 (.08)	2.5 (.1)	3.1 (.12)	3.6 (.14)	4.2 (.16)	4.7 (.18)	5.2 (.20)	5.8 (.23)
EAN-8	1.7 (.07)	2.3 (.09)	2.9 (.11)	3.6 (.14)	4.2 (.16)	4.8 (.19)	5.4 (.21)	6.1 (.24)	6.7 (.26)
UPC A	1.6 (.06)	2.2 (.08)	2.8 (.11)	3.4 (.13)	4 (.16)	4.6 (.18)	5.2 (.2)	5.8 (.23)	6.4 (.25)



**Table 6-3. Module width in mm (inches): Epson or IBM Proprinter Dot-Matrix.**

<b>Width</b>	<b>1</b>	<b>2</b>	<b>3</b>
Code 3 of 9	2.7 (.11)	5.4 (.22)	8.1 (.32)
Code 128	2.5 (.1)	5 (.2)	7.6 (.3)
Interleaved 2 of 5	2.2 (.9)	4.4 (.18)	6.6 (.26)
POSTNET		6.5 (.25)	
EAN 13	1.5 (.06)	3.1 (.12)	4.6 (.18)
EAN 8	1.8 (.07)	3.6 (.14)	5.5
UPC A	1.8 (.07)	3.6 (.14)	5.5 (.21)

Width parameters are ignored when printing POSTNET bar codes, since POSTNET uses one standard width. However, a valid value (1-9) must be entered for the width parameter to ensure the bar code command string is complete.

<hr>: Identifies whether human-readables are printed or not. Human-readables are printed underneath the bar code. Valid values are:

0 = Do not print human-readables.  
1 = Print human-readables.

<chkd>: Indicates whether the PQ-8 automatically calculates and causes a check digit to be printed. The following bar codes require a check digit, so, the PQ-8 automatically generates and adds a check digit to the bar-code data: Code 128, POSTNET, UPC A, EAN 8, EAN 13

If any of the bar codes listed above has been selected, the <chkd> selection is ignored by the PQ-8. However, one of the following values must be entered to ensure the bar-code command string is complete and valid. The options for the <chkd> parameter are:

0 = Do not calculate and add a check digit.  
1 = Calculate and add a check digit to the bar code data.

<ast>: Specifies whether start/stop characters are automatically

generated or manually added. This parameter only applies to bar-code type Code 3 of 9. For all other bar-code types, the start/stop characters are automatically generated by the PQ-8 and input for the <ast> parameter is ignored. However, one of the following values must be entered to ensure the bar-code command string is complete and valid. The options for the <ast> parameter are:

0 = Do not automatically add start/stop characters.  
1 = Automatically add start/stop characters.

## **NOTE**

**If value 0 is selected, you must manually enter start/stop characters (asterisks) together with the data. Failure to add the asterisks will cause an invalid bar code to be printed (i.e. a bar code without start/stop characters). If human-readables are being printed, the asterisks will also print as human-readables.**

**If value 1 is selected, you must not add asterisks as start/stop characters to the data. Failure to omit asterisks will cause an invalid bar code to be printed (i.e. a bar code with a start/stop character pair in the beginning and a start/stop character pair in the end.)**

<data>: The data to be printed as a bar code. Some bar codes require a certain number of characters. Others only allow alphanumeric or numeric characters. Before the PQ-8 processes the data string, it will check the complete data string and verify that it is valid. This is why the -B at the end is so important. If an invalid data string has been entered, the PQ-8 will print "Invalid Data" in the place of the bar code.

## NOTES

**1. Valid values must be entered for each of the parameters specified above, even if the parameter is irrelevant for the type of bar code being printed.**

**2. If an invalid parameter value (other than invalid data) has been entered, the PQ-8 will process the bar-code command up to that point and then reject any information it receives after the incorrect value.**

For example, a bar-code command string has been entered, however, an invalid <hr> value of 3 has been specified.

```
-B2,6,6,3,0,0,code128_B
```

The PQ-8 would cause all characters after the invalid value 3 to be printed:

```
,0,0,code128
```

This helps quickly identify where the mistake occurred.

**3. Spaces in the bar-code command string are invalid and will lead to the same result as mentioned in Step 2.**

**4. If invalid data (either too many characters or the wrong type of characters) is entered, the PQ-8 will print the error message: \*\* Invalid Data \*\***

**5. Allow for sufficient vertical spacing when printing text data beneath the bar code.**

For example, when the bar code command string is entered on line 1 of the document with a bar code height specified as 5 (approximately 1/2 inch or 3 lines at 6 LPI), and text is then entered on line 2 as follows,

```
-B5,7,1,0,0,0,1234567890-B  
This data overrun by barcode
```

this will cause the bar code to overlap the text in the second line:



**Figure 6-1. Bar Code Overlapping Text.**

To avoid overlapping bar codes with text, always allow for sufficient vertical line spacing (by adding line feeds, for example) to accommodate the height of the bar code.

6. When text data is entered to the right of the bar-code command string, the printed text will appear immediately to the right of where the bar-code print ends.

#### **OVERVIEW AND EXAMPLES**

The examples shown on the following pages give an overview of the supported bar code types. Note that the “maximum number of data characters” does not include start/stop characters and check digits.

**Code 3 of 9**

Maximum number of data characters:	30
Valid numeric characters:	0-9
Valid alphanumeric characters:	A-Z
Valid other characters:	space ! " # \$ % & ' ( ) + , - . / : ; < = > ? @

Example: -B1,4,1,1,1,1,0123456789-B



**Figure 6-2. Code 3 of 9.**

**POSTNET**

Maximum number of data characters:	30
Valid numeric characters:	0-9
Valid alphanumeric characters:	N/A
Valid other characters:	N/A

Example: -B4,1,1,1,1,0,0123456789-B



**Figure 6-3. POSTNET.**

**UPC A**

Required number of data characters:	10
Valid numeric characters:	0-9
Valid alphanumeric characters:	N/A
Valid other characters:	N/A

Example: -B5,5,1,1,1,0,0123456789-B



**Figure 6-4. UPC A.**

**EAN 8**

Required number of data characters:	7
Valid numeric characters:	0-9
Valid alphanumeric characters:	N/A
Valid other characters:	N/A

Example: -B6,3,1,1,1,0,1234567-B



**Figure 6-5. EAN 8.**

**EAN 13**

Required number of data characters:	12
Valid numeric characters:	0-9
Valid alphanumeric characters:	N/A
Valid other characters:	

Example: -B7,3,1,1,1,0,012345678912-B



**Figure 6-6. EAN 13.**

**Interleaved 2 of 5**

Maximum number of data characters:	30
Valid numeric characters:	0-9
Valid alphanumeric characters:	N/A
Valid other characters:	N/A

Example: -B3,3,1,1,1,0,0123456789-B



**Figure 6-7. Interleaved 2 of 5.**

**NOTE**

Since Interleaved 2 of 5 symbols are created from data-character pairs, the number to be encoded must have an even number of digits. If an odd number of data characters (including the optional check digit) is entered, the PQ-8 adds a "0" to the beginning of the bar code. If an even number of data characters (including the optional check digit) is entered, the PQ-8 prints the bar code exactly as it is input.

**Code 128**

Code 128 has three unique character subsets (code A, B, and C) shown in the table on the following pages. When entering data representing Code 128 bar code, follow these two steps:

1. Define which code set you want to use: type "A" to represent code A; type "B" to represent Code B; and type "C" to represent code C.
2. If you are using code set B, enter the data characters directly. The ~ character and other special characters are represented by the Symbol Character Value found in the left column of **Table 6-4**.

If you are using code set A or C, enter the Symbol Character Value found in the left column of the table. Each character is represented by two digits or a ~ followed by a digit. For example, to bar code the character "&" using Code Set A, type 06.

Maximum number of data characters: 30 (includes special characters)  
 Valid characters: Differs with selected code set, see **Table 6-4**.

Example: -B2,3,2,1,1,0,ABCDEFGHIJKLMN0PQRSTUVWXYZ-B



**ABCDEFGHIJKLMN0PQRSTUVWXYZ**

**Figure 6-8. Code 128.**



To show how multiple character sets are used, study the following data string. Height, width and other parameters were omitted in this example to focus your attention on the data string. Please note that this example is for illustration purposes only, and is not a recommended way of bar coding. The following data string is a fairly complex way of bar coding “10PQ-810”.

~B2,...,A1716~6PQ-8~510~B

- A: selects code set A
- 17: selects the number “1” from code set A
- 16: selects the number “0” from code set A
- ~6: switches from code set A to code set B
- PQ-8: selects the characters “PrintBoxes” from code set B
- ~5: switches from code set B to code set C
- 10: selects the number “10” from code set C

**Table 6-4. Symbol Character Value and Data Character.**

<b>Symbol Character Value</b>	<b>Code A</b>	<b>Data Character Code B</b>	<b>Code C</b>
00	SP	SP	00
01	!	!	01
02	"	"	02
03	#	#	03
04	\$	\$	04
05	%	%	05
06	&	&	06
07	'	'	07
08	(	(	08
09	)	)	09
10	*	*	10
11	+	+	11
12	.	.	12
13	-	-	13
14	.	.	14
15	/	/	15
16	0	0	16
17	1	1	17
18	2	2	18
19	3	3	19
20	4	4	20
21	5	5	21
22	6	6	22
23	7	7	23
24	8	8	24
25	9	9	25
26	:	:	26
27	;	;	27

Table 6-4 (continued). Symbol Character Value and Data Character.

<b>Symbol Character Value</b>	<b>Code A</b>	<b>Data Character Code B</b>	<b>Code C</b>
28	<	<	28
29	=	=	29
30	>	>	30
31	?	?	31
32	@	@	32
33	A	A	33
34	B	B	34
35	C	C	35
36	D	D	36
37	E	E	37
38	F	F	38
39	G	G	39
40	H	H	40
41	I	I	41
42	J	J	42
43	K	K	43
44	L	L	44
45	M	M	45
46	N	N	46
47	O	O	47
48	P	P	48
49	Q	Q	49
50	R	R	50
51	S	S	51
52	T	T	52
53	U	U	53
54	V	V	54
55	W	W	55

**Table 6-4 (continued). Symbol Character Value and Data Character.**

<b>Symbol Character Value</b>	<b>Code A</b>	<b>Data Character Code B</b>	<b>Code C</b>
56	X	X	56
57	Y	Y	57
58	Z	Z	58
59	[	[	59
60	\	\	60
61	]	]	61
62	^	^	62
63	_	_	63
64	NUL	`	64
65	SOH	a	65
66	STX	b	66
67	ETX	c	67
68	EOT	d	68
69	ENQ	e	69
70	ACK	f	70
71	BEL	g	71
72	BS	h	72
73	HT	i	73
74	LF	j	74
75	VT	k	75
76	FF	l	76
77	CR	m	77
78	So	n	78
79	SI	o	79
80	DLE	p	80
81	DC1	q	81
82	DC2	r	82
83	DC3	s	83

Table 6-4 (continued). Symbol Character Value and Data Character.

<b>Symbol Character Value</b>	<b>Code A</b>	<b>Data Character Code B</b>	<b>Code C</b>
84	DC4	t	84
85	NAK	u	85
86	SYN	v	86f
87	ETB	w	87
88	CAN	x	88
89	EM	y	89
90	SUB	z	90
91	ESC	{	91
92	FS		92
93	GS	}	93
~0	RS	~	94
~1	US	DEL	95
~2	FNC3	FNC3	96
~3	FNC2	FNC2	97
~4	SHIFT	SHIFT	98
~5	CODE C	CODE C	99
~6	CODE B	FNC4	CODE B
~7	FNC4	CODE A	CODE A
~8	FNC1	FNC1	FNC1

## **6.6 I-O Graphics Language™**

The I-O Graphics Language™ (IOGL™) allows printing of graphical elements and charts on PCL5 compatible printers. IOGL is independent of other I-O features, such as internally generated bar codes or font change commands. This means that if an I-O font-change command is followed by an IOGL command to rotate text, the text would print in the specified font. IOGL is also independent of regular text data. This allows text data to be overlaid by a graphical element, such as a shaded box.

