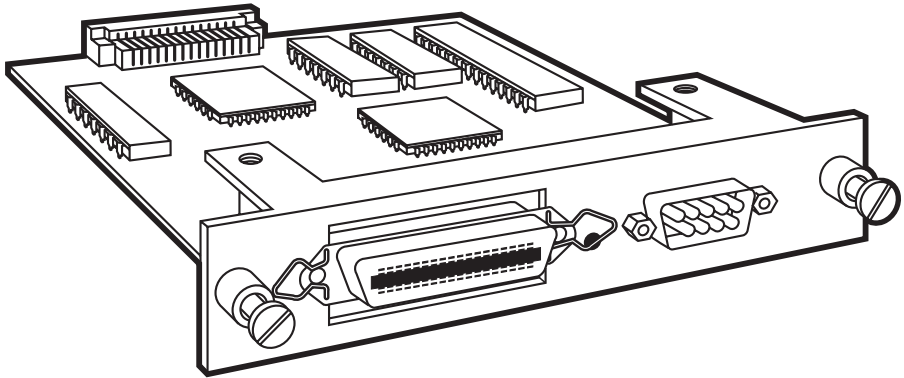




# HPIISi Twinax Card



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**FEDERAL COMMUNICATIONS COMMISSION  
AND  
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RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

*This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.*

*Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.*

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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

<b>System Hardware Required</b> —	Host: IBM AS/400 or System/34, /36, or /38; PC: IBM AT®, PS/2®, PC/XT™ or compatible with available parallel port and using the ASCII code set; Printer: Any Hewlett-Packard printer with MIO interface port
<b>Cable Required</b> —	Host side: DB9-to-twinaxial auto-terminating V-cable (included); PC side: PC-to-parallel-printer cable (not included)
<b>Compliance</b> —	FCC Part 15 Subpart B Class A; DOC Class/MDC classe A; CE (EN60950, EN550082-1, and EN55022) Class A
<b>Interfaces/Protocols</b> —	Host side: IBM 5250 twinaxial; PC side: Centronics parallel; With printer: HP MIO 4.0
<b>Printer Emulation</b> —	IBM 3812-1 (non-IPDS)
<b>Code/Character Sets Supported</b> —	Host side: EBCDIC and DSC; PC side: ASCII; Printer side: HP Roman 8 and Code Page 850
<b>Languages Supported</b> —	16 (see the entry for host/PC-download command 05 in <b>Section 5.3</b> )
<b>Flow Control</b> —	To/from PC: Hardware (BUSY/ACK)
<b>Data Rate</b> —	Receive from host: Maximum burst: 2 Mbps; Effective rate: 1 Mbps; Receive from PC: As fast as PC can transmit
<b>Maximum Distance</b> —	Host side: Standard limitations for twinaxial peripherals (depends on configuration of twinax network and other peripherals); PC side: 20 ft. (6.1 m)



## HPIIISI TWINAX CARD

<b>Processor</b> —	Z80H CMOS
<b>Internal Memory</b> —	8 KB static RAM, including: Dual 256-byte buffers for received twinax data; 16-byte twinax command buffer; 1-byte parallel data buffer; 2-KB HP MIO dual-port communications buffer; NVRAM for storing configuration settings and user-defined strings
<b>User Controls</b> —	Printer's operator panel; Host/PC-download commands; Other embedded commands; Proprietary graphics language
<b>Diagnostics</b> —	User-initiated self-test
<b>Indicators</b> —	(1) Host Ready LED
<b>Connectors</b> —	(1) DB9 male for host communication, (1) 36-pin Centronics female for PC communication
<b>Power</b> —	+5 VDC supplied by the printer
<b>Temperature Tolerance</b> —	40 to 110°F (5 to 43°C)
<b>Humidity Tolerance</b> —	20% to 85% non-condensing
<b>Size</b> —	1.1"H x 6"W x 6"D (2.8 x 15.2 x 15.2 cm)
<b>Weight</b> —	1.1 lb. (0.5 kg)

## 2. Introduction

### 2.1 General Overview

The HPIISi Twinax Card is a twinax interface that can be installed in a Hewlett-Packard® printer with an MIO interface port, such as the HP® LaserJet® III Si, 4, 4 Plus, 4Si, 4V, 5, DeskJet® 1200 or 1600, etc. With the Card installed, your printer will emulate an IBM® 3812-1 (non-IPDS) printer when attached to an IBM AS/400®, System/34, System/36, or System/38 host processor.

An auto-sharing parallel port on the Card lets you attach your printer to a PC as well as the IBM host. It automatically switches between host and PC printing without your having to change cables or reset switches.

You can choose setup options to control the printer's output at the printer's operator panel or by sending host/PC download commands to the Card. You can access advanced printer features with the Card's special commands, its proprietary graphics language, and its "command pass-through" feature

### 2.2 Unpacking

When you receive the Card, check the packaging for water or physical damage, and notify the carrier immediately if any damage is evident. Keep the original packaging in case the Card needs to be moved or shipped.

The following items should be in your package:

- The HPIISi Twinax Card
- Auto-terminating twinax V-cable
- This manual

If anything is missing, notify your supplier.

## 3. Quick Start

### CAUTION

**The HPIIISi Twinax Card is static-sensitive. Make sure you do not damage the Card with static electricity. Take precautions as you would with any static-sensitive device. When one is available, stand on an anti-static mat or use an anti-static work surface when installing the Card.**

Take these steps to get your HPIIISi Twinax Card up and running quickly:

1. Power on the printer and perform a one-page self-test, as described in the printer's user's guide. Do not continue with the installation until the printer successfully completes its self-test.
2. Remove the power cord and other cables attached to the printer.
3. If you're installing the Card in an HP LaserJet III series printer, remove the existing serial/ parallel card (or any other MIO card in the printer) by loosening the screws at either end of its bracket.

If you're installing the Card into an HP LaserJet 4 series laser printer, remove the cover over the MIO expansion slot by loosening the screws at either end of its bracket.

### NOTE

**The Card can be installed in the upper MIO slot on the HP LaserJet 4Si and 4 SiMX with an optional bracket. The Card is shipped configured to fit into the lower MIO slot. If you need to install the Card into the upper MIO slot, call your supplier.**

4. Remove the Card from the bag by its edges and align it with the connector inside the printer.
5. Place the bottom of the Card in the plastic card guide inside the printer and slide it into place.
6. Turn on the printer. After the printer is READY, perform an interface self-test (to verify the Card's operation) by selecting that option through the printer's front panel.

First, take the printer offline, then use the "Menu" button to scroll through the HP menus until you reach the MIO menu associated with the Twinax Card. Press "Item" to display the Card's Test Menu.

Press "+" to display the Self-Test option and press "Select" or "Enter" to activate it. Return to the operating mode by pressing the "Online" button.

A self-test will print out immediately. A sample page is shown in Figure 3-1 on the next page of this manual; the values shown for the options are the factory defaults.

Alternatively, if your printer doesn't have a front panel, you can print a printer self-test: The Twinax Card's settings will print on the bottom portion of the HP printout.

7. Power off the printer.
8. Attach the twinax V-cable to the DB9 connector marked "Twinax" on the Card.
9. Tighten the thumbscrews on each side of the V-cable to secure it to the Card.
10. Attach the twinax cable(s) that run to the host or controller to the V-cable. The V-cable automatically terminates when you attach one other cable and automatically "cables through" when you attach two other cables.
11. Power on the printer, and send a print job from the host to verify that it is printing correctly. The Card is shipped from the factory with its twinax address set to 0 (zero); to set it differently, see the entry for host/PC-download command 00 in **Section 5.3**.

Optional: If you also want to use the printer from a PC, take these additional steps:

12. Power off the printer.
13. Attach the DB25 connector of a standard PC parallel-printer cable to the PC.
14. Attach the cable's 36-pin Centronics® connector to the connector on the Card marked "Auto Sharing/Parallel."
15. Power on the printer and send a print job from the PC to verify that it is printing correctly.

**Figure 3-1. Sample page of the Twinax Card's self-test.**

Twinax - H.P. MIO Interface  
Copyright (c) 1995 SDE  
Version 2.00

RAM OK  
ROM OK

```
#00 - Twinax Address.....: 0
#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.....: 1 - Tray 4
#15 - Paper Drawer 3.....: 1 - Tray 5
#16 - Override Formatting Cmds.....: 0 - Normal Oper
#17 - Character Set.....: 1 - Code Page 850
#18 - Starting Vertical Position.....: 00
#19 - Starting Horizontal Position.....: 00
#20 - Star Pan Overdrive.....: 0 - Inactive
#32 - 11 x 17 (A3).....: 0 - Off
#33 - Duplexing.....: 0 - Off
#42 - EBCDIC Hex Dump.....: 0 - Off
#43 - ASCII Hex Dump.....: 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:

#21 - User Defined Fonts:

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

## 4. Installation

### CAUTION!

The HPIISi Twinax Card is static-sensitive. Make sure you do not damage the Card with static electricity. Take precautions as you would with any static-sensitive device:

Be aware that some work surroundings, such as carpet, floor mats, dry air from winter heating, etc., can cause static buildup.

If one is available, wear a wrist strap or similar static-discharge device during installation. If you are not wearing a wrist strap, touch a grounded surface (such as an exposed twinax connector on a cable attached to the host) *before* handling the card.

If you have one, stand on an anti-static work surface when handling the card.

Do not touch components on the card. Handle the card by the edges only.

**Table 4-1. Recommended Device IDs.**

Host System	Emulation	Device ID
System/34	3812	5224 (2P), 5225 (2P), 5219 (3P)
System/36	3812	5219
System/38	3812	3812-1

Before you install the Card in your printer, you must configure the IBM host with a cable address and device ID for the printer. See your system operator or system manuals for details. Table 4-1 below shows the recommended device ID on the different host systems.

### NOTE

On AS/400 systems, you can run AUTOCONFIG, which works with the HPIISi Twinax Card.

You should keep the following in mind when selecting the emulation:

- The 3812 emulation only supports HP laser-printer commands.
- Support for letter-quality printers on a System 34 as a 5219 can be used, but is limited.

No special training is needed to install the Card. A Phillips and a flat-blade screwdriver are the only tools you'll need. If you need assistance, call your supplier.

### 4.1 Putting the Card into the Printer

Take the following steps to install the Card in your printer. Consult your HP printer's operator's manual for more information.

1. Power on the printer and perform a one-page self-test as described in the HP printer's manual. Do not continue until the printer passes the self-test.
2. Remove the power cord and any cables attached to the printer.

### CAUTION!

**The Card is static-sensitive. Follow the static-sensitivity instructions listed at the beginning of this chapter.**

3. If you will be installing the Card in an HP LaserJet IIISi, remove the serial/parallel card (or any other MIO card installed in the printer) by loosening the screws at either end of the bracket. Store the old card in the HPIIISi Twinax Card's package for future use.

The HP LaserJet 4 and 5 series of laser printers have a cover placed over the MIO expansion slot. If you will be installing the Card in one of these models, remove the slot cover by loosening the screws at either end of the bracket.

### NOTE

**The HPIIISi Twinax Card can be installed in the upper MIO slot on the HP 4Si and 4SiMX with an optional bracket. The Card is shipped configured to fit into the lower MIO slot. If you need to install the Card in the upper MIO slot, call your supplier.**

4. While the Card is still in its anti-static bag, place it next to your printer.
5. Place the twinax cable from the host computer on top of the anti-static bag; make sure the metal connector on the cable is in contact with the bag.
6. Remove the Card from the bag and place it on top of the bag next to the twinax cable.
7. Pick up the Card by its edges, and align it with the connector inside the printer.
8. Place the bottom of the Card in the plastic card guide inside the printer.
9. Slide the Card into place, passing the interface bracket by the grounding fingers on the printer slowly, so you don't loosen them.

10. Tighten the bracket's screws.
11. Make sure the printer's power switch is in the OFF position, then replace the power cord.
12. Turn on the printer. After the printer is READY, perform an interface self-test (to verify the Card's operation) by selecting that option through the printer's front panel. First, take the printer offline, then use the "Menu" button to scroll through the HP menus until you reach the MIO menu associated with the Twinax Card. Press "Item" to display the Card's Test Menu. Press "+" to display the Self-Test option and press "Select" or "Enter" to activate it. Return to the operating mode by pressing the "Online" button. A self-test will print out immediately. A sample page is shown in Figure 3-1 on page 13; the values shown for the options are the factory defaults. Alternatively, if your printer doesn't have a front panel, you can print a printer self-test: The Twinax Card's settings will print on the bottom portion of the HP printout.

## 4.2 Connecting to the Host

Take the following steps to connect the printer through the Card to your IBM host system.

1. Power off the printer.
2. Attach the twinax V-cable to the DB9 connector marked "Twinax" on the Card.
3. Tighten the thumbscrews on each side of the V-cable's DB9 connector to secure it to the Card.
4. Attach the twinax cable from the host or controller to one of the the V-cable's twinax connectors. If other twinax peripherals are going to be on the same line, attach the cable running to the nearest of those to the other twinax connector on the V-cable. The V-cable automatically terminates when you attach one twinax cable and automatically cables through when you attach two cables.
5. Power on the printer, then send a print job from the host to verify that it is printing correctly. The Card is shipped from the factory with its twinax address set to 0 (zero); to set it differently, see the entry for host/PC-download command 00 in **Section 5.3**.



### 4.3 Connecting to a PC

If you also want to use the printer from a PC, take the following steps to connect the printer through the Card. (You will need a standard parallel-printer cable with a DB25 connector on one end and a 36-pin Centronics® on the other.)

1. Attach the printer cable's DB25 connector to the PC.
2. Attach the cable's 36-pin Centronics connector to the printer through the Card at the connector marked "Auto Sharing/Parallel."
3. Power on the printer and send a print job from the PC to verify that it is printing correctly.

# 5. Configuration

After installation and self-test, the Card is ready to operate in most environments. The factory-default configuration settings are satisfactory for many applications. The Card can also be configured to meet the special needs of an application using the printer's front panel (see **Section 5.1**) or host-download commands (see **Section 5.2**).

## 5.1 Printer Front-Panel Setup

The printer's front panel can be used to select various Card-configuration settings. Refer to the Card's self-test printout for a current listing of all of the Card's user-configurable options.

The Card supports HP printers with an MIO expansion slot. Each HP printer has a slightly different method of making changes to the configuration.

Take the following steps to make any necessary changes (steps 2 and 3 will be different for different printer models):

1. When the printer is in READY mode, take it off line by pressing the ONLINE button until the light on the edge of the button goes out.

### HP LaserJet IIISi

2. Press and hold the MENU button for about 5 seconds until "PCL CONFIG MENU" is displayed.
3. Press the MENU button for each item that can be changed. The interface selections begin when "ABLE ADDRESS" is displayed. Go to Step 4 on the next page.

### HP LaserJet 4

2. Press the Menu button until the AUX IO Menu appears.
3. Press the Item button to display the changeable options for the Card. Go to Step 4 on the next page.

### HP LaserJet 4Si and 4SiMX

2. Press the Menu button until the MIO Menu is displayed.

## NOTE

MIO Menu 1 is displayed when the Card has been installed in the lower MIO slot. MIO Menu 2 is displayed when the Card is installed in the upper MIO slot.

3. Press the Item button to display the changeable options for the Card. Go to Step 4 on the next page.
4. Press the “+” or “-” to scroll forward or backward through the available settings. An asterisk (“\*”) will be displayed next to the active setting.
5. To change the active selection, press ENTER MENU when the desired selection is displayed. An asterisk will appear to indicate that the new setting is now active and stored in the Card’s memory.
6. Move to the next item by pressing MENU again.
7. When you’re finished, press ONLINE again.
8. Power the printer OFF and back ON again, to activate the new settings, and then print a self-test to verify that the settings are correct.

## 5.2 Host/PC-Download Commands

You can use host-download commands to change any or all of the Card’s configuration parameters. These commands can be sent to the Card/printer from a PC using the PC’s shared parallel port or from the IBM host.

Most host/PC-download commands are placed in a host or PC document or print screen. The commands take effect when the print job or screen print is sent to the printer. Regardless of what the incoming job is or where it came from, the Card will recognize host-download commands embedded in it.

The command itself will not be printed if it was entered correctly, but the effect of the command should be evident (change in the print orientation, paper-size selection, etc.). If any part of the command is printed, the Card did not recognize the command because of a problem in its format (in the way the command was entered). Check the syntax of the command string, make any necessary corrections, and send the command again.

Most download commands sent to the Card take effect immediately, and stay in the Card’s active memory rather than being saved to NVRAM.

**Section 5.3** provides a description of each command and how it is used.

Take the following steps to enter a host-download command:

1. Type the command pass-through delimiter “&%” (or an alternate CPT start delimiter, as described in the entry in **Section 5.3** for command Z01) into the document at the point where you want the command to take effect.
2. Type an uppercase “Z”.

3. Type the number of the command you want to use, as shown in the examples in **Section 5.3**. Always use two digits for the command number (“&%Z05,” for example).
4. Type a comma.
5. Type the argument (the value) representing your desired selection. No spaces are allowed. A space or invalid character in a command causes the Card to ignore the command and resume printing from the point where the error occurred.
6. Terminate the download command with a single space or control character (“NL,” “FF,” “CR,” or “LF,” for example).
7. Multiple commands can be chained together by using a forward slash (“/”) or backslash (“\”) to separate the commands (no spaces are allowed).

As with a single command, the overall command string must begin with “&%” or the alternate CPT-start delimiter, and must end with a single space or control character (see Step 6). The terminating space or control character is not sent to the printer, but the host-download commands are sent to the printer and take effect immediately on the page where they are located.

Here is a general template for a string containing multiple commands:

```
&%Zxx,y/Zxx,yy/Zxx,yyyC
```

where *xx* = the command no.;  
*y*, *yy*, etc. = the argument; and  
*C* = a space or control character.

For example, to set the host-port timeout (command 03) to 20 seconds (argument 20), change the host language (command 05) to Austrian/German (argument 02), and select long-edge duplexing (command 33, argument 1), type:

```
&%Z03,20/Z05,2/Z33,1
```

### 5.3 The Commands In Detail

This section describes each of the host-download commands, including all available arguments (options). (Any argument that represents a factory-default value is marked with an asterisk.) Examples are also included for each command.

#### **Command: 00, Twinax Address**

**Description:**

Determines the Card's address in your twinax network. New addresses don't become active until the printer is powered off and then on again. When you set a new address, it remains in effect *permanently* until you specifically set the address again—even restoring factory defaults doesn't change this setting.

**Possible Arguments:**

0 to 6

**Results:**

Sets Card's address (ships from the factory as \*0).

**Example:**

"&%Z00,5" sets the Card's twinax address to 5 after the next power-up.

#### **Command: 01, Alternate CPT-Start Delimiter**

**Description:**

Creates an alternate start delimiter for command pass-through, which 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 "&". The Card only recognizes one alternate start delimiter at any given time, but it will always recognize the primary CPT-start delimiter "&%" as valid even if an alternative start delimiter has been defined.

**Possible Arguments:**

[Any two characters  
that are not both  
spaces]

**Results:**

Defines new alternate start delimiter.

[Two spaces]

Deletes previously defined alternate start delimiter.

**Example:**

"&%Z01,#\*" designates "#\*" as an additional start delimiter.

**Command:** 02, Alternate CPT-End Delimiter**Description:**

Creates an alternate end delimiter for command pass-through. Its characteristics are the same as those of the alternate start delimiter defined with command 01, except that it cannot be used as an alternate host/PC download delimiter. As with the start delimiter, the Card will always recognize the primary CPT-end delimiter “&%” as valid even if an alternative CPT-end delimiter has been defined.

**Possible Arguments:**

[Any two characters  
that are not both  
spaces]

[Two spaces]

**Results:**

Defines new alternate end delimiter for command pass-through.

Deletes previously defined alternate end delimiter.

**Example:**

“&%Z02,@^” designates “@^” as an additional end delimiter for command pass-through.

**Command:** 03, Host-Port Timeout**Description:**

Use this command to select a new timeout value for the host port. This timeout value is the number of seconds that the Card will wait for data from the host before allowing the printer to honor PC print jobs.

**Possible Arguments:**

01 to 60

**Results:**

Sets new timeout value in seconds (\*08, 8 seconds, is the factory default).

**Example:**

“&%Z03,05” sets the host-port timeout to five seconds.

**Command:** 04, User-Defined Strings**Description:**

Creates user-defined strings to be sent to the printer. Place up to 25 pairs of hex codes, corresponding to your desired printer commands, inside a pair of parentheses following the main command argument (the string number). Each numbered string is stored in the Card's memory. To send a given string, place a "&%Un" (where *n* is the string number) in the document.

For a list of available printer commands and their hex values, consult your printer's manual.

**Possible Arguments:**

0 to 9([hex codes])

0 to 9()

**Results:**

Defines a numbered user string consisting of the specified hex codes.

Deletes the specified string from memory.

**Example:**

"&%Z04,3(1826643044)" defines a string that tells the printer to start underlining. After defining this string, place "&%U3" in your document wherever you want the printer to start underlining.

**Command:** 05, Host Language**Description:**

Use this command to select the international character set to be used by your twinax host when it receives the "Use Default Language" command. See your printer's operator's manual for more information on character sets. When you select a new host language, it remains in effect *permanently* until you specifically select a different language—even restoring factory defaults doesn't change this setting.

**Possible****Arguments:**

00

\*01

02

03

04

05

06

07

**Results:**

Multinational

US/Canada

Austria/Germany

Belgium

Brazil

Canada (French)

Denmark/Norway

Finland/Sweden

Possible Arg's (cont'd):	Results (cont'd):
08	France
09	Italy
10	Japan
11	Japan (English)
12	Portugal
13	Spain
14	Spanish Speaking
15	United Kingdom

**Example:**

"&%Z05,00" selects the multinational character set.

**Command:** 07, Print Orientation**Description:**

Determines the print orientation if it has not already been determined through the host or with the Card's APO feature (command 08). Refer to **Section 6.4.8** for a detailed discussion of print orientation.

Possible Arguments:	Results:
0	COR, but host can override through the Print Quality command
*1	Portrait
2	Landscape
3	COR (no host override)

**Example:**

"&%Z07,2" selects landscape printing.



**Command: 08, Automatic Print Orientation****Description:**

Use this command to turn Automatic Print Orientation (APO) ON or OFF. If you turn APO OFF, the Card uses the setting of command 07 to determine print orientation. Refer to **Section 6.4.8** for a detailed discussion of APO.

<b>Possible Arguments:</b>	<b>Results:</b>
0	APO OFF
*1	APO ON

**Example:**

"&Z08,1" turns APO ON.

**Command: 09, Paper Size****Description:**

Use this command to select the paper-size setting.

<b>Possible Arguments:</b>	<b>Results:</b>
*0	Use paper size specified by host software.
1	Use A4 size paper.
2	Use paper size selected on printer's front panel.

**Example:**

"&Z09,1" selects A4-size paper.

**Command:** 10, Line Spacing**Description:**

Use this command to select compressed LPI (lines per inch), true LPI, or a type of line-space handling that is compatible with the Xpoint Twinax Controller. If you are using one of the popular electronic-forms packages from companies such as Xpoint, Eclipse, Formula One, etc., select true LPI; however, if you want to run the software setup for the Xpoint Twinax Controller, select option 2.

**Possible****Results:****Arguments:**

0	Compressed LPI
1	True LPI
2	Xpoint Twinax Controller compatibility

**Example:**

“&Z10,1” selects true LPI.

**Command:** 11, Host-Port Initialization String**Description:**

Creates a twinax-port initialization string that the Card will send to the printer after the Card has reconfigured it for host printing. Place up to 25 pairs of hex codes, corresponding to your desired printer commands, inside a pair of parentheses following a “0” (zero). (To aid readability, a single space is allowed between hex bytes.) The string will be stored in the Card’s memory and will be activated after top-of-page processing on each page.

For a list of available printer commands and their hex values, consult your printer’s manual.

**Possible Arguments:****Results:**

0([hex codes])	Defines a host-port initialization string consisting of the specified hex codes.
0()	Deletes the specified string from memory.

**Example:**

“&%Z11,0(1B266C3844)” sets line spacing to 8 LPI on an HP LaserJet 4si printer during each host-printing initialization.

**Command:** 13, Paper Drawer 1**Description:**

Matches the host's "Paper Drawer 1" command with a physical paper source on the printer. When the host tells the printer to feed from paper drawer 1, the printer will feed from the paper source assigned with this command. Consult the printer's manual for the available paper sources and their respective numbers.

**Possible Arguments:**

1 to 7

**Results:**

[Paper sources available on the printer; \*1 is the default.]

**Example:**

"&%Z13,5" assigns the optional 500-sheet cassette on an HP LaserJet 4 Plus as the host's "paper drawer 1."

**Command:** 14, Paper Drawer 2**Description:**

Matches the host's "Paper Drawer 2" command with a physical paper source on the printer. When the host tells the printer to feed from paper drawer 2, the printer will feed from the paper source assigned with this command. Consult the printer's manual for the available paper sources and their respective numbers.

**Possible Arguments:**

1 to 7

**Results:**

[Paper sources available on the printer; \*4 is the default.]

**Example:**

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

**Command:** 15, Paper Drawer 3**Description:**

Matches the host's "Paper Drawer 3" command with a physical paper source on the printer. When the host tells the printer to feed from paper drawer 3, the printer will feed from the paper source assigned with this command. Consult the printer's manual for the available paper sources and their respective numbers.

**Possible Arguments:**

1 to 7

**Results:**

[Paper sources available on the printer; \*5 is the default.]

**Example:**

"&%Z15,4" assigns the MP tray on an HP LaserJet 4 Plus as the host's "paper drawer 1."

**Command:** 16, Override Format Commands**Description:**

Determines whether operator settings on the printer's front panel will override format commands from the host.

**Possible****Arguments:**

\*0

1

2

3

**Results:**

No override of any IBM format commands allowed.

All IBM format commands will be overridden.

NLQ commands will be overridden.

CPI commands will be overridden.

**Example:**

"&%Z16,1" allows the operator to override all IBM format commands through the printer's front panel.

**Command: 17, Character Set****Description:**

Use this command to select which character set should be used as the underlying ASCII table for EBCDIC-to-ASCII translation when both Roman 8 and Code Page 850 are available for the desired font. Consult your printer's manual to verify that the printer supports the character set and font you want to use.

**Possible****Results:****Arguments:**

0	Roman 8
*1	Code Page 850

**Example:**

"&%Z17,0" selects the HP Roman 8 character set.

**Command: 18, Starting Vertical Position****Description:**

Use this command to adjust (in increments of  $\frac{1}{60}$ " [423.3  $\mu$ m]) the starting vertical print position in the upper left-hand corner of the page, for this job and all subsequent jobs.

**Possible Arguments:**

-127 to 127

**Results:**

Sets new vertical starting position as previous starting position plus  $\frac{1}{60}$ " x argument (\*0 is the default).

**Example:**

"&%Z18,-20" moves printing on the page up  $\frac{1}{3}$ " [8.5 mm], or 2 lines at 6 LPI.

**Command:** 19, Starting Horizontal Position**Description:**

Use this command to adjust (in increments of 1/60" [423.3 μm]) the starting horizontal print position in the upper left-hand corner of the page, for this job and all subsequent jobs.

**Possible Arguments:**

-127 to 127

**Results:**

Sets new horizontal starting position as previous starting position plus  $\frac{1}{60}$ " x argument (\*0 is the default).

**Example:**

"&%Z19,12" moves printing on the page right  $\frac{1}{2}$ " [5.1 mm], or 2 characters at 10 CPI.

**Command:** 20, Star-Panel Overdrive**Description:**

If the Card is attached to the host through baluns, twisted-pair cabling, and a passive star panel, use this command to activate star-panel overdrive (that is, to increase signal strength) if problems occur because of the passive star panel. Do *not* activate overdrive if the Card is directly attached to the host with twinax cabling.

**Possible****Arguments:**

\*0

1

**Results:**

Overdrive OFF

Overdrive ON

**Example:**

"&%Z20,1" activates star-panel overdrive.

**Command:** 21, User Font Strings**Description:**

Use this command to assign a printer font-setup string to a host's font ID. The first argument for this command is the number of the font string, the second argument is the host's font-ID number, and the third argument (enclosed in parentheses) is the string itself (a string of up to 25 ASCII characters—printer "escape" commands—that the Card will send to the printer when the font number is received from the host). Refer to your printer's or font cartridge's documentation for a list of available fonts and the printer commands that you'll need to use to set them up properly.

Use "<" (the greater-than sign) to stand for ESC (the escape character) in the string.

**Possible Arguments:**

*First:* 0 to 9

*Second:* 0 to 65535

*Third:* ([Up to 25  
ASCII codes])

*Third:* ()

**Results:**

String number (followed by a comma)

Host's font number (followed by a comma)

Defines a user string consisting of the specified  
ASCII characters (in parentheses)

Deletes the specified string from memory.

**Example:**

"&%Z21,3,11(<(12U<(s0p12h10v1s3b6T)" assigns the third font string to font ID #11 and fills the string with these font-related HP printer commands:

"12U" = Code Page 850; "0p" = fixed spacing; "12h" =

12 pitch; "10v" = 10 point; "1s" = italic; "3b" = bold; and "6T" = Letter Gothic.

**Command:** 32, 11" x 17" (A3) Printing**Description:**

Forces the printer to print on 11" x 17" (A3 size) paper, even when the host sends requests for smaller paper sizes such as letter, legal, A4, or Executive. This command only applies to printers such as the HP LaserJet 4V that are capable of printing on 11" x 17" or A3 size paper.

If both this feature and APO (command 08) are turned ON, APO will automatically rotate all documents and reports with dimensions less than or equal to 11" x 17"; for COR to occur, the document must be larger than 11" x 17".

**Possible****Results:****Arguments:**

*0	Do not force 11" x 17" (A3)
1	Force 11" x 17" (A3)

**Example:**

"&%Z32,1" forces printing on large paper. The Card will ask the printer to load a) A3 size paper when the host requests A3 or A4, or b) 11" 17" paper in all other cases.

**Command:** 33, Duplex Printing**Description:**

Use this command to enable or disable duplexing if the Card is attached to a printer with duplexing capability.

**Possible****Results:****Arguments:**

*0	OFF (no duplexing)
1	Long-edge duplexing
2	Short-edge duplexing

**Example:**

"&%Z33,2" instructs the Card to duplex all host jobs along the short edge of the paper.



**Command: 42, Start/Stop EBCDIC Hex Dump****Description:**

Use this command to start or stop an EBCDIC hex dump. Once you initiate this kind of hex dump, the Card sends all host data, starting with the next buffer received, directly to the printer as hexadecimal print data. The hex dump continues until you stop it with this command (normal printing resumes with the next buffer received) or until the printer is powered off.

Note that by using this command you can isolate hex-dump printing to just the problematic sections of your documents.

<b>Possible Arguments:</b>	<b>Results:</b>
*0	OFF (normal printing)
1	Start EBCDIC hex dump
2	Stop EBCDIC hex dump

**Examples:**

"&%%Z42,1" starts EBCDIC hex-dump printing; "&%%Z42,2" stops it.

**Command: 43, Start/Stop ASCII Hex Dump****Description:**

Use this command to start or stop an ASCII hex dump. Once you initiate this kind of hex dump, the Card translates all host data from EBCDIC into ASCII and sends it, starting with the next buffer received, directly to the printer as hexadecimal print data. The hex dump continues until you stop it with this command (normal printing resumes with the next buffer received) or until the printer is powered off.

<b>Possible Arguments:</b>	<b>Results:</b>
*0	OFF (normal printing)
1	Start ASCII hex dump
2	Stop ASCII hex dump

**Examples:**

"&%%Z43,1" starts ASCII hex-dump printing; "&%%Z43,2" stops it.

**Command:** 50, Sharing-Port Timeout**Description:**

Use this command to select the sharing port's timeout value (the time in seconds that must elapse before the Card automatically switches from the parallel sharing port to check for data from the host).

**Possible Arguments:**

01 to 60

**Results:**

Sets new timeout value in seconds (\*08, 8 seconds, is the factory default).

**Example:**

"&%Z50,10" sets the sharing-port timeout to 10 seconds.