### **6.6.1 I-O GRAPHICS LANGUAGE™ OVERVIEW**

**Table 6-5** is an overview of the I-O Graphics Language™ (IOGL) command strings and a brief description of the parameters used in the IOGL strings.

Table 6-5. IOGL Graphics Language.

Graphical Element	IOGL Command String
Line	-GL<line width>;<x start>;<y start>;<x end>;<y end>
Box	-GB<line width>;<x start>;<y start>;<x end>;<y end>; <% shading>
Circles	-GC<line width>;<x center>;<y center>;<radius>; <% shading>
Arc	-GA<line width>;<x start>;<y start>;<x center>; <y center>;<angle of rotation>
Shading/Color	-GS<# of values>;<color 1>;<% shading 1>; <color 2>;<% shading 2>;...
Pie Chart	-GP<line width>;<x center>;<y center>;<radius>;<# of segments>;<segment value 1>;<segment value 2>;...
Bar Chart (Histogram)	-GH<line width>;<x start>;<y start>;<x increment>;<y increment>;<bar width>;<# of entries>;<value 1>;<value 2>;...
Run (Line) Chart	-GR<line width>;<x start>;<y start>;<x increment>; <y increment>;<# of entries>;<value 1>;<value 2>;...
Text Rotation	-GT<x start>;<y start>;<angle of rotation>;<'text'>
Comments	-GX<'text'>

**Table 6-5. IOGL Graphics Language.**

<b>Parameter</b>	<b>Description</b>	<b>Units of Measurement</b>	<b>Valid Values</b>
'text'	text to be rotated or to be included in the IOGL program as a comment	N/A	any printable character
% shading	percentage of shading	percentage	0-100, integers
# of segments	number of segments to be printed in pie chart	each	1 to 9, integers
# of entries	number of values to be printed in bar or run (line) chart	each	1 to 12, integers
angle of rotation	angle of rotation of arc or text	degrees	arc: 0 to 360, integers text: 0, 90, 180, 270
bar width	width of a bar in a bar chart	n/300 inch	positive integers
color n	color code to select color of pie or bar chart segments	color command numbers	00 to 16
line width	width of any printed line (in line, box, arc, circle, chart)	mm	any positive number



Table 6-5 (continued). IOGL Graphics Language.

<b>Parameter</b>	<b>Description</b>	<b>Units of Measurement</b>	<b>Valid Values</b>
radius	radius of a circle or pie chart	n/300 inch	positive integers
segment value n	value to be represented by a pie chart segment	integer	0 to 100
value n	a value to be represented by a bar in a bar chart or a point in a line chart	any positive integer	any positive integer
x start	x coordinate of start position for lines and boxes	n/300 inch	positive integers; incl. 0
x end	x coordinate of end position for lines and boxes	n/300 inch	positive integers; incl. 0
x center	x coordinate of center point of circle, arc, or pie chart	n/300 inch	positive integers; incl. 0
x increment	horizontal movement before next bar (bar chart) or value (run chart) is printed	n/300 inch	positive integers; incl. 0
y center	y coordinate of center point of circle, arc, or pie chart	n/300 inch	positive integers; incl. 0

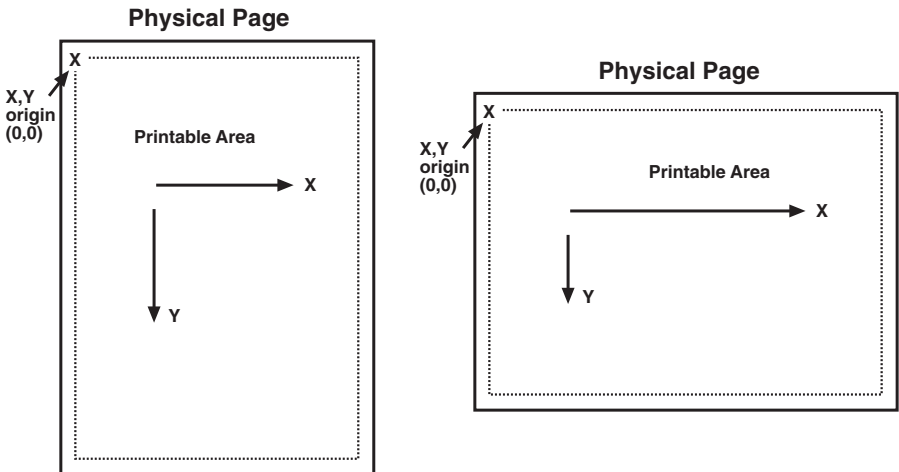
**Table 6-5 (continued). IOGL Graphics Language.**

<b>Parameter</b>	<b>Description</b>	<b>Units of Measurement</b>	<b>Valid Values</b>
y start	y coordinate of start position for lines and boxes	n/300 inch	positive integers; incl. 0
y end	y coordinate of end position for lines and boxes	n/300 inch	positive integers; incl. 0
y increment	height of one unit of the value to be printed in bar or run (line) chart	n/300 inch	positive integers; incl. 0

### 6.6.2 HELPFUL HINTS

1. All xy values (start, end, center, increment) are measured in  $n/300$  of an inch. The origin of the xy coordinate system is the top left hand corner of the printable area of the page (see **Figure 6-9**).

The printable area of the page may vary with the printer model and paper size being used. Refer to your printer's user's guide for specific information.



**Figure 6-9. XY Coordinate System on the Page.**

2. The complete command string must be entered as shown below. Incomplete command strings and command strings with invalid values (such as spaces) will cause the PQ-8 to print the string at the place where the error occurred.

For example, a line command string has been entered. However, an invalid <x start> value has been specified.

```
-GL30;A;1;1;600
```

The PQ-8 would cause all characters, including the invalid value "A" to be printed:

```
A;1;1;600
```

3. As an alternative to using the semicolon ";" as a separator between parameters, you may also enter a comma "," or a forward slash "/".

4. Do not enter numeric values with commas (for example, 50,000). The printer interface will interpret the "," to be the end of the parameter (so that, for example, 50,000 would be interpreted as two values: value 1 = 50, value 2 = 000).

International users should also be aware that a decimal value used to specify line width (in mm) such as "1,5" (i.e. 1 1/2) is also interpreted as two separate values (i.e. value 1 = 1, value 2 = 5). To enter a valid decimal line width use the period "." (i.e. 1.5 mm).

### 6.6.3 BASIC DESCRIPTION

*Lines*—-GL<line width>;<x start>;<y start>;<x end>;<y end>

Draws a line from the specified xy start to xy end. <Line width> is specified in mm.

For example: -GL2;100;0;100;600 draws a 2 mm wide, vertical (<x start> = <x end>) line of 2 inches in length (<y-end> - <y-start> = 600/300" = 2") (**Figure 6-10**)

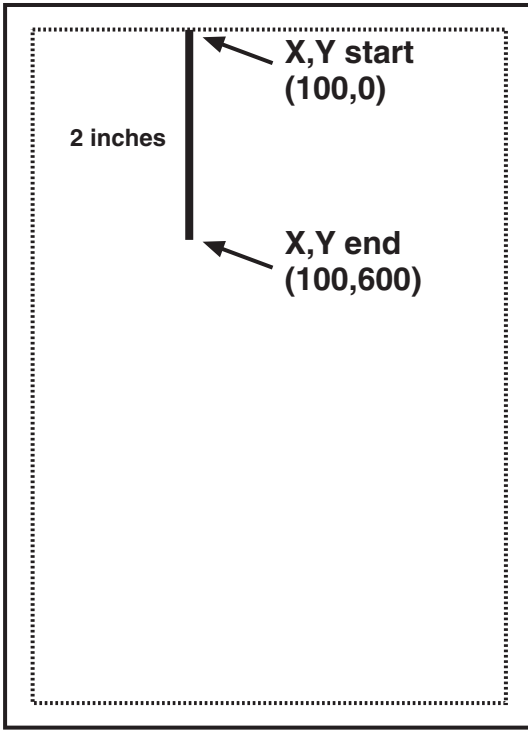
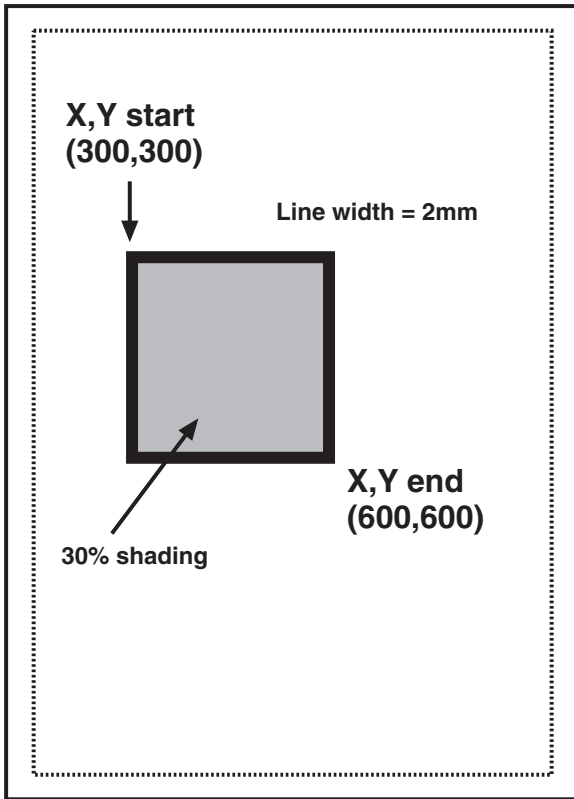


Figure 6-10. Example of Line.

*Boxes*— $\rightarrow$ GB<line width>;<x start>;<y start>;<x end>;<y end>;<% shading>

Draws a box from the specified xy start to the xy end. The box cannot be rotated. <line width> is specified in mm; <% shading> can range from 0 to 100.

For example:  
 $\rightarrow$ GB2;300;300;600;600;30 draws a box with 2 mm wide border and 30% shading (**Figure 6-11**)



**Figure 6-11. Example of Box.**

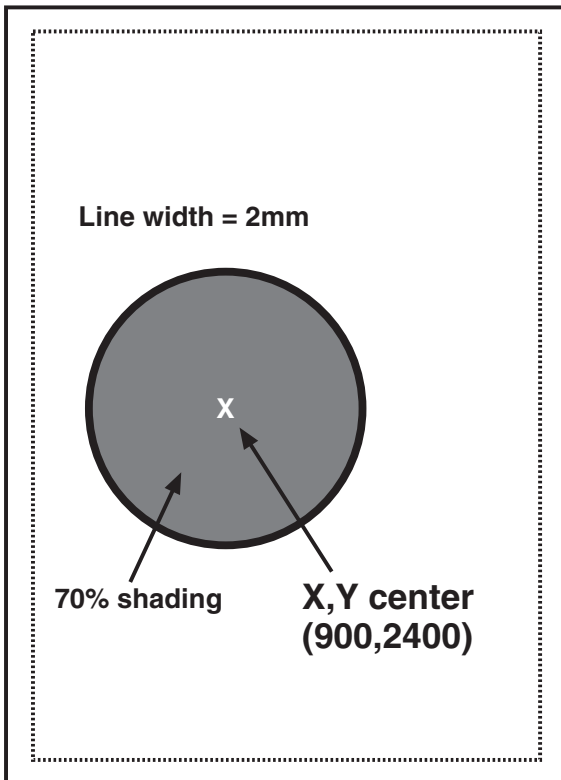
*Circle*—`−GC<line width>;<x center>;<y center>;<radius>;<% shading>`

Draws a circle with the specified radius (in n/300 inches) and line width (in mm) around the x,y center.

For example: `−GC2;900;2400;300;70` draws a circle with a radius of 1 inch (300/300 inches) (**Figure 6-12**)

## NOTE

To avoid cutting off part of the circle, make sure that the radius and the x,y center values are such that the complete circle will fit into the printable area of the page.

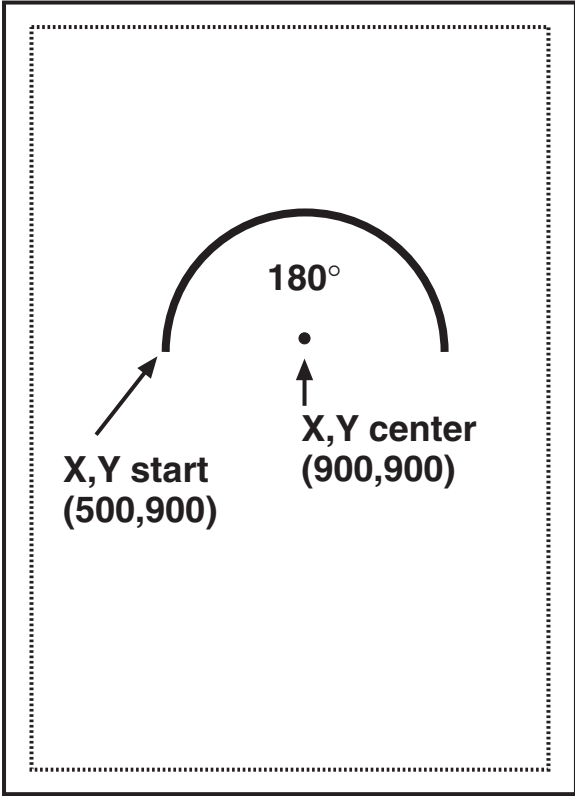


**Figure 6-12. Example of Circle.**

*Arc*—-GA<line width>;<x start>;<y start>;<x center>;<y center>;<angle of rotation>

Draws an arc around the xy center, starting at xy start and ending when the angle of rotation is completed. (Angle is measured from theoretical line xy center to xy start and rotates clockwise.)

For example:  
-GA1;500;900;900;900;180 draws an arc (semi-circle since rotation is 180 degrees) (**Figure 6-13**)



**Figure 6-13. Example of Arc.**



*Color/Shading*—`GS<# of values>;<color 1>;<% shading 1>;<color 2>;<% shading 2>;...`

Defines the color and shading of the pie-chart and bar-chart segments. The first value entered in the pie and bar chart commands will be printed in color 1 with shading 1. The second value entered in the pie and bar chart commands will be printed in color 2 with shading 2.

Colors are entered as numeric values 0-16 (corresponding to color command scheme). Shading is entered as a numeric value from 0-100 (% of shading). If the attached printer is not capable of recognizing PCL color commands, all printing will be black. Refer to pie and bar charts for an example.

*Pie Chart*—`GP<line width>; <x center>;<y center>;<radius>;<# of segments>;<segment value 1>;<segment value 2>;....`

Draws a pie chart around the xy center with the specified radius (in n/300 inches), number of segments (maximum of 9), and segment values. Segment values are entered as numerics and converted to percentages. Segment values can range from 0 to 100.

Each segment will have the color and/or shading as specified in the shading command (pie chart value 1 will get color/shading value 1,...). `<line width>` is specified in mm. The first pie segment starts at "9 o'clock," meaning on the far left of the circle (**Figure 6-14**).

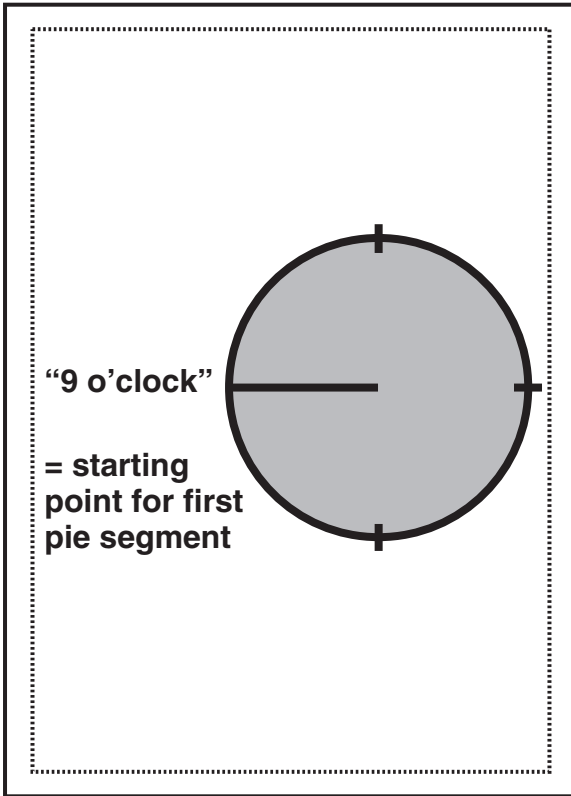


Figure 6-14. Color/Shading and Pie Chart.

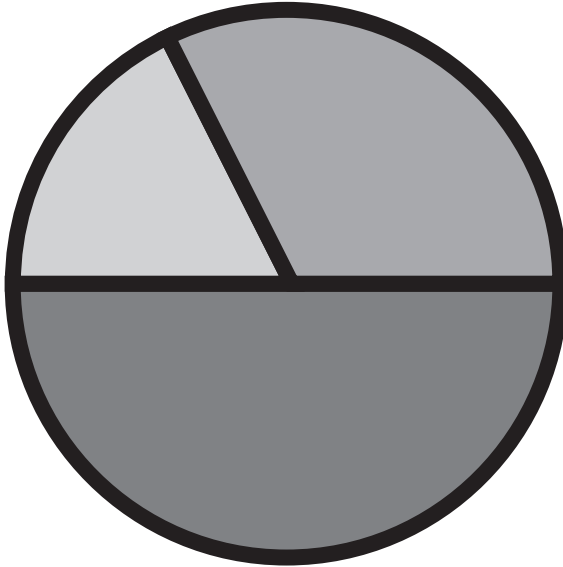
For example:

-GS3;01;20;02;50;04;80

-GP5;900;2400;600;3;10;20;30 draws

a three-segment pie chart. If the attached printer is a PCL color printer, the first segment will be blue (01), the second segment will be red (02), and the third segment will be green (04). The segments will be shaded at 20%, 50%, and 80% respectively.

The first segment (value 10) will be  $1/6$  of the complete circle ( $10/(10+20+30)=10/60=1/6$ ), the second segment (value 20) will be  $2/6$  of the complete circle ( $20/60$ ), and the third segment will be  $3/6$  of the complete circle (**Figure 6-15**).



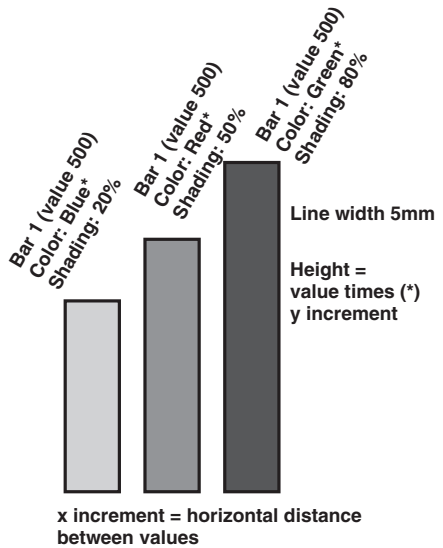
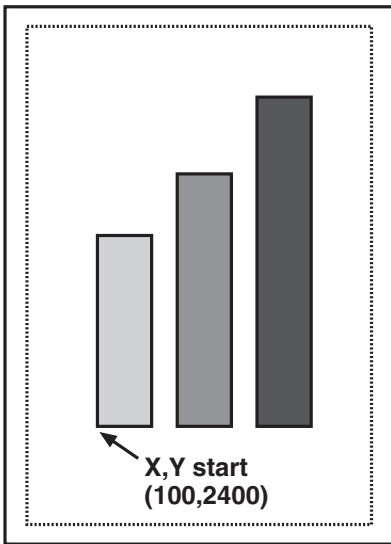
**Figure 6-15. Segment of Circle.**

*Bar Chart (Histogram)*—`-GH<line width>;<x start>;<y start>;<x increment>;<y increment>;<bar width>;<# of entries>; <value 1>;<value 2>; ...`

Draws a bar chart. `xy start` specifies the bottom left-hand corner of the first bar (the origin on the chart's `xy` scale). The `x increment` specifies the horizontal movement before the next bar is printed. The `y increment` (in `n/300` inches) determines the height of the bar (multiplied by the value). The bar width (in `n/300` inches) specifies the width of the

bar. Bar-chart values can range from 0 to 3,000. Each bar will have the color and/or shading as specified in the shading command (bar 1 is color/shading value 1,...). A maximum of 12 bars can be printed.

For example:  
`-GS3;01;20;02;50;04;80`  
`-GH1;100;2400;300;1;100;3;500;600;800`  
 draws three bars. If the attached printer is a PCL color printer, the first bar will be blue, the second red, and the third green. The bars will be shaded 20%, 50%, and 80% respectively (**Figure 6-16**).



**Figure 6-16. Bar Chart (Histogram).**

Each bar is  $1/3$  inch wide ( $100/300$  inch). The distance from the left side of one bar to the left side of the next bar is one inch ( $300/300$ ). This allows other bars to be added through a separate command.

Bar 1 will be  $1\ 2/3$  inches ( $500 \times 1/300$  inch) high, bar 2 will be two inches high ( $600 \times 1/300$  inch), and bar 3 will be  $2\ 2/3$  inches high ( $800 \times 1/300$  inch).

## NOTE

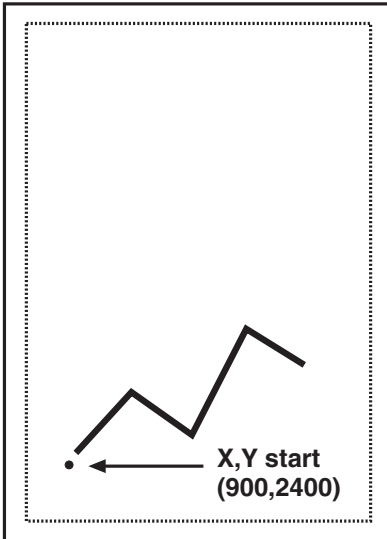
**The y-increment determines the scaling. Only integers (i.e. 1, 2, 3, 4, etc.) are valid. If you are charting sales figures in thousands of dollars, the y-increment should be small (for example, 1). If you are charting the number of customer complaints per period the y-increment should be high (for example, 100 or more). Be aware that the bar height must not exceed the total printable area of the page.**

*Run Chart*—`-GR<line width>;<x start>;<y start>;<x increment>;<y increment>;<# of entries>;<value 1>;<value 2>; ...`

Draws a run (line) chart. The xy start specifies the origin of the chart's xy scale (xy axes are not drawn). The x increment specifies the horizontal movement before the next value is printed. The y increment determines the height of the line (multiplied by the value).

For example:

`-GR3;900;2400;150;1;5;100;300;200;500;400` draws a run (line) chart (Figure 6-17).