**Command:** 56, Parallel-Port Initialization String**Description:**

Creates a parallel-port initialization string that the Card will send to the printer after the Card has reconfigured it for shared printing. Place up to 25 pairs of hex codes, corresponding to your desired printer commands, inside a pair of parentheses following a "0" (zero). (To aid readability, a single space is allowed between hex bytes.) The string will be stored in the Card's memory.

For a list of available printer commands and their hex values, consult your printer's manual.

**Possible Arguments:**

1([hex codes])

**Results:**

Defines a parallel-port initialization string consisting of the specified hex codes.

1()

Deletes the specified string from memory.

**Example:**

"&%Z56,1()" deletes the hex string previously defined as the parallel-port initialization string.

**Command:** 98, Restore Defaults or Print Configuration**Description:**

Either restores the factory-default configuration settings, prints out a copy of the active configuration settings, or loads the configuration settings stored in permanent nonvolatile memory as the new active configuration.

If you print a document using temporary configuration settings established with host/PC-download commands (that is, settings that haven't been stored with the "Z99,0" command), "Z98,2" will restore the saved settings from permanent memory.

Note that after you send the "Z98,2" or "Z99,0" command, the active configuration and the stored configuration will be identical.

**NOTE**

**Even restoring factory defaults has no effect on the Card's twinax address (host/PC-download command 00) or the host language (command 05).**

<b>Possible Arguments:</b>	<b>Results:</b>
0	Restores the factory-default configuration as the current active configuration
1	Prints out the active configuration settings
2	Restores the configuration settings stored in NVRAM to active status

**Examples:**

"&%Z98,0" reloads the factory-default settings as the active configuration;  
"&%Z98,1" prints out the active configuration settings for review; when placed at the end of a document, "&%Z98,2" restores the standard configuration settings for the next user of the printer.

**Command:** 99, Save All Current Settings

**Description:**

Saves all current configuration settings as established by host/PC-download commands in permanent memory.

**Possible**

**Result:**

**Argument:**

0

All current configuration settings are saved to NVRAM

**Example:**

“&%Z99,0” saves all current settings.

## 5.4 Restoring the Factory Defaults

You can replace the HPIISi Twinax Card's current configuration with the factory-default configuration settings by sending the host-download command "&%Z98,0" (see the entry for command 98 in the previous section) or by taking these steps:

1. After the printer is READY, use the "Menu" button on its front panel to scroll through the HP menus until you reach the MIO menu associated with the Card.
2. Press "Item" to display the Test menu.
3. Press "+" once to display the Restore Factory Default option, then press "Select" or "Enter" to activate this option. By the time the asterisk appears next to this option, the Card will already have replaced the previous active configuration with the factory-default values.
4. To activate all factory-default settings, power the printer OFF, then back ON.

### **NOTE**

**Even restoring factory defaults has no effect on the Card's twinax address (host/PC-download command 00) or the host language (command 05).**

# 6. Operation

With the HPIII Si Twinax Card, your printer can automatically switch between print jobs from an attached twinax host and an attached PC or LAN server. The Card uses a timeout between each print job to select the next job without your having to change cables or switches. Make sure your printer is loaded with paper and “READY” is displayed before you try to print.

When you first turn the printer on, the twinax connection is selected. If the twinax host does not send any data during the timeout period, and data is sent from the PC or LAN, the Card automatically switches to the parallel-port connection to print from the PC. The timeout period defaults to 8 seconds; you can set a custom timeout with a host-download command or front-panel selection (see **Chapter 5**).

The Card constantly monitors both connections for data being sent, waiting the specified timeout period between print jobs before printing the next job from either the twinax host or the PC/LAN. The Card automatically restores formatting parameters for twinax printing each time it prints from the twinax host. We recommend that the printer be reinitialized at the beginning of each PC/LAN print job to reset parameters that may remain from the previous print job.

## 6.1 Parallel-Port Initialization

If you want to change the printer’s configuration for shared printing (for example, to set it to PostScript® mode), use the parallel-port initialization string (host/PC-download command 56). Consult the printer’s manual for the ASCII hex values that correspond to the desired configuration commands. Then store these commands as an initialization string in the HPIII Si Twinax Card’s memory using host/PC-download command 56.

After host printing is completed and before the print job from the shared (parallel) port is sent to the printer, the Card will send this initialization string to the printer and configure it according to your instructions. However, it is possible that the print job coming through the shared port contains other printer instructions that override the parallel initialization string.

## 6.2 PC/LAN Printing

To print from your PC or LAN, follow these steps:

1. Make sure that the PC printer cable is attached to the Card and to the PC or LAN server as described in **Section 4.3**.

2. Make sure you have defined your printer correctly in the software program you are using (refer to the manuals for the software and printer).
3. Reinitialize the printer. You can set up an initialization string (see **Section 6.1**) to automatically reinitialize the printer before each job.
4. Send a print job to the printer.

The “Buffer” LED on the printer’s operator panel should blink. If this LED and the “Ready” LED both remain steadily lit, press the “Print/Check” or “Print Buffer” button on the printer’s operator panel to eject the last page.

(The printer might continue to print after the PC shows the print job is finished, until it has printed everything in its buffer.)

If you send the PC/LAN print job 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 and sent to the printer after the host job is complete. Or, if you set the printer port of the PC or LAN server for infinite retry with the DOS “Configure Printer” command (described in the DOS manual), the print job waits until the printer is available to receive the data.

### 6.3 Host-Port Initialization

After PC/LAN printing, the HPIIISi Twinax Card reconfigures the printer according to the active configuration settings. If you want to further modify the printer configuration (for example, to select a different font for all host printing), take advantage of the host-port initialization string (host/PC-download command 11). Unlike the parallel-port initialization string, which is usually overridden by commands that accompany the PC/LAN print job, the host-port initialization string is not sent to the printer until after the Card has reconfigured the printer for host printing. The initialization string is sent at the beginning of each printed page.

### 6.4 Host Printing

With the HPIIISi Twinax Card installed, your printer emulates the IBM 3812-1. The IBM 3812-1 printer is a laser-type printer which provides font-changing capability, plus text-rotation and -compression features called Automatic Print Orientation (APO) and Computer Output Reduction (COR).

The Card’s emulation of the 3812 includes bolding, underlining, and super/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 the font as necessary with a font-change command in the document (see **Section 6.4.1**), a printer override, or an OCL command.

Table 6-1 below shows which fonts can be used as system defaults for a System/36 or System/38 host.

#### 6.4.1 FONT-CHANGE COMMANDS

You can place font-change commands within the text of a word-processing or data-processing document to select a font other than the default font. The commands appear on the screen but do not print. The font change takes effect immediately and continues until the next font change. See **Appendix A** for a list of font IDs.

**Table 6-1. Data-Processing Fonts for S/36 and S/38**

<b>Typestyle Number</b>	<b>Font ID (Hex)</b>	<b>Pitch (CPI)</b>	<b>Typeface</b>
05	05	10	Presentation
11	0B	10	Courier
13	0D	10	Courier
80	50	12	Prestige Elite
85	55	12	Courier
86	56	12	Prestige Elite
87	57	12	Letter Gothic
91	5B	12	Letter Gothic
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
254	FE	17.1	Letter Gothic



To select a different font that is not a resident scalable font, type in a font-change command “¬Qnnnnn”, where “¬” is a “logical not”, “Q” indicates a font change, and “nnnnn” is the font ID.

To select a resident scalable font with a specific point size, type in a font-change command “¬Fnnnnn, xx”, where “¬” is a “logical not”, “F” indicates a change to a resident scalable font, “nnnnn” is the font number, and “xx” is the desired point size. The resident scalable font numbers are listed in **Appendix D**.

All text following the command will be printed in the new font until you specify a different font.

### **NOTE**

**The host might send the code for the original font to the printer at the beginning of each page. If this happens, you may need to put a font-change command at the beginning of each page of your document.**

If the font-change command changes the pitch, the host might continue to format each line using the pitch of the original font. For Text Management/38® and other word-processing programs, you might not be able to use more than one font per line.

#### **6.4.2 USING FONTS IN DATA PROCESSING**

To change fonts for a data-processing report, you must add the new font to the CL or OCL printer statement (for the System/36, you must convert the font number to hexadecimal before adding it to the printer statement). The font IDs listed in Table 6-1 can be used in host printer statements.

#### **6.4.3 USING FONTS IN WORD PROCESSING**

When your system operator configures the printer on the host, a default font ID is configured for the printer. The default font ID should be that of the most commonly used font. The word-processing program might also have a default font ID. Since the default font ID can vary depending on the system setup, ask your system operator if you have questions about the default font ID on your system.

If necessary, you can change the font ID with an appropriate command in the word-processing document. You can use the Card's font-change commands, or you can select a new font-ID number in the word-processing program. Refer to the operator's manual(s) of the word-processing program for information on changing font IDs within the program.

#### 6.4.4 FORMATTING THE PAGE

The printer prints up to 66 lines at 6.25 LPI (the line spacing is compressed slightly to fit). The System/36 allows only 65 lines per page. If you get one or two lines at the top of the next page, it's usually because you have formatted more lines per page than can be printed.

#### 6.4.5 PAPER SIZE

Configure the printer's setup to the paper size you use most. The MPP and font must match the paper size exactly to work correctly. The Card recognizes only the following 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	11.69 x 16.54 in. (297 x 420 mm)

If you choose paper of any other dimensions in the word-processing program, the Card ignores your choice and continues using the previous paper size.

You can also perform a paper-size override through a host/PC-download command or a front-panel selection, as described in **Chapter 5**. As described in the entry for command 09, Paper Size, on page 24, the "Size selected on front panel" argument causes the Card to use whatever paper size is currently selected on the printer's front panel; the "A4 Size" argument causes the Card to use A4 paper only.

With A4 paper selected, 10 CPI fonts will print as 10.3 CPI. This allows 80 columns to be printed in portrait orientation on A4 paper.

The following steps describe how to select legal-size paper in DisplayWrite/36® or AS/400 Office®:

1. Choose legal-size paper on the host and send the print job.
2. The printer's operator panel displays 3 for "Load paper request." Install the legal-size paper tray in the printer.
3. Press "Start/Stop" on the printer's operator panel to continue.

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

1. Select a paper size in the host program.
2. Install the correct paper size in the printer.
3. Power off the printer for about 5 seconds, then power it back on.
4. Release the job for printing at the printer's controlling workstation.

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

### 6.4.6 PRINTING ON 11" x 17" AND A3 SIZE PAPER

Some printers, such as the HP LaserJet 4V printer, allow printing on 11" x 17" and A3 size paper. The HPIIIISi Twinax Card automatically recognizes these larger paper sizes (see **Section 6.4.5**). However, at times it might be advantageous to force the printer to print on 11" x 17" or A3 size paper, even when the host sends requests for smaller paper sizes (for example, letter, legal, A4, or Executive). If this is desired, the Card's forced 11" x 17" (A3) feature should be turned ON through host/PC-download command 32.

With this feature turned ON, the Card will request the printer to load A3 size paper (when the host requests A4 or A3) or 11" x 17" paper (in all other cases). In addition, the Card's APO feature (if turned ON) will automatically rotate all documents/reports with dimensions of 11" x 17" or smaller. To achieve COR in this case, the document/report has to be larger than 11" x 17".

### 6.4.7 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 I-O interface acts as the matchmaker between theoretical paper drawers and physical trays available on the printer.

The paper-drawer feature of the HPIIIISi Twinax Card can be accessed through host/PC-download commands 13, 14, and 15 (see the entries for these commands in **Section 5.3**).

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

1. Select the paper drawer with host/PC-download command 13, 14, or 15.
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 6-2 below shows the default values of the three host/PC-download commands and, as examples, lists the corresponding paper trays used by the HP LaserJet 4Si and 4 Plus printers.

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 HPIISi Twinax Card, 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 paper drawer #1, send the host/PC-download command &%Z13,5 to the printer.

**Table 6-2. Assigning Paper Sources to Paper Drawers**

Host/PC-Download Command	Paper-Drawer Number	Default Value	HP4si Paper Tray	HP4 Plus Paper Tray
13	1	1	Upper	Cassette
14	2	4	Lower	MP tray
15	3	5	Not Used	500-sheet cassette

### 6.4.8 PRINT ORIENTATION

When operating the printer and the HPIIISi Twinax Card 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. The Card's Automatic Print Orientation (APO) setting.
3. The Card's Print Orientation setting.

As you read the following subsections, refer to Figure 6-1 for an illustration of the print-orientation logic.

#### 6.4.8.A 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 6.4.9** for a description of how to access the print file and the document-format menu. The available settings are 0, 90, 180, or 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°, 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 these settings, the print job will print in portrait orientation 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 Card.

#### 6.4.8.B Automatic Print Orientation

If no page rotation was specified by the host, the HPIIISi Twinax Card's Automatic Print Orientation (APO) feature is the first setting used to determine the final print orientation. This feature automatically rotates print jobs with dimensions equal to or smaller than 8.5" x 14" to portrait or landscape orientation.