Value 1 = 100  
 Value 2 = 300  
 Value 3 = 200  
 Value 4 = 500  
 Value 5 = 400

$\frac{1}{3}$  inch = 100  
 (value) x 1  
 (y increment)  
 ÷ 300/inch

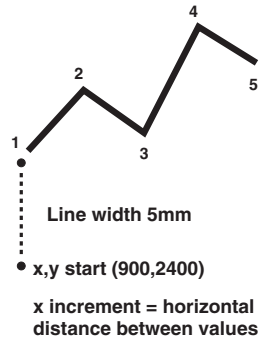


Figure 6-17. Run (Line) Chart.

**NOTE**

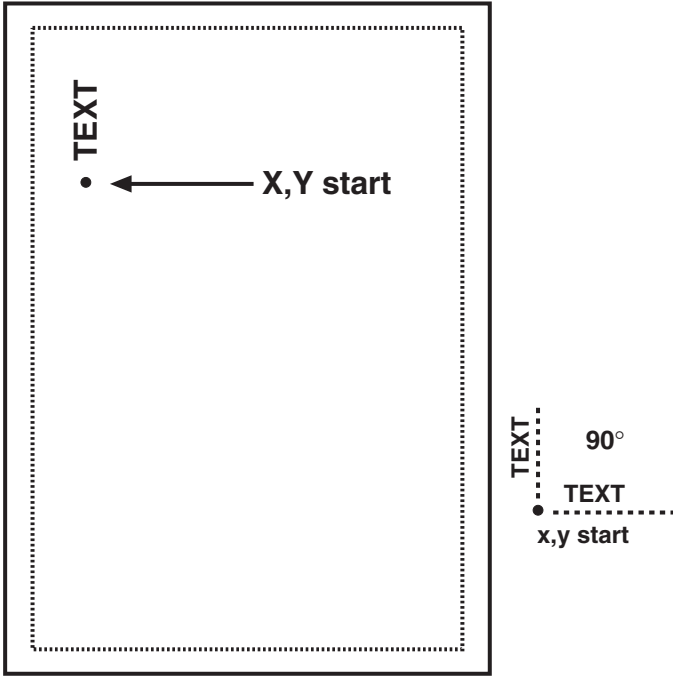
The y-increment determines the scaling. Only integers (1, 2, 3, 4, etc.) are valid. If you are charting sales figures in thousands of dollars, the y-increment should be small (for example, 1). If you are charting the number of customer complaints per period the y-increment should be high (for example, 100 or more).

*Text*—-GT<x start>;<y start>;<angle of rotation>;<'text'>

Prints the text (“text”) in the active font, with the specified rotation and specified xy start. Text will be rotated counterclockwise.

For example:

-GT1000;1000;90;'TEXT' prints the word “TEXT” in the active font with 90-degree rotation (**Figure 6-18**).



**Figure 6-18. Text.**

*Comments*—`→GX<'text'>`

Allows text to be added to IOGL commands for documentation. Comments will not print out.

For example: `→GX'Pie chart with 3 elements'` can be used to document an IOGL pie chart command.

## **6.7 I-O Graphics Language™ (IOGL) in Action**

### **6.7.1 GENERAL STEPS**

I-O Graphics Language™ (IOGL) can be used in many different ways. It can enhance the appearance of standard host reports through a few simple graphical elements such as lines, boxes, and circles; or it can be used to present pertinent data through charts. IOGL can even be used to create sophisticated electronic forms. However, programming with IOGL follows the same general steps:

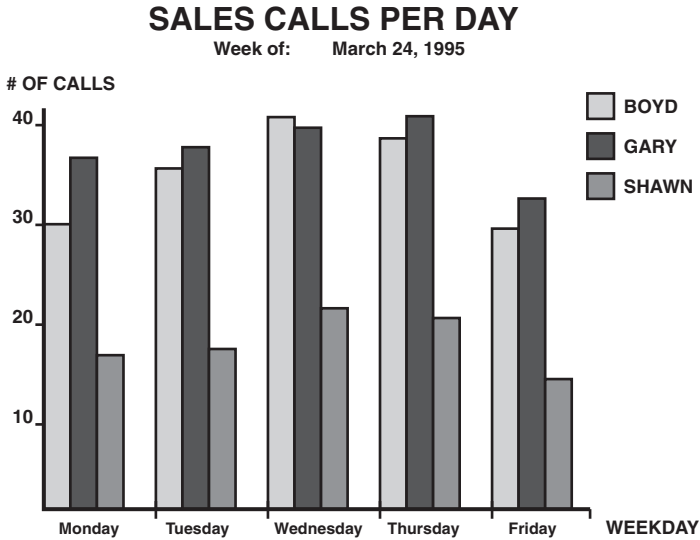
1. Determine which IOGL elements are needed to create the desired output. (For example, the bar chart in **Figure 6-19** uses four different IOGL elements.)

2. Determine the printable area of the page.
3. Determine the positioning of the graphical elements relative to the top left-hand corner of the printable area.
4. PCL color printer only: Determine the order in which to print the graphical elements. The lines of the last IOGL element will overlap (and cover) the previous IOGL elements.
5. Design the graphical output, one element at a time.
6. Link the graphical output with your host application.

### **6.7.2 TUTORIAL**

The following example (**Figure 6-19**) shows how multiple IOGL elements interact to create a bar chart.





**Figure 6-19. Bar Chart.**

- Following the above mentioned general steps, we first determined the makeup of this bar chart. The example consists of four IOGL elements: bar charts, lines, boxes, and text.
- To determine the printable area of the paper, we printed a box using 0;0 as the x;y starting coordinates. This was done by typing `-GB1;0;0;300;300;50` on the screen and sending it to the printer. The top left corner of the printed box marks the top left corner of the printable area of the page. For reference, we drew the printable area on the

blank sheet of paper. All references to distances are made in respect to the printable page, not the actual physical page. Refer to **Figure 6-9**.

- Determine where the chart should be placed (always in relation to the top left-hand corner of the printable area). In the example, the bar chart is on the bottom half of a letter-size page. The origin of the chart is one inch away from the left margin and 10 inches away from the top margin (**Figure 6-20**).

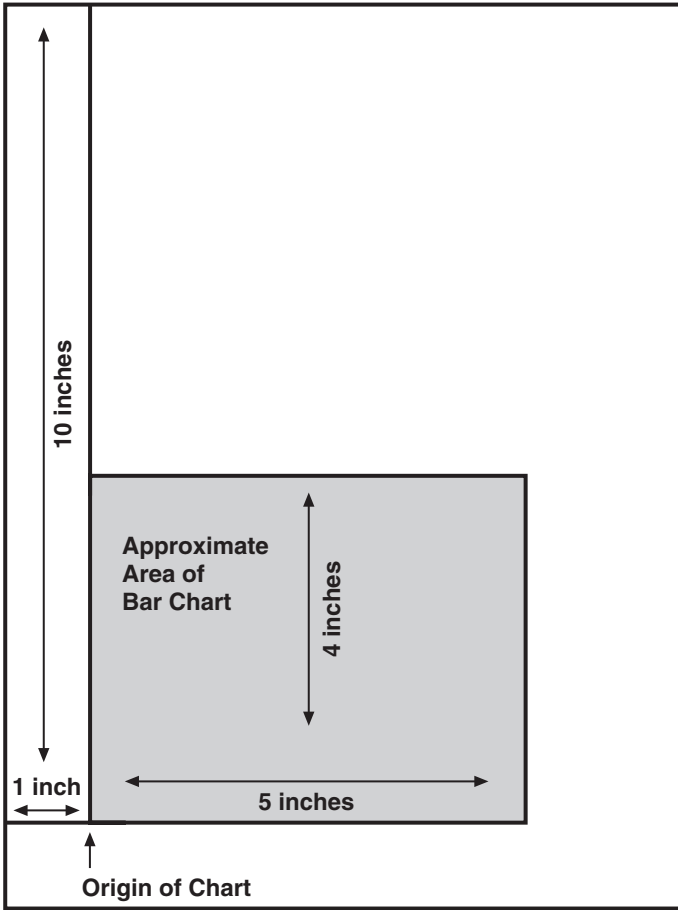


Figure 6-20. Placement of Bar Chart.

Next, determine the approximate maximum height and width of the chart. In the example, 40 was the expected maximum number of calls. We chose to represent 10 calls by one inch, resulting in a total maximum height of four inches (not including the title and subtitle.) Similarly, each day was represented by one inch, resulting in a total maximum width of five inches (not including the space needed for the label "WEEKDAY").

4. If the chart is being printed on a black-and-white PCL printer, the order in which these elements are created is irrelevant. However, if you are printing on a PCL color printer, the lines of the last element will always overlay (and cover) the element previously printed. In the example, the elements creating the x- and y-axes should be entered last when printing on a PCL color printer.
5. Create the separate IOGL elements based on the order determined in Step 4. In the example, the bar charts were created first. Recall the IOGL formula for the bar chart and the preceding shading/color command string:

```
-GS<# of values>;<color 1>;<% shading 1>;<color 2>;<% shading 2>;...
```

```
-GH<line width>;<x start>;<y start>;<x increment>;<y increment>;<bar width>;<# of entries>;<value 1>;<value 2>; ...
```

The bar chart shown in **Figure 6-16** was created using the following parameters:

#### *Bar Chart Boyd*

Shading/Color: Boyd's calls were plotted for each day of the business week, so the number of values is five. Since we printed to a black-and-white laser printer, the color parameters were irrelevant. The shading was set to 10%.

Bar Chart (Histogram): The line width was set to 1 mm. The x;y-start parameters defined the bottom left corner of the bar which is identical with the origin of the chart. Remember that the origin was one inch from the left margin, and 10 inches from the top margin of the printable area. The resulting values were 300 (=1 inch x 300/inch) for <x start> and 3000 (= 10 inches x 300/inch) for <y start>.

The bar representing Boyd's calls for Tuesday was to be printed one inch to the right of Monday's bar. The resulting <x increment> was 300 (= 1 inch x 300/inch). Since the maximum height of a bar was specified at four inches, the resulting value for <y increment> was 30 (= 4 inches/40 max. calls x 300/inch).