1. With the APO feature ON, the Card first checks the dimensions of the host print job. If the print job is larger than 8.5" x 14", the Card cannot fit the print job on one page. In this case the orientation of the print job is determined by the Card's print-orientation setting (BLOCK 3).

2. If the dimensions of the print job are 8.5 x 14" or smaller, the Card 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).

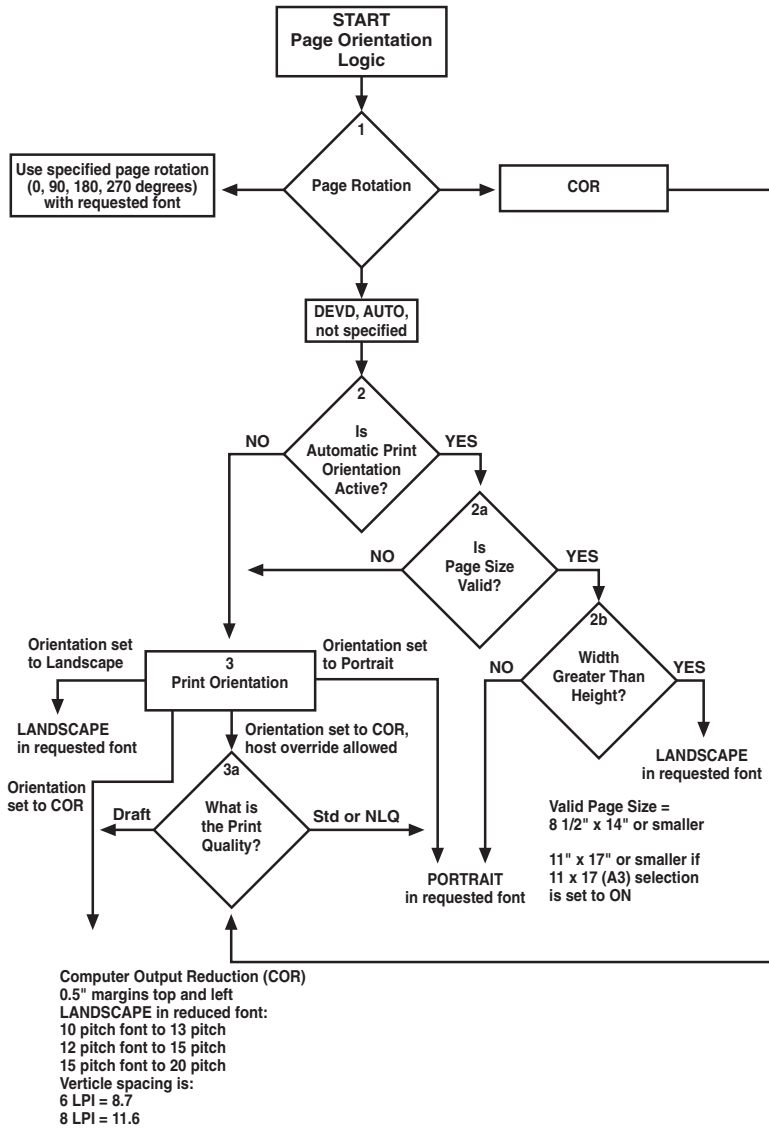


Figure 6-1. Printing with Computer Output Reduction.

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 no. of columns) divided by CPI
- Length = Page Length (in no. of lines) divided by LPI

### *6.4.8.C Print-Orientation Settings*

The Card's print-orientation settings determine the orientation of the host document or report *after* the host's page-rotation setting and the Card's APO setting have been accounted for.

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  $\frac{7}{8}$ " 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 Card'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. This COR setting ignores print-quality settings and always prints COR (unless the host's page rotation or the Card's APO setting determine the print orientation).

The Card's second 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 Card's print orientation is set to COR, host override allowed (host/PC-download command &%Z07,0).

Tables 6-3 through 6-5 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 6-6 shows desired print-orientation results and the combination of settings required to obtain those results. Most print-orientation results can be achieved with more than one setting combination. Refer to Figure 6.1.

**Table 6-3. Page-Rotation and Print-Quality 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 (OfficeVision/400)	NLQ, Test
S/36	not specified	Text - Yes
S/38	not specified	*NLQ, *STD

COR is defined as printing in landscape orientation, having top and left margins set to half an inch, with CPI and LPI reduced according to these tables:

**Table 6-4. COR CPI Reduction**

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

**Table 6-5. COR LPI Reduction**

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



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

<b>Result</b>	<b>Host Setting</b>	<b>Card Setting for APO</b>	<b>Card Setting for Print Orientation</b>
<p><b>Data processing:</b>                      Print reports with a width of 80 columns or less (at 10 CPI) in 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>	Degree of Page Rotation... *AUTO	ON	COR
<p><b>Word processing:</b>                      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>	Rotate Paper...=1 (Automatic)		
Print all reports/documents in landscape with requested font	Degree of Page Rotation... *AUTO; Rotate Paper....=1 (Automatic)	OFF	COR
Print all reports/documents in portrait with requested font	Degree of Page Rotation... *AUTO; Rotate Paper....=1 (Automatic)	OFF	Portrait

### 6.4.9 VIEWING AND CHANGING PAGE-ROTATION SETTINGS

Before changing page-rotation settings, first verify the current settings. In OfficeVision/400 and DisplayWrite/36, take these steps to view (and change) page-rotation settings:

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. To change the currently selected rotation setting, move the cursor to this setting and type in the desired value.

Be sure to consider how changing the page rotation will affect print orientation (see **Section 6.4.8**).

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.

Alternatively, 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 MIS director.

To change the print file:

1. Type “CHGPRTF” on the command line of the host, then 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, then 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 the dashed line and enter the desired selection.
6. Press [ENTER] to activate the selection and exit the print-file menu.

## **6.5 Envelope Printing**

Use landscape orientation for envelope printing; place the first line of the address on line 30 and set the left margin to 55. A trial run with a blank sheet of paper helps in positioning the address. There are three ways to select envelopes:

- a. Select "Manual Feed" in the word-processing program's paper-feed selections. The printer displays "3" on the operator panel. Place envelopes into the manual-feed tray and press "Start/ Stop." Then press "Paper" to select manual feed.
- b. Place envelopes into the paper tray and move the tray stops to the proper position. Specify the bin number in the word-processing program and the printer will print envelopes from the paper tray.
- c. Select "Envelope Feed" in the word-processing program's paper-feed selections, a paper width of 7.5" or 9.5", and a paper length of 11". The printer will automatically find the envelope feeder (if one is installed) and print from the feeder.

## 6.6 Printing Letters and Envelopes from the Same Document (Host Only)

You can print a letter and an envelope from DisplayWrite/36 or AS/400 Office in the same document by following this procedure:

1. Set the format for your letter. Enter your letter file. On the first typing line, press [CMD20] for "Change Format."
2. Select [1] for "Entire Document Options," then another [1] for "Document Format." Now select [3] for "Typestyle/Color."
3. Select the font-ID number for your letter ("11" or "86," for example), 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, select a paper size of 8.5" (width) x 11" (length), and select "1" as the paper source. If the letter is more than one page, select "1" as the paper source for the following pages as well. Press [ENTER] to return to the Document Format screen, then [CMD12] to return to the Document Options screen.
5. You can 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 ("5", for example), then press [ENTER] to return to the Alternate Format screen.
6. Select [4], "Page Layout/Paper Options." Choose a first typing line of 11, then scroll down to the second screen of the options and choose a paper width of 7.5" (monarch size) or 9.5" (commercial [#10] size) and a paper length of 4". 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 40. Press [ENTER] and [CMD3] until you are back in your document.
8. Type in the text. When you're done, add a "page end" by pressing [ALT]-[P].
9. Now, load in your alternate format for the envelope. 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. The document is displayed with the alternate format. The cursor will be on the first typing line of 11 with a left margin of 40. Type in the envelope address, then send the file to print. The letter will print out first, followed by the envelope.

## NOTE

The printer might eject a blank page when you change printing orientation. If the Buffer LED and Ready LED on the printer's operator panel remain steady, press the Print/Check button on the operator panel to eject the last page of the previous document.

### 6.7 Duplex Printing

Some printer models can print both simplex (single-sided) and duplex (double-sided). The duplex printing can be both long-edge (landscape) and short-edge (portrait).

With the HPIIISi Twinax Card, you can access the printer's duplexing capability in a variety of ways:

- a. If you are running OS/400® V2R3 on the host, simply select duplex printing in the printer file. The menu option is called "Print on both sides . . ." and is found on the second-to-last menu screen. Available selections are \*NO, \*YES, and \*TUMBLE.
- b. Select duplex printing in the word-processing program. In the OfficeVision/400 printer-options menu, the printer option is called "Type of page printing . . ." and the available selections are: 1 = Single-sided; 2 = Double-sided; and 3 = Double-sided tumble.
- c. Insert the duplex-printing command on the first line (line 1, position 1) of the document. The duplex-printing commands are:
  - D0 for simplex printing;
  - D1 for duplex printing, long-edge; and
  - D2 for duplex printing, short-edge (tumble)

Make sure to place these commands starting on line 1, column 1 of your document. If you start these commands anywhere else, they will not become active until the following page.

When the printer receives one of these commands, it will do all printing in that mode until another printing command is received. If your printer is usually in simplex mode and you are printing in duplex mode, be sure to put a simplex command at the end of your document to return the printer to simplex mode. Envelope printing between documents won't change the printer's mode.

- d. Set the Card to duplexing mode through the printer's front panel. The available selections are "no duplexing," "long-edge," and "short-edge" (tumble).
- e. Set the Card to duplexing mode through host/PC-download command 33. The possible arguments are:
  - 0 = simplex;
  - 1 = duplex, long-edge; and
  - 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 Card to duplex printing (long-edge or short-edge respectively). To return to simplex printing, type and print "&%Z33,0".

For some duplex printing, if the last page is blank on the back side, the information for the last page may remain in the printer until the next print job is received. If you want to print the last page, take the printer off line by pressing the ONLINE button, then press the FORM FEED button to print the last page. Put the printer back on line by pressing the ONLINE button again.

## 6.8 Other Print Commands

You can also enter commands into your document that let you control true LPI and response to host commands. These commands, listed in Table 6-2 below, are similar to font-change and duplex-printing commands.

The `-E` command lets you send an escape command to the printer to control the printing. For example, "`-E(s3B`" would begin bold printing (see your printer's manual for a list of the printer's escape commands).

The printer may compress line spacing to fit 66 lines onto the page. This may be undesirable, for example when you use preprinted 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 forms-generating software, the files are recognized by the host as text files and formatted 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 Card to remove the host's carriage-return and line-feed commands and send only the data to the printer.

**Table 6-2. Other Print Commands**

<b>Command</b>	<b>Function</b>
-E	Sends an ASCII ESC command to the printer
-TY	Enables true LPI printing
-TN	Disables true LPI printing
-I	Ignores all host formatting commands
-S	Stops ignoring host formatting commands

# 7. Advanced Features

The HPIISi Twinax Card has several advanced features for accessing special printer functions that are not normally available on the IBM 3812-1 printer. These features, which include command pass-through, user-defined strings and fonts, color and bar-code printing, and a proprietary graphics language, are described in separate sections of this chapter.

## 7.1 Command Pass-Through

The command pass-through (CPT) feature lets you access all of the built-in features of your printer, even if these features aren't normally available through the host software. With command pass-through, you can place printer-specific command sequences into the data sent to the printer. The Card recognizes these special sequences and “passes the command through” to the printer. Follow these steps to use command pass-through:

1. Find the command for the print feature in the printer's manual.
2. Convert the printer command to hexadecimal.
3. Type “&%” (or the alternate CPT-start delimiter, as defined by host/PC-download command 01—see the entry for this command in **Section 5.3**) in the document at the point you want the feature to take effect. This signals the start of the print feature. Type in the printer command that turns the feature ON, then type “&%” (or the alternate CPT-end delimiter as defined by host/PC-download command 02—see the entry for this command in **Section 5.3**). You may enter a space between the hexadecimal code pairs to make the printer command easier to read, but do not put spaces between the delimiters and the hexadecimal characters.
4. Move the cursor to the point in the text that you want to end the print feature. Type in the start delimiter, followed by the printer command that turns the feature OFF, then the end delimiter.

For example:

On HP printers, the command “[ESC]&d0D” (where [ESC] stands for the escape character) begins underlining, and “[ESC]&d@” ends underlining. First, convert the “start underlining” command to the hexadecimal 1B 26 64 30 44 and the “end underlining” command to 1B 26 64 40. Then, assuming the delimiter is the default “&%” (hex 50 6C), insert the command in your text like this:



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

The printer will print the sentence above as:

This is an underlined word.

Only characters from 00 to FF are recognized (letters must be in upper case).

Errors in the command pass-through sequence will cause the Card to ignore the command and printing will resume at the point the error occurred.

Although the command is displayed on the screen, the Card treats it as a command and does not print it. If part of the sequence is printed, you have made an error in entering the codes; check your document and make sure you are using the correct format and EBCDIC characters.

Command pass-through may make horizontal spacing unpredictable; lines with commands in them might be shorter than normal when printed. Avoid sending codes that would move the print position during command pass-through. Since the Card does not process these commands, it cannot keep track of the print position changes; this may affect the position of the characters and page layout.

You can also send command pass-through strings to the printer by typing them on the host screen and pressing the “screen print” key.

### 7.2 User-Defined Command Strings

Command pass-through (see the previous section) is all well and good, but having a bunch of printer commands embedded as hex sequences between CPT delimiters in your document can make a mess of your on-screen display. To avoid keying in frequently used printer commands, you should take advantage of the HPIISi Twinax Card’s “user-defined strings” feature.

You can define as many as ten printer-command strings, numbered 0 through 9, by using host/PC-download command 04 (see the entry for this command in **Section 5.3**).

After you have defined a command string, activate it by typing the delimiter (either “&%” or an alternate delimiter) followed by the uppercase letter “U” and the string number (0 through 9) into the document or on the screen. When the document or screen is printed, the Card will recognize the &%U and send the command assigned to the string number to the printer.

For example, if you assigned string number U1 to a command string that turns on shadowed printing on an HP LaserJet 4 printer (hex codes 1B 28 73 31 32 38 53), then you would simply enter “&%U1” in your document at the point where you want shadow printing to begin.

Some commands, such as emphasized (**bold**) printing, may stay in effect 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 Card's self-test prints out a list of command numbers and the command strings assigned to them.

### 7.3 User-Defined Fonts

The HP III Si Twinax Card supports a vast variety of fonts. For a list of the supported fonts, refer to **Appendixes A and D**. In addition, the “user-defined fonts” feature allows you to assign new or existing font IDs to different printer-resident fonts or to fonts from an optional font cartridge. Up to 10 new pairs of font IDs and fonts can be assigned.

The following example assumes that the Card is installed in an HP 4Si and that the default font is specified to be font 11. 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 ID 11 (for example, Courier **bold** 10 CPI). This is done by sending the host/PC-download command “&%Z21,0,11(<(12U<(s0p10h12v 0s3b4099T)” 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 way, 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.

## 7.4 Color Printing

The HPIII Si Twinax Card allows printing of color on the HP Color LaserJet, DeskJet 1200C, or DeskJet 1600C printer. Simply insert the color command in front of the text you want to print in color. 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 - Composite (Registr.) 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.
```