To aid in readability, extra space was left between the last bar of day one and the first bar of the next day. To determine the <bar width>, divide the available one inch (<x increment>) into four equal sections (three bars and one space). The resulting value was 75 (= 300/4). Next, count the <# of entries> (5) and enter the respective values. The parameters are:

-GX'bar chart Boyd'  
 -GS5;01;10;01;10;01;10;01;10  
 -GH1;300;3000;300;30;75;5;30;34;39;  
 37;28

#### *Bar Chart Gary*

The bars representing Gary's calls were to be printed directly to the right of Boyd's. The resulting horizontal start value <x start> was:

$$\begin{array}{r} 300 \quad (\text{Boyd's}) \\ + 75 \quad (\text{Bar width}) \\ \hline 375 \end{array}$$

With the exception of the actual calls, the other parameters for Gary's bar chart were identical to Boyd's. The parameters are:

-GX'bar chart Gary'  
 -GS5;02;75;02;75;02;75;02;75  
 -GH1;375;3000;300;30;75;5;35;36;38;  
 39;31

#### *Bar Chart Shawn*

Shawn's bar chart was to be printed directly to the right of Gary's. The resulting horizontal starting position <x start> was:

$$\begin{array}{r} 375 \quad (\text{Gary's}) \\ + 75 \quad (\text{Bar width}) \\ \hline 450 \end{array}$$

The parameters are:

-GX'bar chart Shawn'  
 -GS5;04;50;04;50;04;50;04;50  
 -GH1;450;3000;300;30;75;5;15;16;21;  
 20;13

#### **6.7.3 X- AND Y-AXES**

The x-axis (Weekday) and the y-axis (# of calls), along with the increments, were created through a series of separate lines. Notice that the line width of the axis is the same as the line width of the bars. The parameters are shown below:

-GX'X-Axis with increments'  
 -GL1;300;3000;1850;3000  
 -GL.5;600;3000;600;3019  
 -GL.5;900;3000;900;3019  
 -GL.5;1200;3000;1200;3019  
 -GL.5;1500;3000;1500;3019  
 -GL.5;1800;3000;1800;3019

-GCY-Axis with increments'  
 -GL1;300;3000;300;1750  
 -GL.5;281;2700;300;2700  
 -GL.5;281;2400;300;2400  
 -GL.5;281;2100;300;2100  
 -GL.5;281;1800;300;1800

### 6.7.4 LABELS/TITLE/SUBTITLE/LEGEND

All text was created through text rotation command strings. Text was always printed in the selected font. In the example, Universe Medium was used in different point sizes (-Q...). The legend consists of three separate boxes followed by text rotation commands. The parameters are shown below:

```
-GX'Font Change Command'
-Q4808
-GX'Labels X-Axis'
-GT300;3100;0;'Monday'
-GT600;3100;0;'Tuesday'
-GT900;3100;0;'Wednesday'
-GT1200;3100;0;'Thursday'
-GT1500;3100;0;'Friday'
-GT1800;3100;0;'WEEKDAY'

-GX'Labels Y-Axis'
-GT200;2700;0;'10'
-GT200;2400;0;'20'
-GT200;2100;0;'30'
-GT200;1800;0;'40'

-GX'Legend (boxes with text)'
-GT200;1650;0;# OF CALLS'
-GB1;1700;1650;1750;1700;10
-GT1760;1700;0;' = BOYD'
-GB1;1700;1750;1750;1800;75
-GT1760;1800;0;' = GARY'
-GB1;1700;1850;1750;1900;50
-GT1760;1900;0;' = SHAWN'

-GX;'Font Change Command'
-Q4813
-GX'Title'
-GT500;1500;0;'SALES CALLS PER
DAY'

-GX'Font Change Command'
-Q4808
-GX'Subtitle'
-GT600;1550;0;'Week of:'
-GT900;1550;0;'March 24, 1995'
```

### 6.8 Linking Graphical Output to a Host Application

There are several ways to link the graphical output to a host application. One method is to simply add the IOGL commands to the application code. This means that whenever the application is used and sent to the printer, the IOGL commands are also sent.

Another method is to design a separate subroutine that sends the IOGL output to the printer as a macro. The IOGL macro will only be sent to the printer once and resides in the printer's active memory until the printer is powered down. The application code requires only a macro call and does not require the complete graphic to be downloaded when a report is printed.

To store the IOGL output as a printer macro, begin the IOGL routine with a PCL command that begins a macro by typing: -E&f#y0X

For the # symbol, substitute a number that identifies the macro. Make sure this command precedes all IOGL commands. Also, be aware that PCL is case-sensitive.

At the end of the IOGL routine, stop the macro and save it permanently (until the printer is powered down) in the printer's memory. To end the macro, type: -E&f#y1X

To save the macro permanently (until the printer is powered down) type: -E&f#y10X. Store this macro in the printer's memory by "printing" it.

A call for this macro can be used in your application by embedding the following PCL command in the application code: `-E&f#y3X`

Another command that can be used to prevent overloading the printer's memory is `-E&f#y8X`. This command deletes the macro ID # that currently resides in the printer's memory.

## **6.9 Printing Images From The Host**

It is often advantageous to include images such as company logos or signatures with printed output. Logos and other images can be stored on printer cartridges or "Flash" SIMMs, offered through the printer manufacturer or various third-party vendors. While the process of loading the cartridge or SIMM differs, the final result is the same. The stored image is assigned a macro ID number that must be called up by the application when

the image is to be printed. Please refer to the documentation supplied with the cartridge or SIMM for instructions on how to store an image.

Generally, a macro stored in non-volatile memory is called up by sending the command `-E&f#y3X`, where # is the macro ID.

A PCL command used to reposition the stored image on a page is `-E&l#u#Z`, where the first # (`l#u`) specifies the "Left Offset Registration" or horizontal movement in `n/720` inch and the second # (`#Z`) specifies the "Top Offset Registration" or vertical movement of the image in `n/720` inch.

The repositioning command must precede the macro call. To return to the original position, type `-E&l0u0Z` immediately after the macro call.

## 7. Troubleshooting

This chapter provides instructions for performing diagnostic tests on the PQ-8. It also contains a problem resolution guide that describes common problems with the PQ-8 or the printer and their solutions. If you are unable to solve a problem by following the procedures outlined in this chapter, call for technical support.

Before calling, verify that the PQ-8 is installed correctly and that its configuration settings are correct, perform the appropriate diagnostic tests outlined in this chapter, and have the following information ready:

- Printer and PQ-8 self-test printouts
- Model number and serial number of the PQ-8
- Description of the problem
- Results of diagnostic tests
- Type of host system or controller

You may also need to print an EBCDIC hex dump by enabling the EBCDIC Hex Dump option through the PQ-8's configuration switches. This causes all printing to be in hexadecimal EBCDIC code, just as it's received from the host, to help in tracing problems.

If you need to ship the PQ-8, use the original carton and packaging to prevent damage.

### 7.1 PQ-8 Self-Test

Verify proper installation and configuration of the PQ-8 by performing a PQ-8 self-test. The self-test prints out the current software version, memory condition (RAM and ROM), and configuration selections.

#### NOTE

**If you are operating a label printer put the printer in ASCII hex dump mode, then follow the self-test instructions below. If the label printer starts printing, the PQ-8 has passed the self-test. To obtain a printout of the current settings, connect the PQ-8 to a laser or dot-matrix printer.**

The self-test can be started through Host/PC download command 98.

Follow the steps below to start the self-test from your PC or terminal.

1. Verify that the printer is connected properly to the PQ-8 and in "Ready" mode.
2. Type "&%Z98,1" on the screen.

3. Send that command to the printer (press the Print Screen Button or print the document/file that contains the Host/PC download command). The self-test will print out in a few seconds.

Follow the steps below to start the self-test by setting the configuration switches.

1. Verify that the printer is connected properly to the PQ-8.
2. Power off the printer interface.
3. Set configuration switch SW1:8 (far right on the first switch bank) to “1”. Verify that configuration switches SW1:1 through SW1:3 are not all set to “1”, but are set to a valid Twinax Address.
4. Power on the PQ-8. A self-test will print within a few seconds after power up. After the self-test prints, the LED lights “Host Ready” and “Printer Ready” will begin blinking, indicating that the PQ-8 is not in operating mode.
5. Power off the PQ-8 and return configuration switch SW1:8 to the “o” position.

Two self-test pages will print if the PQ-8 is installed properly. Sample printouts are shown beginning on page 17. The selections shown in the samples are factory defaults. The numbers at the left margin are command numbers used to change this setting using Host/PC download commands (see **Section 4.3**).

If the test does not print, the PQ-8 failed the self-test. Call for technical support.

## **7.2 EBCDIC Hex Dump**

The PQ-8 can be set up to print the buffer in hexadecimal EBCDIC code. This can be useful for a technician to diagnose problems with the PQ-8 or the printer.

The EBCDIC hex data is printed on a grid corresponding to the data's position in the buffer. If the hex data represents a printable character, that character is printed below the hex data.

To start the EBCDIC Hex Dump through Host/PC Download:

1. Verify that the printer is connected properly to the PQ-8.
2. Type “&%Z42,1” on the screen.



3. Send the command to the printer (press the Print Screen Button or print the document/file that contains the Host/PC download command).
4. To stop the Buffer Hex Dump, type “&%Z42,2” on the screen, then send it to the printer (press the Print Screen Button or print the document/file that contains the Host/PC download command).

Start the EBCDIC Hex Dump from the PQ-8's front panel as follows:

1. With configuration switches SW1:1 through SW1:3 set to a valid Twinax Address (0-6), set configuration switch SW1:8 (far right on the first switch bank) to “1”. The PQ-8 is now in buffer print mode.
2. Return configuration switch SW1:8 to the “0” position after printing is completed.

### 7.3 ASCII Hex Dump

The PQ-8 can be set up to print the buffer in hexadecimal ASCII code. This differs from the EBCDIC hex dump in that the buffer is first translated into ASCII code before it is printed. This can be useful to diagnose problems with the PQ-8 or the printer. The ASCII Hex Dump can only be started through the PQ-8's configuration switches. To start the ASCII Hex Dump:

1. Locate configuration switches SW1:4, SW1:5, SW1:6, and SW1:7 on the first switch bank.
2. Write down their current position (“0” or “1”).
3. With the PQ-8 powered on, set configuration switches SW1:4, SW1:5, SW1:6, and SW1:7 to “1”. The PQ-8 is now in ASCII Hex Dump mode.
4. To end ASCII Hex Dump mode, return the switches to their original position (see Step 2).

## 7.4 Self-Diagnostics

### **CAUTION**

**To avoid damage to your host system, the host must be disconnected before running this test.**

The PQ-8 can be set up to perform a complete analysis of its functions. The PQ-8 transmits data to itself and then analyzes how that data is processed. If an error is detected, an error message is printed on the printer. Follow the steps below to perform PQ-8 self-diagnostics.

1. Power off the PQ-8.
2. Disconnect the host adapter from the PQ-8.
3. Set configuration switches SW1:1 through SW1:3 and SW1:8 to "1".
4. Verify that the printer is connected properly to the PQ-8 and in "Ready" mode.

5. Power on the PQ-8. The PQ-8 will start the self-diagnostics program and repeat it until it is powered off. After each completed self-diagnostic, the PQ-8 will send the following message to the printer:

**TEST SEQUENCE COMPLETE**

Because a laser printer will only print full pages, it will store these and other messages in the printer buffer until enough messages are accumulated to fill up one page.

6. Power off the PQ-8 to end the self-diagnostics program.

Any error messages are printed between the "TEST SEQUENCE COMPLETE" messages.

Table 7-1. Error Messages.

Error Message	Description	Probable Cause
Output Timing Error	The twinax output circuits are not responding to the microprocessor as expected.	A circuit is not functioning, or a terminated cable is not attached to the PQ-8.
Unexpected Vector or Improper Byte Vector	The interrupt handling process received an improper interrupt value.	Initialization problems, non-functioning circuits, or microprocessor problems.
Error in Poll Address X	A poll test was sent to the indicated address but was not received properly.	A terminated cable is not properly installed, a circuit is not functioning, or connections are intermittent.
Incorrect Data on Poll to Address X	A poll was sent to the indicated address and was detected as a poll; however, the data received was not the expected data.	Problem with the twinaxial receiver circuitry.

**Table 7-1 (continued). Error Messages.**

<b>Error Message</b>	<b>Description</b>	<b>Probable Cause</b>
No Interrupt on Data	A byte of data (not a poll) was sent and the receiver circuitry did not interrupt the microprocessor.	Problems in the receiver circuitry or problems with the microprocessor interrupts.
Output Data Available Bit Bad	The transmitter timing is not staying busy for the proper period.	This indicates an ASIC failure.
Input Data Available Bit Bad	The bit signaling that data was received was not set as expected.	A properly terminated cable is not attached, a driver circuitry failure, a receiver circuit failure, or an ASIC failure.
No Interrupt on Bad Parity or Wrong Interrupt on Bad Parity	This test sends a transmission with the parity purposely invalid to test the proper reaction. Either no interrupt or the wrong interrupt was received in this test.	This indicates an ASIC failure.
Interrupt Without NMI on Poll to Address X	During a poll test, the transmission was received as data, not as a poll.	This indicates an ASIC failure.

Table 7-1 (continued). Error Messages.

Error Message	Description	Probable Cause
Input Not Indicating Busy	This is an ASIC internal test during a transmission.	This indicates an ASIC failure.
Two Byte Data Checks Bad	This test verifies multi-byte data transmissions for proper data.	A failure could be caused by a -5 volt supply problem, a transmitter circuit failure, a receiver circuit failure, or an ASIC failure.
Overflow Counter Bad	This tests the protection circuit in the ASIC designed to prevent a host failure from over-filling the PQ-8 buffer and causing an error in operation.	This indicates an ASIC failure.
Bad Data Expecting XX Received YY	A byte of data was sent and the receiver circuitry interrupted the microprocessor. However, when the data was checked, it was not the same as when it was sent.	This indicates a problem with the twinaxial-circuitry data paths.

**Table 7-1 (continued). Error Messages.**

<b>Error Message</b>	<b>Description</b>	<b>Probable Cause</b>
Parity Error Detected or Parity Failure	This error indicates that the twinaxial receiver detected a parity error on receiving polls or data.	This indicates an error in the parity generation by the twinaxial output, a malfunctioning of the parity checking circuit of the twinaxial receiver, or a poor cable connection.

## 7.5 Problem Resolution Guide

**Table 7-2** is a general guide to resolve common problems that may occur. Please refer to this guide before contacting technical support.

**Table 7-2. Problem Resolution Guide.**

<b>Problem or Message</b>	<b>Probable Cause</b>	<b>Action</b>
Host Line Sync LED is not on when connected to the host	Host is not configured for a printer at the address specified	Make sure the host is properly configured for the printer.
	Host is not operating	Check host system.
	Damaged or improper cabling	Check host cabling for damage or improper connection.
	Twinax cable improperly terminated	Make sure the prior device is not terminated (some PC emulator cards may terminate mid-line).
	Twisted pair cabling is not attached to an "active" or boosted hub	Activate Star Panel Overdrive (front panel or host/PC download command 20).
Host Line Sync LED blinks on and off	Address conflict with another twinax device on the cable	Make sure no other devices on this cable have the same address.

**Table 7-2 (continued). Problem Resolution Guide.**

<b>Error Message</b>	<b>Description</b>	<b>Probable Cause</b>
Printer Online LED is off when printer is connected	Printer fault, such as paper out, paper jam, etc.	Make sure the printer has paper, is clear of jams, etc.
	Damaged or loose printer cable	Check printer cable for damage or improper connection.
	Printer pinouts are incompatible with printer cable/PQ-8	Review the pin assignments on the printer's input port and the PQ-8's output port.
Printer loses host communication (drops off line)	Improper or damaged cabling	Check host cabling for improper connections or damage.
	Twisted-pair cabling is not attached to an "active" or boosted hub	Activate Star Panel Overdrive (Host/PC download command 20).
Right margin is cut off	Page width in word-processing program is not set wide enough	Reposition right margin setting.
	Page width is too wide	Select a narrower page.



Table 7-2 (continued). Problem Resolution Guide.

Error Message	Description	Probable Cause
Extra blank sheets are ejected between sheets of printout	Form length not correct in software (maximum length is 66 lines)	Make sure the document length doesn't exceed the maximum number of lines.
	Page orientation was changed	The printer may eject a blank page when the page orientation (portrait or landscape) is changed.
Form length is incorrect	Form length incorrect in software	Change form length.
	Incorrect configuration at the host	Make sure the host configuration matches the printer's.
Printer won't change fonts	Incorrect typestyle number	Make sure the font ID used is valid. Invalid font IDs are ignored by the printer.
	Wrong font cartridge loaded	Load the cartridge with the font that corresponds to the font ID.
	Font cartridge damaged or not seated into the printer properly	If possible, try a known good cartridge to determine if cartridge is faulty. Make sure the cartridge is loaded properly.

**Table 7-2 (continued). Problem Resolution Guide.**

<b>Error Message</b>	<b>Description</b>	<b>Probable Cause</b>
Printer does not print landscape in requested font	Did not select a rotation in the word-processing program	Select 90° or 270° rotation in the program.
	Did not select a rotation in the data-processing OCL statement	Add a 90° or 270° orientation instruction to the OCL statement.
	APO feature is ON <u>and</u> page size is 8-1/2" x 14" or less <u>and</u> width is less than height	Turn APO off <u>or</u> increase page size so it is larger than 8-1/2" x 14" <u>or</u> change width and height so width is greater than height. Refer to <b>Section 5.8</b> for more information.
	APO feature is OFF <u>and</u> orientation is set to COR; COR, host	Set PQ-8 orientation to landscape. override; or portrait
Printer does not print portrait in requested font	Selected the wrong rotation in the word-processing program	Select 0° to 180° rotation in the word-processing program.
	Selected the wrong rotation in the data-processing OCL statement	Select 0° to 180° rotation in OCL statement.

Table 7-2 (continued). Problem Resolution Guide.

Error Message	Description	Probable Cause
(continued)	APO feature is ON <u>and</u> page size is 8-1/2" x 14" or less <u>and</u> width is greater than height	Turn APO off <u>or</u> increase page size so it is larger than 8-1/2" x 14" <u>or</u> change width and height so width is less than height. Refer to <b>Section 5.8</b> for additional information.
	APO feature is OFF <u>and</u> orientation is set to COR; COR, host override allowed; or landscape	Set PQ-8 orientation to portrait.
Printer does not print COR	APO feature is ON <u>and</u> page size is 8-1/2" x 14" or less	Turn APO off <u>or</u> increase page size so it is larger than 8-1/2" x 14".
	APO feature is OFF <u>and</u> orientation is set to portrait or landscape	Set orientation to COR.
	APO feature is OFF <u>and</u> orientation is set to COR, host override allowed	Set orientation to COR <u>or</u> change host settings (see <b>Section 5.8</b> ).

**Table 7-1 (continued). Error Messages.**

<b>Error Message</b>	<b>Description</b>	<b>Probable Cause</b>
(continued)	Rotation in data processing printer file is set to *COR and host print quality in printer file is *STD or *NLQ	Select *DRAFT print quality in printer file.
DisplayWrite/36 or OfficeVision/400 document prints incorrectly	There might be a mistake in using DisplayWrite/36 or OfficeVision/400	Choose "yes" to printer error log on page 3 of the Print Option screen.

# Appendix A: Font (FGID) Reference for PCL Compatible Printers

**Table A-1** lists standard resident fonts and cartridges that are available, along with the font ID number used to select the font.

For more information regarding font selection, refer to **Sections 5.7.2** and **6.3**.

**Table A-1. Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Courier	R-8/CP850	P/L	10	12	11
Line Printer	R-8/CP850	P/L	15	8.5	223
Line Printer	R-8/CP850	P/L	17.1	8.5	254
Line Printer	R-8/CP850	P/L	19	8.5	281
Line Printer	R-8/CP850	P/L	13.33	8.5	204
Courier italic	R-8/CP850	P/L	10	12	18
Courier bold	R-8/CP850	P/L	10	12	46
Courier	R-8/CP850	P/L	12	10	85
Courier bold	R-8/CP850	P/L	12	10	88

**Table A-1. Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Courier italic	R-8/CP850	P/L	12	10	89
Letter Gothic	R-8/CP850	P/L	12	12	87
CG Times	R-8/CP850	P/L	Prop.	6	4605
	R-8/CP850	P/L	Prop.	8	4606
	R-8/CP850	P/L	Prop.	10	4607
	R-8/CP850	P/L	Prop.	12	4608
	R-8/CP850	P/L	Prop.	14	4609
	R-8/CP850	P/L	Prop.	18	4611
	R-8/CP850	P/L	Prop.	24	4614
	R-8/CP850	P/L	Prop.	30	4617
CG Times bold	R-8/CP850	P/L	Prop.	6	4625
	R-8/CP850	P/L	Prop.	8	4626
	R-8/CP850	P/L	Prop.	10	4627
	R-8/CP850	P/L	Prop.	12	4628
	R-8/CP850	P/L	Prop.	14	4629

Table A-1 (continued). Selecting Standard Fonts.

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
	R-8/CP850	P/L	Prop.	18	4631
	R-8/CP850	P/L	Prop.	24	4634
	R-8/CP850	P/L	Prop.	30	4637
CG Times italic	R-8/CP850	P/L	Prop.	6	4645
	R-8/CP850	P/L	Prop.	8	4646
	R-8/CP850	P/L	Prop.	10	4647
	R-8/CP850	P/L	Prop.	12	4648
	R-8/CP850	P/L	Prop.	14	4649
	R-8/CP850	P/L	Prop.	18	4651
	R-8/CP850	P/L	Prop.	24	4654
	R-8/CP850	P/L	Prop.	30	4657
CG Times bold italic	R-8/CP850	P/L	Prop.	6	4665
	R-8/CP850	P/L	Prop.	8	4666
	R-8/CP850	P/L	Prop.	10	4667
	R-8/CP850	P/L	Prop.	12	4668

**Table A-1. Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
	R-8/CP850	P/L	Prop.	14	4669
	R-8/CP850	P/L	Prop.	18	4671
	R-8/CP850	P/L	Prop.	24	4674
	R-8/CP850	P/L	Prop.	30	4677
Univers medium	R-8/CP850	P/L	Prop.	6	4805
	R-8/CP850	P/L	Prop.	8	4806
	R-8/CP850	P/L	Prop.	10	4807
	R-8/CP850	P/L	Prop.	12	4808
	R-8/CP850	P/L	Prop.	14	4809
	R-8/CP850	P/L	Prop.	18	4811
	R-8/CP850	P/L	Prop.	24	4814
	R-8/CP850	P/L	Prop.	30	4817
Univers med italic	R-8/CP850	P/L	Prop.	6	4825
	R-8/CP850	P/L	Prop.	8	4826
	R-8/CP850	P/L	Prop.	10	4827



Table A-1 (continued). Selecting Standard Fonts.

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
	R-8/CP850	P/L	Prop.	12	4828
	R-8/CP850	P/L	Prop.	14	4829
	R-8/CP850	P/L	Prop.	18	4831
	R-8/CP850	P/L	Prop.	24	4834
	R-8/CP850	P/L	Prop.	30	4837
Univers med condensed	R-8/CP850	P/L	Prop.	6	4845
	R-8/CP850	P/L	Prop.	8	4846
	R-8/CP850	P/L	Prop.	10	4847
	R-8/CP850	P/L	Prop.	12	4848
	R-8/CP850	P/L	Prop.	14	4849
	R-8/CP850	P/L	Prop.	18	4851
	R-8/CP850	P/L	Prop.	24	4854
	R-8/CP850	P/L	Prop.	30	4857

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Univers med cond italic	R-8/CP850	P/L	Prop.	6	4865
	R-8/CP850	P/L	Prop.	8	4866
	R-8/CP850	P/L	Prop.	10	4867
	R-8/CP850	P/L	Prop.	12	4868
	R-8/CP850	P/L	Prop.	14	4869
	R-8/CP850	P/L	Prop.	18	4871
	R-8/CP850	P/L	Prop.	24	4874
	R-8/CP850	P/L	Prop.	30	4877
ITC Zapf Dingbat	R-8/CP850	P/L	Prop.	6	4985
	R-8/CP850	P/L	Prop.	8	4986
	R-8/CP850	P/L	Prop.	10	4987
	R-8/CP850	P/L	Prop.	12	4988
	R-8/CP850	P/L	Prop.	14	4989
	R-8/CP850	P/L	Prop.	18	4991

Table A-1 (continued). Selecting Standard Fonts.