Alternatively, you can select a color through the “Typestyle/color” menu of OfficeVision/400 (V3R1 or later). This menu is accessed by selecting [F20] (Format Options),

- [1] (Document Options),
- [1] (Document Format), and finally
- [3] (Typestyle/color).

## 7.5 Printing Bar Codes

### 7.5.1 THE COMMAND LINE

Using the HPIIISi Twinax Card's "bar code" feature, the bar codes in Table 7-1 can be easily printed.

**Table 7-1. Printable 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.

The following paragraphs describe each of the components of the bar-code command string:

**¬B:**

Identifies the string 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 7-1.

**<height>:**

Specifies the height of the bar code. Height is expressed in whole-number multiples of 2.5 mm (approximately  $\frac{1}{8}$ " ), from 1 (2.5 mm) to 9 (22.5 mm).

Height values are ignored if the POSTNET bar code is being printed, since POSTNET uses one standard height. However, a valid value (1 to 9) must be entered for the height parameter to ensure that 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 (it can range from 1 to 9), you can determine the width of the module and the thickness of the bars and spaces.

To determine the total length of the bar code, simply multiply the module length (found in Table 7-2) 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 Card 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 1½":

- Number of characters: 11  
(8 letters ["PRINTERS"] +  
2 start/stop characters +  
1 check digit)
- Module width (from Table 7-2):  
3.6 mm (0.14")
- Calculation:  
 $11 \times 3.6 \text{ mm} = 39.6 \text{ mm} =$   
3.96 cm; or  
 $11 \times 0.14" = 1.54"$

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

**Table 7-2. Module Width in mm (Inches)**

<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	Always 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)

### <hr>:

Identifies whether human-readables are printed or not. Human-readable characters are printed underneath the bar code. Valid values are:

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

### <chkd>:

Indicates whether the Card automatically calculates a check digit and causes it to be printed.

Some bar codes (Code 128, POSTNET, UPC A, EAN 8, and EAN 13) require a check digit, so the Card automatically generates one and adds it to the bar-code data. If any of these bar codes has been selected, the <chkd> selection is ignored by the Card. However, one of the following values must be entered to ensure that the bar-code command string is complete and valid. The options for the <chkd> parameter are:

- 0 = Do not calculate/add a check digit.
- 1 = Calculate a check digit and add it 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 Card and input for the <ast> parameter is ignored. However, one of the following values must be entered to ensure that 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 (that is, 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 (that is, a bar code with too many start/stop characters).**

### <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 Card 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 Card

will print “Invalid Data” in the place of the bar code.

## 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 Card will process the bar-code command up to that point and then reject any information it receives after the incorrect value.

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

```
-B2,6,6,3,0,0,code128-B
```

The Card 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 result described in paragraph 2.

4. If invalid data (either too many characters or the wrong type of characters) is entered, the Card will print the error message “\*\* Invalid Data \*\*”