Typeface	Symbol Set	Orient.	Pitch	Point Size	Typestyle No.
	R-8/CP850	P/L	Prop.	24	4994
	R-8/CP850	P/L	Prop.	30	4997
<b>General Font Assignments</b>					
Time	R-8/CP850	P	Prop.	8	157
Time	R-8/CP850	P	Prop.	10	158
Time Bold	R-8/CP850	P	Prop.	10	159
Time Italic	R-8/CP850	P	Prop.	10	155
Helvetica Bold	R-8/CP850	P	Prop.	14.4	34126
Courier Bold	R-8/CP850	P/L	10	12	46
Courier Italic	R-8/CP850	P/L	10	12	18
Prestige	R-8/CP850	P/L	12	10	86
Prestige Bold	R-8/CP850	P/L	12	10	111
Prestige Italic	R-8/CP850	P/L	12	10	112
Letter Gothic	R-8/CP850	P/L	12	12	87

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Letter Gothic Bold	R-8/CP850	P/L	12	12	110
Letter Gothic Italic	R-8/CP850	P/L	12	10	112
Helvetica	ASCII	P	Prop.	6	181
Helvetica	ASCII	P	Prop.	8	183
Helvetica Bold	ASCII	P	Prop.	8	182
Helvetica Bold	ASCII	P	Prop.	10	185
Helvetica Bold	ASCII	P	Prop.	12	188
Helvetica Bold	ASCII	P	Prop.	14	190
Tax Line Draw	LinDrw-7	P	10	12	34
Letter Gothic	R-8/CP850	P	10	14.4	40
Letter Gothic	R-8/CP850	P	17.1	9.4	255

Table A-1 (continued). Selecting Standard Fonts.

Typeface	Symbol Set	Orient.	Pitch	Point Size	Typestyle No.
OCR-A 10N	OCR-A	P	10	12	19
OCR-B 10N	OCR-B	P	10	12	3
Code 3-9 4.6N	3 of 9	P	4.6	12	240
Code 3-9 9.3N	3 of 9	P	9.3	12	61
EAN/UPC Bold Bar Code	UPC	P	Prop.	12	171
EAN/UPC Bar Code	UPC	P	Prop.	12	170
<b>HP Cartridge Font Assignments</b>					
Procollection Cartridge					
Line Printer	ASCII	P/L	17.1	8.5	253
Courier Bold	ASCII	P/L	10	12	45
Courier Italic	ASCII	P/L	10	12	17
Courier	ASCII	P/L	12	10	85
Courier Bold	ASCII	P/L	12	10	108

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Courier Italic	ASCII	P/L	12	10	92
Courier	Legal	P	10	12	51
Courier Bold	Legal	P	10	12	52
Courier Italic	Legal	P	10	12	53
Courier	Legal	P	12	10	93
Courier Bold	Legal	P	12	10	94
Courier Italic	Legal	P	12	10	95
Prestige Elite	ASCII	P/L	15	7	220
Prestige Elite	ASCII	P/L	12	10	83
Prestige Elite Bold	ASCII	P/L	12	10	113
Prestige Elite Italic	ASCII	P/L	12	10	114
Prestige Elite	Legal	P	15	7	219
Prestige Elite	Legal	P	12	10	97

Table A-1 (continued). Selecting Standard Fonts.

Typeface	Symbol Set	Orient.	Pitch	Point Size	Typestyle No.
Prestige Elite Bold	Legal	P	12	10	98
Prestige Elite Italic	Legal	P	12	10	99
Letter Gothic	ASCII	P/L	27	3.6	291
Letter Gothic	ASCII	P/L	19	6	281
Letter Gothic	ASCII	P/L	17.1	9.5	257
Letter Gothic	ASCII	P/L	12	12	66
Letter Gothic Bold	ASCII	P/L	12	12	69
Letter Gothic Italic	ASCII	P/L	12	12	68
Times Roman	ASCII	P	Prop.	8	163
Times Roman	ASCII	P	Prop.	10	164
Times Roman Bold	ASCII	P	Prop.	10	165
Times Roman Italic	ASCII	P	Prop.	10	166

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Times Roman	ASCII	P	Prop.	12	167
Times Roman Bold	ASCII	P	Prop.	12	168
Times Roman Italic	ASCII	P	Prop.	12	169
Times Roman	Legal	P	Prop.	8	173
Times Roman	Legal	P	Prop.	10	174
Times Roman Bold	Legal	P	Prop.	10	175
Times Roman Italic	Legal	P	Prop.	10	176
Times Roman	Legal	P	Prop.	12	177
Times Roman Bold	Legal	P	Prop.	12	178
Times Roman Italic	Legal	P	prop.	12	179
Helvetica	ASCII	P	Prop.	8	183



Table A-1 (continued). Selecting Standard Fonts.

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Helvetica	ASCII	P	Prop.	10	184
Helvetica Bold	ASCII	P	Prop.	10	185
Helvetica Italic	ASCII	P	Prop.	10	186
Helvetica	ASCII	P	Prop.	12	187
Helvetica Bold	ASCII	P	Prop.	12	188
Helvetica Italic	ASCII	P	Prop.	12	189
Helvetica Bold	ASCII	P	Prop.	14	190
Helvetica Bold	Legal	P	prop.	14	191
<b>WordPerfect Cartridge</b>					
CG Times	DskTop	P	Prop.	6	4685
CG Times	DskTop	P	Prop.	8	4686

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
CG Times Bold	DskTop	P	prop.	8	4706
CG Times Italic	DskTop	P	Prop.	8	4814
CG Times	DskTop	P	Prop.	10	4687
CG Times Bold	DskTop	P	Prop.	10	4707
CG Times Italic	DskTop	P	Prop.	10	4815
CG Times	DskTop	P	Prop.	12	4688
CG Times Bold	DskTop	P	Prop.	12	4708
CG Times Italic	DskTop	P	Prop.	12	4816
CG Times	DskTop	P	Prop.	14	4689
CG Times Bold	DskTop	P	Prop.	14	4709
CG Times Italic	DskTop	P	Prop.	14	4817

Table A-1 (continued). Selecting Standard Fonts.

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
CG Times Bold	DskTop	P	Prop.	18	4711
CG Times Bold	DskTop	P	Prop.	24	4714
Univers	DskTop	P	Prop.	14	4789
Univers	DskTop	P	Prop.	18	4791
Univers	DskTop	P	Prop.	24	4794
<b>Microsoft Cartridge</b>					
Helv	R-8	P	Prop.	8	34102
Helv	R-8	P	Prop.	10	34103
Helv Bold	R-8	P	Prop.	10	34123
Helv Italic	R-8	P	Prop.	10	34231
Helv	R-8	P	Prop.	12	34104
Helv Bold	R-8	P	Prop.	12	34124
Helv Italic	R-8	P	Prop.	12	34232

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Helv Bold	R-8	P	Prop.	14	34125
TmsRmn	R-8	P	Prop.	8	5686
TmsRmn	R-8	P	Prop.	10	5687
TmsRmn Bold	R-8	P	Prop.	10	5707
TmsRmn Italic	R-8	P	Prop.	10	5815
TmsRmn	R-8	P	Prop.	12	5688
TmsRmn Bold	R-8	P	Prop.	12	5708
TmsRmn Italic	R-8	P	Prop.	12	5816
Tms Rmn Bold	R-8	P	Prop.	14	5709
Line Printer	R-8	P/L	15	8.5	223

Table A-1 (continued). Selecting Standard Fonts.

Typeface	Symbol Set	Orient.	Pitch	Point Size	Typestyle No.
<b>Polished Worksheets Cartridge</b>					
Prestige Elite	R-8	P/L	15	7	221
Prestige Elite	R-8	P/L	12	10	86
Prestige Elite Bold	R-8	P/L	12	10	111
Prestige Elite Italic	R-8	P/L	12	10	112
Prestige Elite	Legal	P/L	15	7	219
Prestige Elite	Legal	P/L	12	10	97
Prestige Elite Bold	Legal	P/L	12	10	98
Prestige Elite Italic	Legal	P/L	12	10	99
Letter Gothic	R-8	P/L	27	3.6	290
Letter Gothic	R-8	P/L	12	12	87
Letter Gothic Bold	R-8	P/L	12	12	110

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Letter Gothic Italic	R-8	P/L	12	12	109
Letter Gothic	Legal	P/L	27	3.6	292
Letter Gothic	Legal	P/L	12	12	90
Letter Gothic Bold	Legal	P/L	12	12	107
Letter Gothic Italic	Legal	P/L	12	12	106
Presentation Bold	ASCII	P/L	8.1	16	434
Presentation Bold	Legal	P/L	8.1	16	431
<b>Persuasive Presentations Cartridge</b>					
Letter Gothic	ASCII	P/L	10	14	39
Letter Gothic	Legal	P/L	10	14	38
Presentation Bold	ASCII	P/L	10	14	6

Table A-1 (continued). Selecting Standard Fonts.

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Presentation Bold	Legal	P/L	10	14	7
Presentation Bold	ASCII	P/L	8.1	16	434
Presentation Bold	Legal	P/L	8.1	16	431
Presentation Bold	ASCII	P/L	6.5	18	435
Presentation Bold	Legal	P/L	6.5	18	432
Presentation Bold	ASCII	P/L	5.7	24	436
Presentation Bold	Legal	P/L	5.7	24	433
Helv Outline	ASCII	P/L	Prop.	24	34115
Helv Outline	Legal	P/L	Prop.	24	34116
Serifa	ASCII	P/L	Prop.	24	34215
Serifa	Legal	P/L	Prop.	24	34216

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
Line Draw	LinDrw	P/L	10	14	31
PC Line Bold	PCLin	P/L	10	14	32
<b>Forms, Etc. Cartridge</b>					
Univers	R-8	P/L	Prop.	6	33101
Univers	R-8	P/L	Prop.	8	33102
Univers Bold	R-8	P/L	Prop.	8	33122
Univers Bold	R-8	P/L	Prop.	10	33123
Univers Bold	R-8	P/L	Prop.	12	33124
Univers Bold	R-8	P/L	Prop.	14	33125
Helv Cond Black Bold	TaxNum	P/L	Prop.	24	34128
OCR-A	OCR-A	P	10	12	19
Tax Line Draw	TaxLin	P/L	10	12	30



Table A-1 (continued). Selecting Standard Fonts.

Typeface	Symbol Set	Orient.	Pitch	Point Size	Typestyle No.
<b>Bar Codes &amp; More Cartridge</b>					
Letter Gothic	R-8	P/L	15	9.5	230
Letter Gothic	R-8	P/L	12	12	87
Letter Gothic	R-8	P/L	10	14	40
OCR-A	OCR-A	P	10	12	19
OCR-B	OCR-B	P	10	12	3
Code 3 of 9	3 of 9	P	8.1	12	60
Code 3 of 9	3 of 9	P	4.6	12	240
EAN/UPC 10 Mil	UPC	P	Prop.	12	170
EAN/UPC 13 Mil Bold	UPC	P	Prop.	12	171
USPS Zip	ZIP	P/L	Prop.	12	172
Line Draw	LinDrw	P/L	10	12	33

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
<b>Text Equations</b>					
Prestige Elite	R-8	P	15	7	221
Prestige Elite	R-8	P	17.1	7	256
Prestige Elite	R-8	P	12	10	86
Prestige Elite Bold	R-8	P	12	10	111
Prestige Elite Italic	R-8	P	12	10	112
CG Times	R-8	P	Prop.	8	157
CG Times	R-8	P	Prop.	10	158
CG Times Bold	R-8	P	Prop.	10	159
CG Times Italic	R-8	P	Prop.	10	155

Table A-1 (continued). Selecting Standard Fonts.

Typeface	Symbol Set	Orient.	Pitch	Point Size	Typestyle No.
<b>Global Text Cartridge</b>					
CG Century Schoolbook	R-8	P/L	Prop.	8	16950
CG Century Schoolbook	R-8	P/L	Prop.	10	16951
CG Century Schlbk Bold	R-8	P/L	Prop.	10	16971
CG Century Schlbk Italic	R-8	P/L	Prop.	10	17079
CG Triumvirate	R-8	P/L	Prop.	10	33335
CG Triumvirate Bold	R-8	P/L	Prop.	14	33357

**Table A-1 (continued). Selecting Standard Fonts.**

<b>Typeface</b>	<b>Symbol Set</b>	<b>Orient.</b>	<b>Pitch</b>	<b>Point Size</b>	<b>Typestyle No.</b>
<b>Pretty Faces Cartridge</b>					
Microstyle	ASCII	P	Prop.	18	5910
Microstyle Bold	ASCII	P	Prop.	36	5920
Hobo Medium	ASCII	P	Prop.	30	5930
Hobo Medium	ASCII	P	Prop.	14	5940
Thunderbird	ASCII	P	Prop.	54	5950
Signet Roundhand	ASCII	P	Prop.	18	5960
Signet Roundhand	ASCII	P	Prop.	14	5970
ITC Dingbats	ITC	P	Prop.	36	5980
ITC Dingbats	ITC	P	Prop.	18	5990

# Appendix B: Resident Scalable Font Numbers

**Table B-1** is a list of the resident scalable fonts and font numbers for current PCL compatible printers. Refer to **Section 5.7.2** to change resident scalable fonts.

Fonts with ID numbers 410 through 490 are fixed pitch fonts. All others are proportional fonts.

**Table B-1. Resident Scalable Fonts.**

<b>Font</b>	<b>Font ID No.</b>
Letter Gothic	410
Letter Gothic bold	420
Letter Gothic italic	430
Courier	460
Courier bold	470
Courier italic	480
Courier bold italic	490
Symbol	3400
Wingdings	3500

**Table B-1. Resident Scalable Fonts.**

<b>Font</b>	<b>Font ID No.</b>
Dingbats	3600
CG Omega	4919
CG Omega bold	4939
CG Omega italic	5047
CG Omega bold italic	5067
CG Times	5687
CG Times bold	5707
CG Times italic	5815
CG Times bold italic	5835
Arial	6199
Arial bold	6219
Arial italic	6327
Arial bold italic	6347
Garamond Antiqua	8503
Garamond Halbfett	8523

Table B-1. Resident Scalable Fonts.

<b>Font</b>	<b>Font ID No.</b>
Garamond Kursiv	8631
Garamond Kursiv Halbfett	8651
Coronet	8759
Clarendon condensed	8779
Marigold	8887
Albertus medium	12855
Albertus extra bold	12875
Times New	16951
Times New bold	16971
Times New italic	17079
Times New bold italic	17099
Antique Olive	33335
Antique Olive bold	33355
Antique Olive italic	33463
Univers medium condensed	33591

**Table B-1. Resident Scalable Fonts.**

<b>Font</b>	<b>Font ID No.</b>
Univers bold condensed	33601
Univers medium condensed italic	33719
Univers bold condensed italic	33729
Univers medium	34103
Univers bold	34123
Univers medium italic	34231
Univers bold italic	34251
<b>3812 Font Numbers that use the CG Times Typeface</b>	
Sonoran-Serif	751
Sonoran-Serif	1051
Sonoran-Serif bold	1053
Sonoran-Serif italic	1056
Sonoran-Serif	1351
Sonoran-Serif bold	1653
Sonoran-Serif bold	2103



## Appendix C: Character Sets

The IBM 3812-1 printer emulation supports both the Roman 8 character set and Code Page 850. The IBM 4214, 5224, 5225, and 5256 printer emulations support both the Code Page 850 and Code Page 437 character sets. The selection between the two available character sets decides which is used when a font supports both. Refer to the printer's user's guide for illustrations and information on character sets.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p				—	â	Å	Á	þ
1	SOH	DC1	!	1	A	Q	a	q			À		ê	î	Ä	ð
2	STX	DC2	"	2	B	R	b	r			Â		ô	Ø	ã	
3	ETX	DC3	#	3	C	S	c	s			È	°	û	Æ	Ð	
4	EOT	DC4	\$	4	D	T	d	t			Ê	Ç	á	å	đ	
5	ENQ	NAK	%	5	E	U	e	u			Ë	ç	é	í	í	
6	ACK	SYN	&	6	F	V	f	v			Î	Ñ	ó	ø	ì	–
7	BEL	ETB	'	7	G	W	g	w			Ï	ñ	ú	æ	Ó	¼
8	BS	CAN	(	8	H	X	h	x			´	ı	à	Ä	Ò	½
9	HT	EM	)	9	I	Y	i	y			`	ı	è	ì	Õ	<sup>a</sup>
A	LF	SUB	*	:	J	Z	j	z			^		ò	Ö	õ	<sup>o</sup>
B	VT	ESC	+	;	K	[	k	{			¨	£	ù	Ü	Š	«
C	FF	FS	,	<	L	\	l				~	¥	ä	É	š	■
D	CR	GS	-	=	M	]	m	}			Ù	§	ë	ï	Ú	»
E	SO	RS	.	>	N	^	n	~			Û	f	ö	ß	ÿ	±
F	SI	US	/	?	O	_	o	DEL			£	¢	ü	Ô	ÿ	

Figure C-1. Roman 8.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		▶		0	@	P	`	p	Ç	É	á	⋮	ˆ	õ	Ó	–
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	⊞	⊥	Ɖ	β	±
2	☹	↕	"	2	B	R	b	r	é	Æ	ó	⊞	⊥	Ê	Ô	=
3	♥	!!	#	3	C	S	c	s	â	ô	ú		†	Ë	Ò	3/4
4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	†	–	È	õ	¶
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	†	ì	Õ	§
6	♠	–	&	6	F	V	f	v	å	û	ª	Â	ã	í	μ	÷
7	•	↕	'	7	G	W	g	w	ç	ù	º	À	Ã	î	þ	,
8	◻	↑	(	8	H	X	h	x	ê	ÿ	¿	©	⊥	ï	þ	º
9	○	↓	)	9	I	Y	i	y	ë	Ö	®	‡	‡	ˆ	Ú	ˆ
A	◼	→	*	:	J	Z	j	z	è	Ü	¬		⊥	ˆ	Û	•
B	♂	←	+	;	K	[	k	{	ï	ø	1/2	¶	¶	■	Ù	1
C	♀	⊥	,	<	L	\	l	l	î	£	1/4	‡	‡	■	y	3
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F	⊗	▼	/	?	O	_	o	◊	Å	f	»	ˆ		■	'	

Figure C-2. Code Page 850.

# Appendix D: Serial-Port Specifications

The PQ-8S uses a standard RS-232-C, 25-pin serial printer cable for connection to a serial printer and for connection to a serial PC/LAN print server port.

The PQ-8S's input and output connectors use the same pin assignments. They are:

Shell:	Chassis Ground
1:	Chassis Ground
2:	Transmit (TXD) .....output
3:	Receive (RXD) .....input
4:	Request To Send (RTS) .....output
5:	Clear To Send (CTS) .....input
6:	Data Set Ready (DSR) .....input
7:	Signal Ground
8-19:	No connection
20:	Data Terminal Ready (DTR) .....output

**Figure D-1. Input and Output Connector Pinout.**

The serial printer cable shipped with the PQ-8S has the following pin assignments:

DB25F .....	DB25M
Shell .....	Shell
2 .....	3
3 .....	2
5, 6, 8 .....	20
7 .....	7
20 .....	5,6,8

**Figure D-2. Serial Printer Cable Pinout.**

This pinout will work with most PCs and printers (which means the supplied cable can be used as either sharing cable or printer cable). When used to connect the printer to the print box, the cable's female side (DB25F) is connected to the PQ-8S. When used as a sharing cable, the male end (DB25M) is connected to the PQ-8S.

# Appendix E: Parallel-Port Specifications

The PQ-8P uses standard 36-pin/25-pin Centronics® printer cables for connection to a parallel printer and to connect a parallel PC/LAN printer server port.

The 25-pin connector on the PQ-8P label “Parallel Out To Printer” has the following pin assignments:

**Table E-1. 25-Pin Connector Pinout.**

<b>Pin Number</b>	<b>Direction</b>	<b>Name</b>
1	Output	nStrobe
2-9	Output	Data 1 - Data 8
10	Input	nAck
11	Input	Busy
12	Input	PError
13	Input	Select
14	Output	nAutoFd (always high)
15	Input	nFault
16	Output	nInit (always high)
17	Output	nSelectIn (always high)
18-25		Signal Ground
Shell		Chassis Ground

The 36-pin connector on the PQ-8P labeled “Parallel In From PC/LAN” (TxP plus) and “Parallel Setup Port From PC/LAN” uses the following pin assignment:

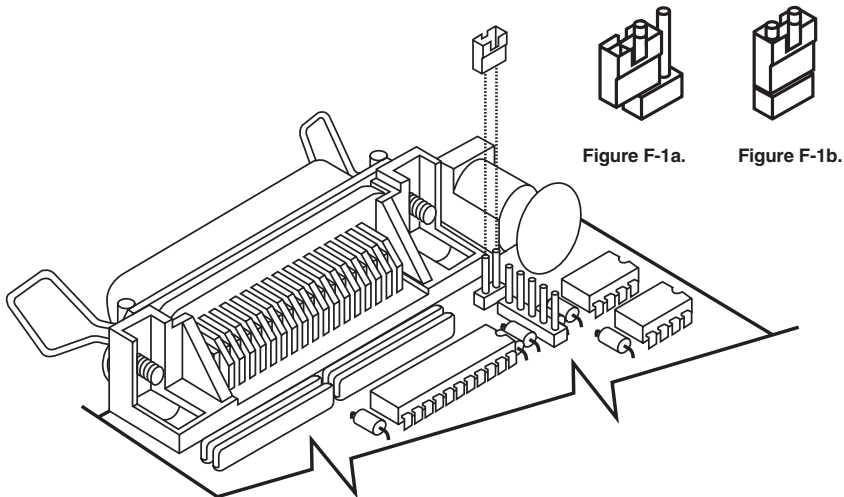
**Table E-2. 36-Pin Connector Pinout.**

Pin Number	Direction	Name
1	Input	nStrobe
2-9	Input	Data 1 - Data 8
10	Output	nAck
11	Output	Busy
12	Output	PError
13	Output	Select
14, 15		No connection
16		Signal Ground
17		Chassis Ground
18	Output	Optional +5V (350 mA max)
19-30		Signal Ground
31	Input	nSelectIn (an Acknowledge will be generated in response to this input going active; however, the PQ-8P will not be reset)
32	Input	nFault
34-36		No connection
Shell		Chassis Ground

## Appendix F: Transferring Power to Pin 18

To transfer power to pin 18 of the parallel input connector of the PQ-8P, you must move a jumper on the PQ-8P board. To move this jumper do the following:

1. Power off the printer, the PQ-8P, and the attached PC or LAN print server.
2. Disconnect all cables from the PQ-8P.
3. Remove the two black screws from the outside of the back panel.
4. Pull out the PQ-8P's back panel, together with the attached board.
5. Locate the jumper in the lower left corner, right above the parallel connector labeled "Parallel In From PC/LAN" (see **Figure F-1**).
6. Remove the black jumper from the pin, then reinsert it covering both pins (see **Figures F-1a** and **F-1b**).
7. Slide the PQ-8 board back into the bottom groove of the chassis.
8. Tighten the black screws on the back panel.
9. Connect the printer and the PC/LAN to the PQ-8, then connect the power cord.
10. Power on the printer, then the PQ-8.



**Figure F-1. Jumpers.**