5. Allow for sufficient vertical spacing when printing text data beneath the bar code. For example, let’s say the bar-code command string below is entered on line 1 of the document with a bar-code height specified as 5 (approximately ½” 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
```

When you print it, the bar code will overlap the text in the second line:



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.**

### 7.5.2 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 through 9
Valid alphanumeric characters:	A through Z
Valid other characters:	space ! “ # \$ % & ‘ ( ) + , - . / : ; < = > ? @

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



**Figure 7-1. Code 3 of 9.**

#### POSTNET

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

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



**Figure 7-2. POSTNET.**

**UPC A**

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

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



**Figure 7-3. UPC A.**

**EAN 8**

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

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



**Figure 7-4. EAN 8.**

**EAN 13**

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

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



**Figure 7-5. EAN 13.**

**Interleaved 2 of 5**

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

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



**Figure 7-6. 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 Card 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 Card prints the bar code exactly as it is input.

**Code 128**

Code 128 has three unique character subsets—codes A, B, and C—which are shown in Table 7-3 on the following pages. When you enter data representing a Code 128 bar code, follow these two steps:

1. Define which code set you want to use: Type “A” to represent code A, “B” to represent Code B, or “C” to represent code C.
2. If you are using code set B, enter the data characters directly. The tilde (“~”) character and other special characters are represented by the Symbol Character Value found in the left column of Table 7-3.

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 by a tilde followed by a digit. For example, to bar code the ampersand (“&”) 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 7-3.

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



**Figure 7-7. 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 “10Card10”.

-B2, . . . , A1716~6Card~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
Card:	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 7-3. Character Subsets of Code 128**

<b>Symbol- Character Value</b>	<b>Data Character</b>		
	<b>Code A</b>	<b>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 7-3 (continued). Character Subsets of Code 128

Symbol- Character Value	Data Character		
	Code A	Code B	Code C
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 7-3 (continued). Character Subsets of Code 128**

<b>Symbol- Character Value</b>	<b>Data Character</b>		
	<b>Code A</b>	<b>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 7-3 (continued). Character Subsets of Code 128

Symbol- Character Value	Data Character		
	Code A	Code B	Code C
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



## **7.6 The Card's Proprietary Graphics Language**

The HPIIISi Twinax Card understands a proprietary graphics language (we'll refer to it as "the GL" for short). By using this graphics language, you can print graphical elements and charts. The GL is independent of the Card's other features, such as internally generated bar codes or font-change commands. This means that if a font-change command is followed by a GL command to rotate text, the text would print in the specified font. The GL is also independent of regular text data. This allows text data to be overlaid by a graphical element, such as a shaded box.

### **7.6.1 GRAPHICS-LANGUAGE OVERVIEW**

Table 7-4 is an overview of the command strings used in the HPIIISi Twinax Card's graphics language. Table 7-5 briefly describes these strings' parameters.

Table 7-4. The Card's Graphics Language: Commands

Graphical Element	GL 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 7-5. The Card's Graphics Language: Parameters**

<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 GL 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 7-5 (continued). The Card's Graphics Language: Parameters

Parameter	Description	Units of Measurement	Valid Values
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

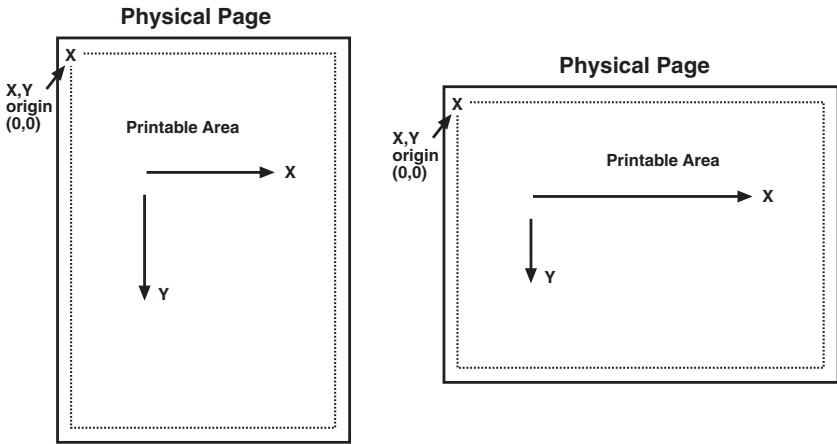
**Table 7-5 (continued). The Card's Graphics Language: Parameters**

<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

## 7.6.2 HELPFUL HINTS

1. All x,y values (start, end, center, increment) are measured in  $n/300$  of an inch. The origin of the x,y-coordinate system is the top left-hand corner of the printable area of the page (see Figure 7-8).

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 7-8. X,Y-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 Card to print the string at the place where the error occurred.

For example, suppose you enter a line-command string with an invalid `<x start>` value:

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

The Card 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 commas used to represent decimal points for line width in mm (as in “1,5” for “1½”) also cause the number to be interpreted as two separate values (for “1,5”, value 1 = “1”, value 2 = “5”). To enter a valid decimal line width, use periods “.” to represent decimal points (as in “1.5” for “1½”).

### 7.6.3 BASIC DESCRIPTION

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

Draws a line from the specified x,y start to x,y 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 that is 2 inches long (<y-end> - <y-start> =  $600/300$  = 2”), as shown in Figure 7-9.

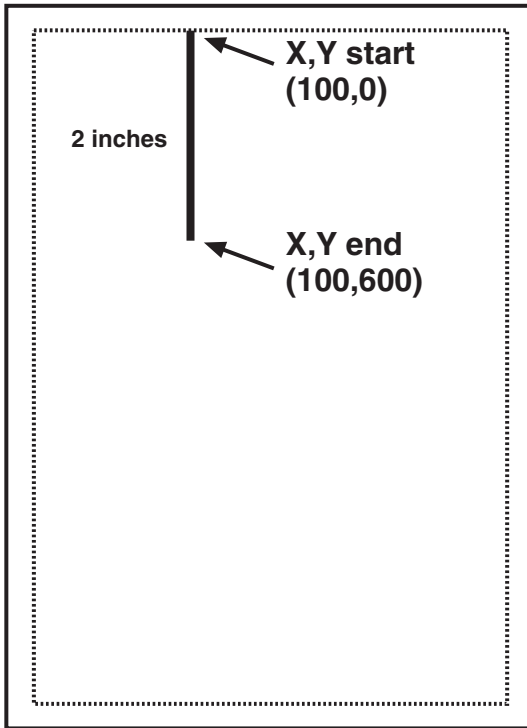


Figure 7-9. Example of a line.

*Box*—`GB<line width>;<x start>;<y start>;<x end>;<y end>;<% shading>6`

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

For example: `-GB2;300;300;600;600;30` draws a box with a 2-mm wide border and 30% shading, as shown in Figure 7-10.

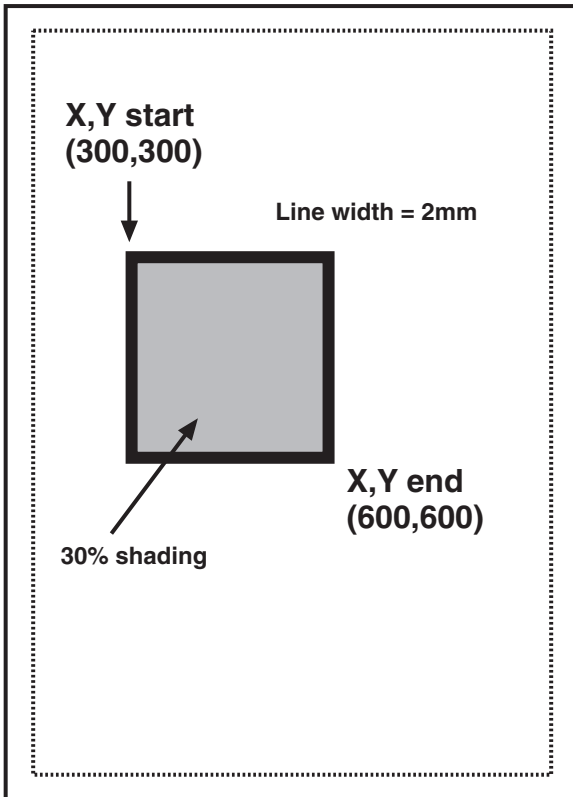


Figure 7-10. Example of a box.



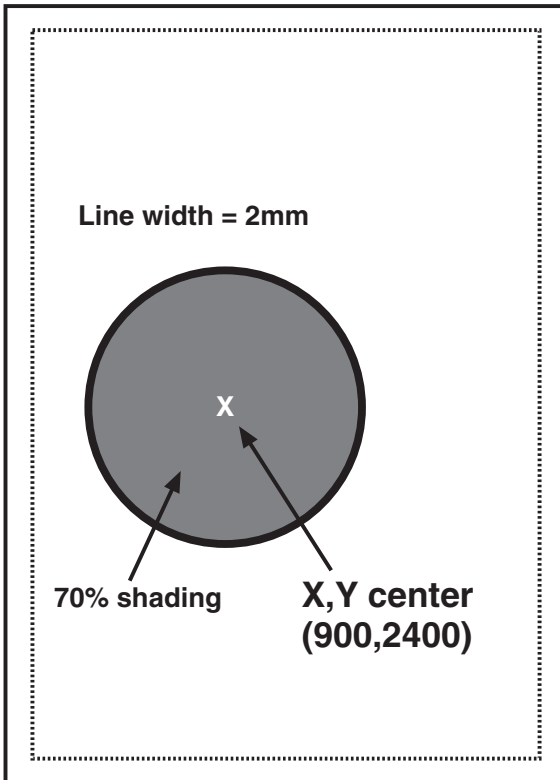
*Circle*—`-GC<line width>;<x center>;<y center>;<radius>;  
<% shading>`

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), as shown in Figure 7-11.

## 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.

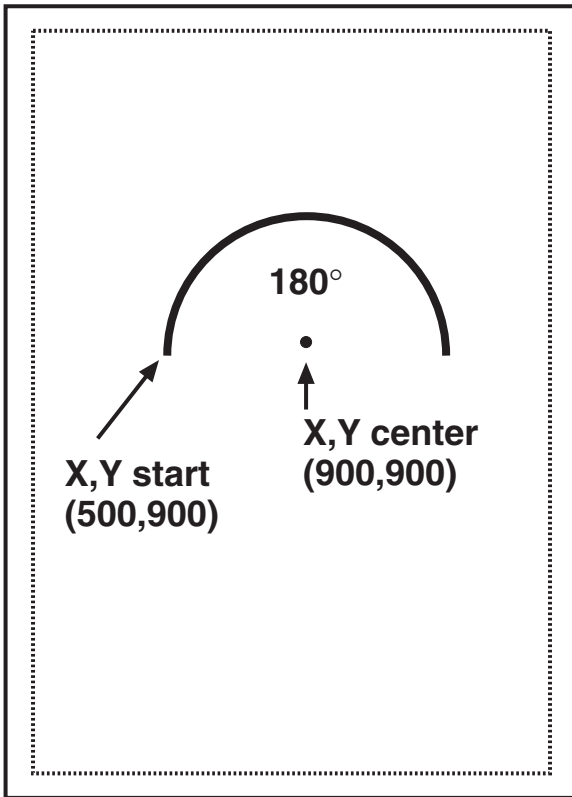


**Figure 7-11. Example of a circle.**

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

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

For example: *GA*1;500;900;900;900;180 draws the 1-mm-wide arc—a semicircle, because the rotation is 180 degrees—shown in Figure 7-12.

**Figure 7-12. Example of an arc.**

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

Defines the color and shading of 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, and so on.

Colors are entered as numeric values 0 through 16 (corresponding to the color scheme of the color-printing commands—see **Section 7.4**). Shading is entered as a numeric value from 0 to 100 (% of shading). If the attached printer is not capable of recognizing PCL color commands, all printing will be black. Refer to the following sections on pie and bar charts for examples.

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

Draws a pie chart around the x,y 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; they can range from 0 to 100. <line width> must be specified in mm.

Each segment will have the color and/or shading specified in the color/shading command (see the previous section on page 81—pie chart value 1 will get color/shading value 1, etc.). The first pie segment starts at “9 o’clock,” meaning on the far left of the circle, as shown in Figure 7-13.

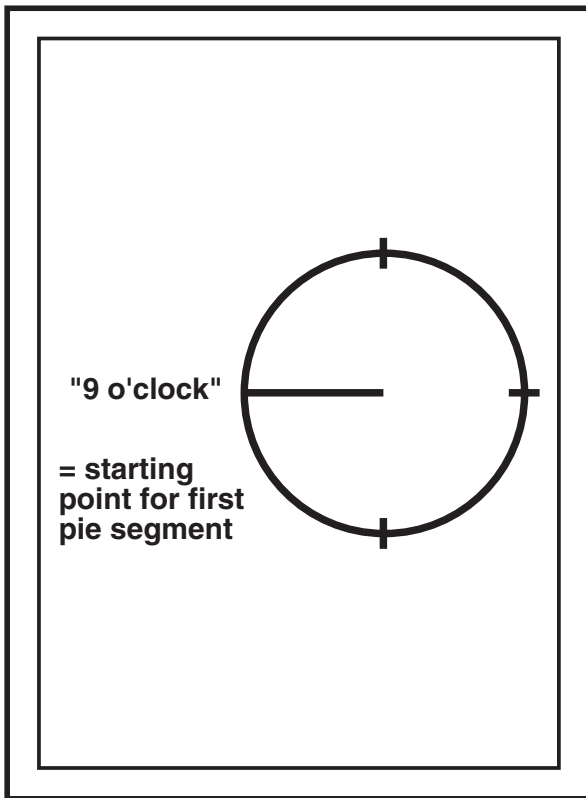
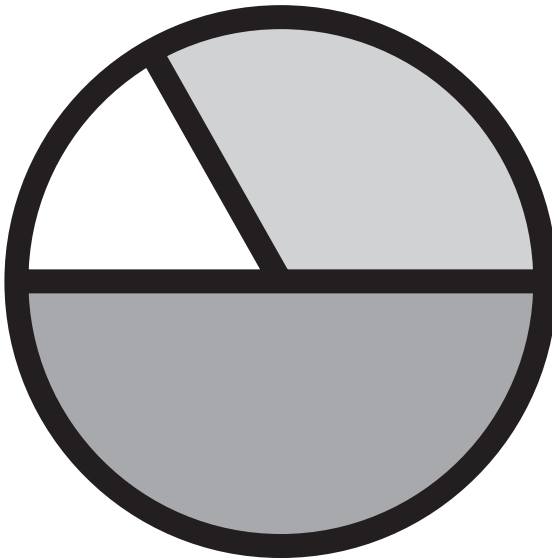


Figure 7-13. Segment orientation for pie charts.

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  $\frac{1}{3}$  of the complete circle ( $10/[10+20+30] = \frac{1}{6} = \frac{20\%}{100}$ ), the second segment (value 20) will be  $\frac{2}{3}$  ( $\frac{40\%}{100}$ ) of the complete circle, and the third segment (value 30) will be  $\frac{1}{2}$  ( $\frac{30\%}{100}$ ) of the complete circle, as shown in Figure 7-14.



**Figure 7-14. A three-segment pie chart.**

*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. X,Y start specifies the bottom left-hand corner of the first bar (the origin on the chart's x,y 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 3000. Each bar will have the color and/or shading specified in the color/shading command. A maximum of 12 bars can be printed in the same chart.

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, as shown in Figure 7-15.

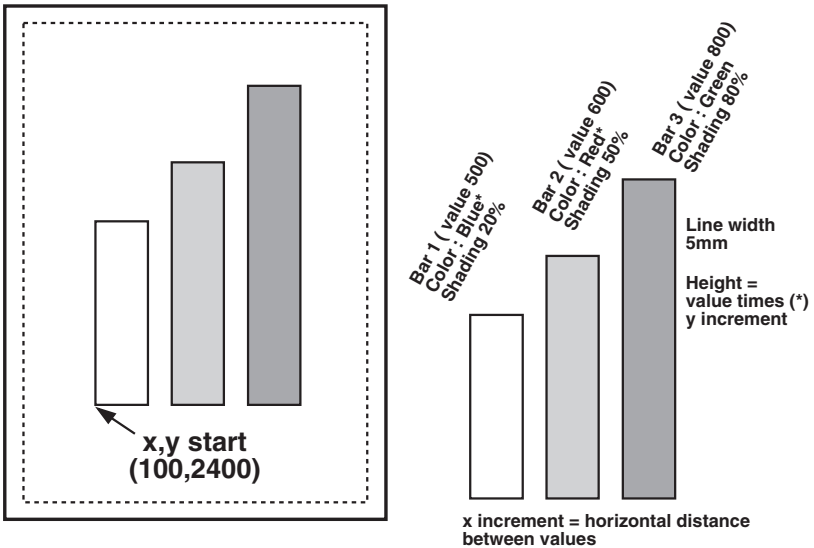


Figure 7-15. Bar chart (histogram).

Each bar is  $\frac{1}{8}$  ( $\frac{100}{500}$ ) of an inch wide. The distance from the left side of one bar to the left side of the next bar is one inch ( $\frac{300}{500}$ "). This allows other bars to be added through a separate command.

Bar 1 will be  $1\frac{3}{8}$ " ( $500 \times \frac{1}{500}$ ") high, bar 2 will be 2" ( $600 \times \frac{1}{500}$ ") high, and bar 3 will be  $2\frac{2}{8}$ " ( $800 \times \frac{1}{500}$ ") high.

### 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). Be aware that the bar height must not exceed the total printable area of the page.

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

Draws a run (line) chart. The x,y start specifies the origin of the chart's x,y scale (x,y 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:  $\neg$ GR3;900;2400;150;1;5;100;300;200;500;400 draws the run (line) chart shown in Figure 7-16 below.

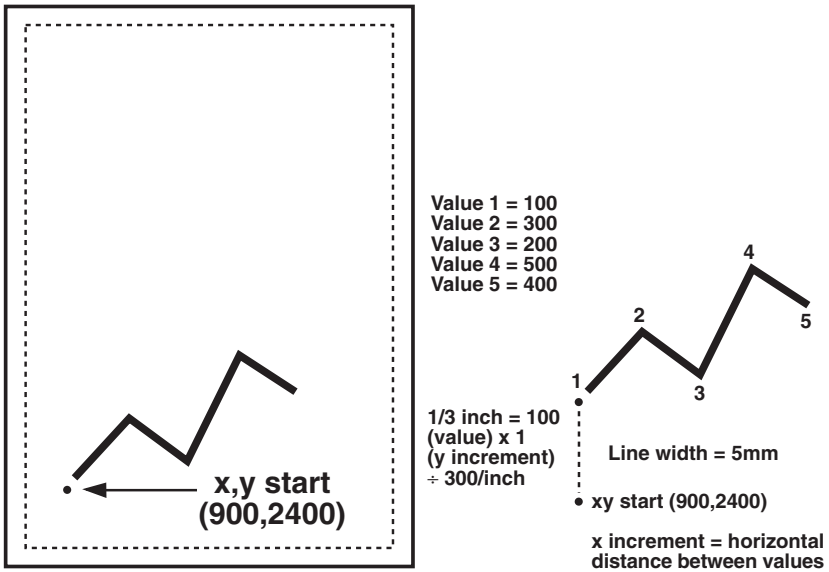


Figure 7-16. Run (line) chart.

**NOTE**

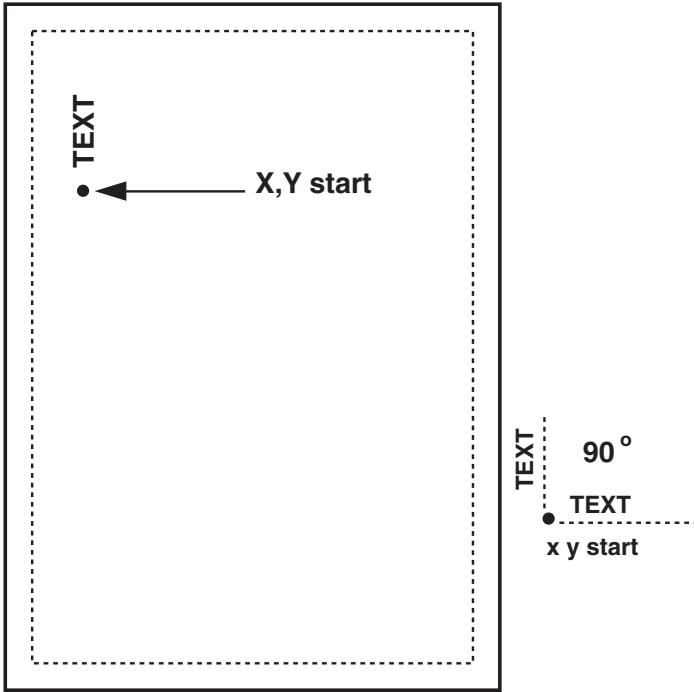
The y-increment determines the scaling. Only integers (1, 2, 3, 4, etc.) are valid. If you are charting sales figures in thousands of dollars, the y-increment should be small (for example, 1). If you are charting the number of customer complaints per period, the y-increment should be large (for example,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



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

Prints the word “text” in the active font, with the specified rotation and specified x,y start. Text will be rotated counterclockwise.

For example: `-GT1000;1000;90;'TEXT'` prints the word “TEXT” in the active font with 90-degree rotation, as shown in Figure 7-17.



**Figure 7-17. Text.**

*Comments*—`-GX<'text'>`

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

For example: `-GX'Pie chart with 3 elements'` can be used to document a GL pie-chart command.

## 7.7 The Graphics Language in Action

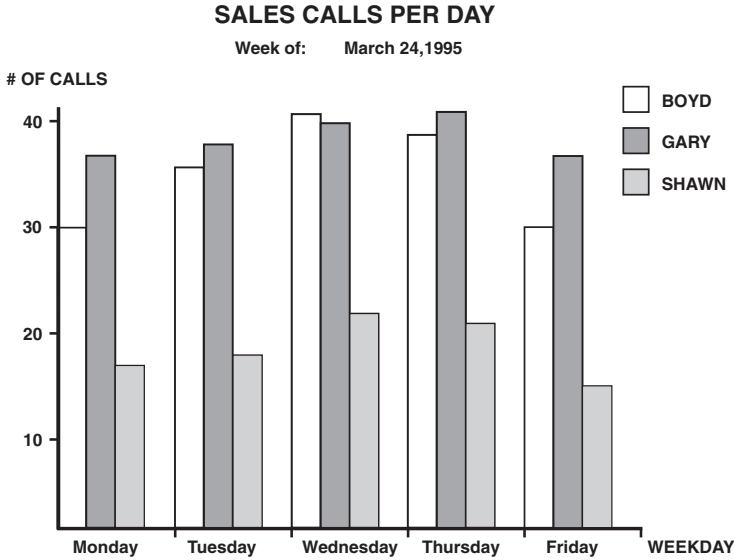
### 7.7.1 GENERAL STEPS

The HPIISi Twinax Card's graphics language can be used in many different ways. It can enhance the appearance of standard host reports with a few simple graphical elements such as lines, boxes, and circles; or it can be used to present pertinent data through charts. The GL can even be used to create sophisticated electronic forms. Whatever you want to do with it, programming with GL follows the same general steps:

1. Determine which GL elements are needed to create the desired output. (For example, the bar chart shown in Figure 7-18 uses four different GL 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 GL element will overlap (and cover) the previous GL elements.
5. Design the graphical output, one element at a time.
6. Link the graphical output to your host application.

**7.7.2 TUTORIAL: PRIMARY BAR CHARTS**

This section describes how multiple GL elements interact to create a bar chart like the one shown in Figure 7-18.



**Figure 7-18. Finished bar chart.**

1. Following the general steps listed in **Section 7.7.1**, we first determined the makeup of this bar chart. The example consists of four GL elements: bar charts, lines, boxes, and text.
2. 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 a blank sheet of paper. All references to distances are made in respect to the printable page, not the actual physical page. Refer to Figure 7-8.
3. 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, as shown in Figure 7-19.

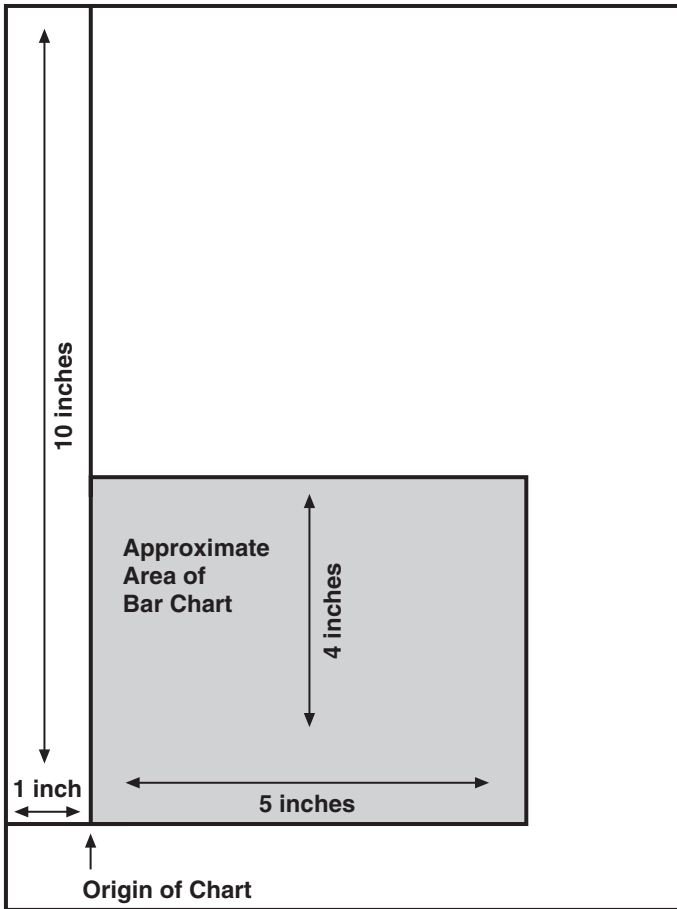


Figure 7-19. Placement of the bar chart.

4. 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 have one inch represent 10 calls, 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").
5. 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.
6. Create the separate GL elements based on the order determined in Step 5. In the example, the bar charts were created first. Recall the GL 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 7-18 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 corresponding values were 300 ( $x \frac{1}{300}'' = 1''$ ) for <x start> and 3000 ( $x \frac{1}{300}'' = 10''$ ) 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  $\langle x\text{-increment} \rangle$  was 300 ( $x \frac{1}{300}'' = 1''$ ). Since the maximum height of a bar was specified at four inches, the resulting value for the  $\langle y\text{-increment} \rangle$  was 30 ( $x 40 \text{ max. calls } x \frac{1}{300}'' = 4''$ ).

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  $\langle \text{bar width} \rangle$ , divide the available one inch ( $\langle x\text{-increment} \rangle$ ) into four equal sections (three bars and one space). The resulting value was 75 ( $= 300 \div 4$ ). Next, count the  $\langle \# \text{ of entries} \rangle$  (5) and enter the respective values. The parameters are:

```
-GX'bar chart Boyd'  
-GS5;01;10;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  $\langle x \text{ start} \rangle$  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;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;04;50  
-GH1;450;3000;300;30;75;5;15;16;21;20;13
```

**7.7.3 TUTORIAL: 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  
  
-GX'Y-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
```

## 7.7.4 TUTORIAL: LABELS, TITLE, SUBTITLE, LEGEND

All text was created through text-rotation command strings. Text was always printed in the selected font. In the example, Univers 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'
```



## **7.8 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 GL commands to the application code. This means that whenever the application is used and sent to the printer, the GL commands are also sent.

Another method is to design a separate subroutine that sends the GL output to the printer as a macro. The GL 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 GL output as a printer macro, begin the GL 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 GL commands. Also, be aware that PCL is case-sensitive.

At the end of the GL 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 PCL command “-E&f#y3X” in the application code.

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

## **7.9 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 nonvolatile 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 “#” (in “l#u”) specifies the “Left Offset Registration” (horizontal movement in  $n/720$  inch), and the second “#” (in “#Z”) specifies the “Top Offset Registration” (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.

## 8. Troubleshooting

This chapter provides instructions for performing diagnostic tests on the HPIIISi Twinax Card. It also contains a problem-resolution guide that describes possible causes of, and solutions to, problems that can occur with the Card and printer. If you are unable to solve a problem by following the procedures outlined in this chapter, call your supplier for technical support.

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

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

You may also need to print a “hex dump” or “buffer print” by enabling buffer print from the front panel, or by sending the Card host/PC-download command 42 (see the entry for this command in **Section 5.3**). This causes all printing to be in hexadecimal code, just as it’s received from the host, to help in tracing the problem. See **Sections 8.3** and **8.4**.

If it becomes necessary to ship the Card, use the original carton and packaging to prevent damage.

### 8.1 Twisted-Pair Applications

If you are using a passive star panel and twisted-pair cabling with the HPIIISi Twinax Card, and you’re having problems with the printer dropping off line, you should turn star-panel overdrive ON. (See the entry for host/PC-download command 20 in **Section 5.3** for how to do this.) Star-panel overdrive increases the signal-driving capability of the Card.

For installations using twinax cabling, the star-panel overdrive option should always be set to OFF.

### 8.2 The Card’s Self-Test

Verify proper installation and configuration of the HPIIISi Twinax Card by performing an interface self-test. The self-test prints out the current software version, the memory condition (RAM and ROM), and the currently active configuration settings.

Follow the steps below to start the self-test from your host, PC, or LAN server:

1. Verify that the printer is connected properly to the Card and in “READY” mode.
2. Type the “&%Z98,1” host/PC-download command on the screen. (Refer to the entry for this command in **Section 5.3.**)
3. Send that command to the printer (press the Print Screen button or print the document/ file that contains the command). The self-test will print out in a few seconds.

Follow the steps below to start the self-test through the printer’s operator panel:

1. Verify that the Card is installed properly and that the printer is in “READY” mode.
2. Press the “Online” button once to take the printer off line.
3. Use the “Menu” button to scroll through the HP menus until you reach the MIO menu associated with the Card.
4. Press “Item” to display the Card’s test menu.
5. Press “+” twice to display the self-test option, then press “Select” or “Enter” to activate this test option.
6. Return to the operating mode by pressing the “Online” button. A self-test will print immediately. A sample printout page is shown on page 13. The settings in the sample are the factory defaults.
7. If your printer does not have an LCD front panel, you can perform a printer self-test instead. The Card’s settings will print on the bottom portion of the HP printout.

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

### 8.3 EBCDIC Hex Dump

The HPIIISi Twinax Card can be set up to print its buffer in hexadecimal EBCDIC code. This can be useful for a technician to diagnose problems with the Card 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 from your host, PC, or LAN server, take these steps:

1. Verify that the printer is connected properly to the Card.
2. Type the “&%Z42,1” host/PC-download command on the screen. (Refer to the entry for this command in **Section 5.3.**)
3. Send the command to the printer (press the Print Screen button or print the document/ file that contains the 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 command).

To start the EBCDIC hex dump from the printer's operator panel, take these steps:

1. Verify that the Card is installed properly and that the printer is in “READY” mode.
2. Press the “Online” button to take the printer off line.
3. Use the “Menu” button to scroll through the HP menus until you reach the MIO menu associated with the Card.
4. Press “Item” several times until you reach the item “Hex Dump N.”
5. Press “+” to change the display to “Hex Dump Y,” then press “Select” or “Enter” to activate this option.
6. Return to the operating mode by pressing the “Online” button. The Card is now in EBCDIC hex-dump mode. Send the host data to the printer.
7. To stop the EBCDIC hex-dump printout, first repeat Steps 2 and 3.
8. Press “Item” several times until you reach “Hex Dump Y.”
9. Press “+” to change the display to “Hex Dump N,” then press “Select” or “Enter” to activate this option.
10. Return to the operating mode by pressing the “Online” button.

## 8.4 ASCII Hex Dump

The HP11Si Twinax Card can also 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 Card or the printer.

To start the ASCII hex dump from your host, PC, or LAN server:

1. Verify that the Card is installed properly and that the printer is in “READY” mode.
2. Type the “&%Z43,1” host/PC-download command on the screen. (Refer to the entry for this command in **Section 5.3**.)
3. Send the command to the printer (press the Print Screen button or print the document/ file that contains the command).
4. To stop the ASCII hex dump, type “&%Z43,2” on the screen, then send it to the printer (press the Print Screen button or print the document/file that contains the command).

To start the ASCII hex dump from the printer’s operator panel, take these steps:

1. Verify that the Card is installed properly and that the printer is in “READY” mode.
2. Press the “Online” button to take the printer off line.
3. Use the “Menu” button to scroll through the HP menus until you reach the MIO menu associated with the Card.
4. Press “Item” several times until you reach the item “ASCII Dump N.”
5. Press “+” to change the display to “ASCII Dump Y,” then press “Select” or “Enter” to activate this option.
6. Return to the operating mode by pressing the “Online” button. The interface is now in ASCII hex-dump mode. Send the host data to the printer.
7. To stop the ASCII hex-dump printout, first repeat Steps 2 and 3.
8. Press “Item” several times until you reach “ASCII Dump Y.”
9. Press “+” to change the display to “ASCII Dump N,” then press “Select” or “Enter” to activate this option.
10. Return to the operating mode by pressing the “Online” button.

## 8.5 Self-Diagnostics

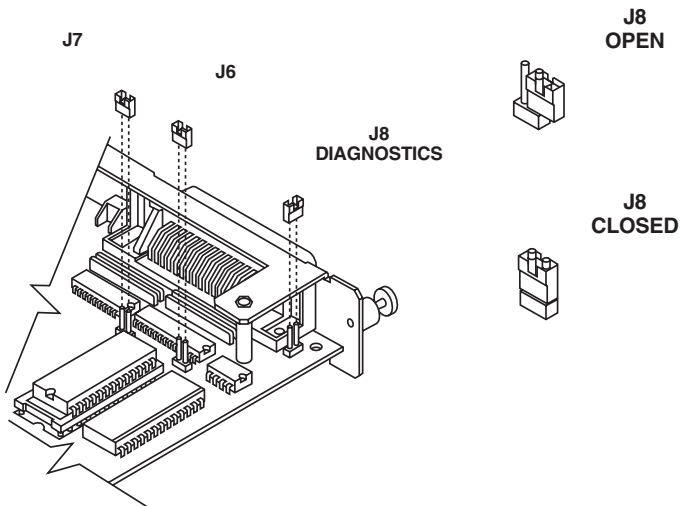
You can set up the HPIISi Laser Card to perform a complete analysis of its own functions. The Card transmits data to itself and then analyzes how that data is processed. If the Card detects an error, it prints an error message on the printer.

Follow the steps below to perform the Card's self-diagnostic test.

### **CAUTION!**

**To avoid damaging your host system, you must disconnect the host before you run this test.**

1. Turn OFF the printer.
2. Disconnect all cables from the printer and the Card.
3. Take the Card out of the printer.
4. Locate the plastic jumper on the Card's circuit board, near the parallel port labeled "Parallel In From PC/LAN" (see Figure 8-1).
5. Remove the plastic jumper from the pin.
6. Locate the two pins labeled "J8 DIAGNOSTICS".
7. Insert the plastic jumper so it covers both pins, shown as "J8 CLOSED" below.



**Figure 8-1. The Card's jumpers.**

8. Reinstall the Card and reconnect all cables to the printer and the Card.
9. Turn ON the printer. The Card now performs its self-diagnostics and prints the message

TEST SEQUENCE COMPLETE

The diagnostics repeat and each full page is printed until you turn the printer OFF. The first page may take several minutes to print. Any error messages are printed between the “TEST SEQUENCE COMPLETE” messages. Call for technical support if error messages are printed.

10. To disable the diagnostics mode, repeat Steps 1 through 3; then remove the plastic jumper from the J8 pins and put it back on its original pin, or back on only one of the J8 pins (shown as “J8 OPEN” in Figure 8-1); then reinstall the Card, reconnect all cables, and turn the printer back ON. (Make sure the jumper only covers one of the J8 pins; otherwise the Card will not operate properly, and can cause unwanted disturbances on the twinax line or even damage the host.)



**8.6 Problem-Resolution Guide**

**Table 8-2. Typical Problems.**

<b>Problem or Message</b>	<b>Probable Cause</b>	<b>Action</b>
“Printer not ready” message at host.	Printer not in a ready status.	Make sure the printer is on line, has paper, etc.
Printer loses host communication (drops off line).	Improper or damaged cabling.	Check twinax cabling for improper connections or damage.
	Twisted-pair cabling is not attached to an “active” or boosted hub.	See <b>Section 8.1</b> .
Right margin is cut off.	Page width in word-processing program is not set wide enough.	Change to a wider page.
	Page is too wide.	Select a narrower page.
Extra blank sheets are ejected between sheets of printout.	Form length not correct in software (maximum length is 66 lines).	Make sure your 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.

Table 8-2 (continued). Typical Problems.

Problem or Message	Probable Cause	Action
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 tpestyle 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 in the printer properly.	If possible, try a known-good cartridge to determine if cartridge is faulty. Make sure the cartridge is loaded properly.

### 8.7 Calling Your Supplier

If you determine that your HPIIISi Twinax Card is malfunctioning, *do not attempt to alter or repair the unit*. It contains no user-serviceable parts. Contact your supplier.

Before you do, make a record of the history of the problem. Your supplier will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem,
- when the problem occurs,
- the components involved in the problem, and
- any particular application that, when used, appears to create the problem or make it worse.

### 8.8 Shipping and Packaging

If you need to transport or ship your HPIIISi Twinax Card:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Card for repair, make sure you include its twinax V-cables. If you are returning the Card, make sure you include its manual as well. Before you ship, contact your supplier to get a Return Authorization (RA) number.

# Appendix A: Font Reference

The following chart lists the HP LaserJet IIISi and HP LaserJet 4 resident fonts and the HP font cartridges that are available, along with the font ID number used to select the font. For more information on selecting fonts, refer to **Chapter 6**.

Typeface	Symbol	Orient	Pitch	Point	Font/ID
<b>Resident Fonts</b>					
Courier	R-8/850	P/L	10	12	11
Line Printer	R-8/850	P/L	13.3	9.5	204
Line Printer	R-8/850	P/L	15	9	223
Line Printer	R-8/850	P/L	17.1	8.5	254
Line Printer	R-8/850	P/L	20	8	281/282
Courier Bold	R-8/850	P/L	10	12	46
Courier	R-8/850	P/L	10	12	85
Courier Italic	R-8/850	P/L	10	12	18
Courier Bold	R-8/850	P/L	10	12	88
Courier	R-8/850	P/L	12	10	89
<b>Resident Scalable Fonts</b>					
CG Times™	R-8/850	P/L	Prop.	6	4605
	R-8/850	P/L	Prop.	8	4606
	R-8/850	P/L	Prop.	10	4607
	R-8/850	P/L	Prop.	12	4608
	R-8/850	P/L	Prop.	14	4609
	R-8/850	P/L	Prop.	18	4611
	R-8/850	P/L	Prop.	24	4614
	R-8/850	P/L	Prop.	30	4617

**HPIIISI TWINAX CARD**

<b>Typeface</b>	<b>Symbol</b>	<b>Orient</b>	<b>Pitch</b>	<b>Point</b>	<b>Font/ID</b>
CG Times Bold	R-8/850	P/L	Prop.	6	4625
	R-8/850	P/L	Prop.	8	4626
	R-8/850	P/L	Prop.	10	4627
	R-8/850	P/L	Prop.	12	4628
	R-8/850	P/L	Prop.	14	4629
	R-8/850	P/L	Prop.	18	4631
	R-8/850	P/L	Prop.	24	4634
	R-8/850	P/L	Prop.	30	4645
CG Times Italic	R-8/850	P/L	Prop.	6	4645
	R-8/850	P/L	Prop.	8	4646
	R-8/850	P/L	Prop.	10	4647
	R-8/850	P/L	Prop.	12	4648
	R-8/850	P/L	Prop.	14	4649
	R-8/850	P/L	Prop.	18	4651
	R-8/850	P/L	Prop.	24	4654
	R-8/850	P/L	Prop.	30	4657
CG Times Bold Italic	R-8/850	P/L	Prop.	6	4665
	R-8/850	P/L	Prop.	8	4666
	R-8/850	P/L	Prop.	10	4667
	R-8/850	P/L	Prop.	12	4668
	R-8/850	P/L	Prop.	14	4669
	R-8/850	P/L	Prop.	18	4671
	R-8/850	P/L	Prop.	24	4674
	R-8/850	P/L	Prop.	30	4677

<b>Typeface</b>	<b>Symbol</b>	<b>Orient</b>	<b>Pitch</b>	<b>Point</b>	<b>Font/ID</b>
Univers® Medium	R-8/850	P/L	Prop.	6	4805
	R-8/850	P/L	Prop.	8	4806
	R-8/850	P/L	Prop.	10	4807
	R-8/850	P/L	Prop.	12	4808
	R-8/850	P/L	Prop.	14	4809
	R-8/850	P/L	Prop.	18	4811
	R-8/850	P/L	Prop.	24	4812
	R-8/850	P/L	Prop.	30	4813
Univers Medium It	R-8/850	P/L	Prop.	6	4825
	R-8/850	P/L	Prop.	8	4826
	R-8/850	P/L	Prop.	10	4827
	R-8/850	P/L	Prop.	12	4828
	R-8/850	P/L	Prop.	14	4829
	R-8/850	P/L	Prop.	18	4831
	R-8/850	P/L	Prop.	24	4834
	R-8/850	P/L	Prop.	30	4837
Univers Medium Condensed	R-8/850	P/L	Prop.	6	4845
	R-8/850	P/L	Prop.	8	4846
	R-8/850	P/L	Prop.	10	4847
	R-8/850	P/L	Prop.	12	4848
	R-8/850	P/L	Prop.	14	4849
	R-8/850	P/L	Prop.	18	4851
	R-8/850	P/L	Prop.	24	4854
	R-8/850	P/L	Prop.	30	4857

**HPIIISI TWINAX CARD**

<b>Typeface</b>	<b>Symbol</b>	<b>Orient</b>	<b>Pitch</b>	<b>Point</b>	<b>Font/ID</b>
Univers Medium Condensed It	R-8/850	P/L	Prop.	6	4865
	R-8/850	P/L	Prop.	8	4866
	R-8/850	P/L	Prop.	10	4867
	R-8/850	P/L	Prop.	12	4868
	R-8/850	P/L	Prop.	14	4869
	R-8/850	P/L	Prop.	18	4871
	R-8/850	P/L	Prop.	24	4874
	R-8/850	P/L	Prop.	30	4877
Univers Bold	R-8/850	P/L	Prop.	6	4905
	R-8/850	P/L	Prop.	8	4906
	R-8/850	P/L	Prop.	10	4907
	R-8/850	P/L	Prop.	12	4908
	R-8/850	P/L	Prop.	14	4909
	R-8/850	P/L	Prop.	18	4911
	R-8/850	P/L	Prop.	24	4914
	R-8/850	P/L	Prop.	30	4917
Univers Bold Italic	R-8/850	P/L	Prop.	6	4925
	R-8/850	P/L	Prop.	8	4926
	R-8/850	P/L	Prop.	10	4927
	R-8/850	P/L	Prop.	12	4928
	R-8/850	P/L	Prop.	14	4929
	R-8/850	P/L	Prop.	18	4931
	R-8/850	P/L	Prop.	24	4934
	R-8/850	P/L	Prop.	30	4937

<b>Typeface</b>	<b>Symbol</b>	<b>Orient</b>	<b>Pitch</b>	<b>Point</b>	<b>Font/ID</b>
Univers Bold Condensed	R-8/850	P/L	Prop.	6	4945
	R-8/850	P/L	Prop.	8	4946
	R-8/850	P/L	Prop.	10	4947
	R-8/850	P/L	Prop.	12	4948
	R-8/850	P/L	Prop.	14	4949
	R-8/850	P/L	Prop.	18	4951
	R-8/850	P/L	Prop.	24	4954
	R-8/850	P/L	Prop.	30	4957
Univers Bold Condensed It	R-8/850	P/L	Prop.	6	4965
	R-8/850	P/L	Prop.	8	4966
	R-8/850	P/L	Prop.	10	4967
	R-8/850	P/L	Prop.	12	4968
	R-8/850	P/L	Prop.	14	4969
	R-8/850	P/L	Prop.	18	4971
	R-8/850	P/L	Prop.	24	4974
	R-8/850	P/L	Prop.	30	4977
ITC Zapf Dingbats®	10/L	P/L	Prop.	6	4985
	10/L	P/L	Prop.	8	4986
	10/L	P/L	Prop.	10	4987
	10/L	P/L	Prop.	12	4988
	10/L	P/L	Prop.	14	4989
	10/L	P/L	Prop.	18	4991
	10/L	P/L	Prop.	24	4994
	10/L	P/L	Prop.	30	4997
<b>ProCollection® Cartridge</b>					
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	84
Courier Bold	ASCII	P/L	12	10	108



# HPIIISI TWINAX CARD

Typeface	Symbol	Orient	Pitch	Point	Font/ID
<b>ProCollection Cartridge</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
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	284
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
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	181

<b>Typeface</b>	<b>Symbol</b>	<b>Orient</b>	<b>Pitch</b>	<b>Point</b>	<b>Font/ID</b>
<b>ProCollection Cartridge</b>					
Times Roman	Legal	P	Prop.	10	174
Times Roman Bold	Legal	P	Prop.	10	192
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	170
Helvetica®	ASCII	P	Prop.	8	183
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
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

# HPIIISI TWINAX CARD

Typeface	Symbol	Orient	Pitch	Point	Font/ID
<b>WordPerfect Cartridge</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>					
Helvetica	R-8	P	Prop.	8	34102
Helvetica	R-8	P	Prop.	10	34103
Helvetica Bold	R-8	P	Prop.	10	34123
Helvetica Italic	R-8	P	Prop.	10	34231
Helvetica	R-8	P	Prop.	12	34104
Helvetica Bold	R-8	P	Prop.	12	34124
Helvetica Italic	R-8	P	Prop.	12	34232
Helvetica Bold	R-8	P	Prop.	14	34125
Times Roman	R-8	P	Prop.	8	5686
Times Roman	R-8	P	Prop.	10	5687
Times Roman Bold	R-8	P	Prop.	10	5707
Times Roman Italic	R-8	P	Prop.	10	5815
Times Roman	R-8	P	Prop.	12	5688
Times Roman Bold	R-8	P	Prop.	12	5708
Times Roman Italic	R-8	P	Prop.	12	5816
Times Roman Bold	R-8	P	Prop.	14	5709
Line Printer	R-8	P/L	15	8.5	223

<b>Typeface</b>	<b>Symbol</b>	<b>Orient</b>	<b>Pitch</b>	<b>Point</b>	<b>Font/ID</b>
<b>Polished Worksheets® Cartridge</b>					
Prestige Elite	R-8/850	P/L	15	7	221
Prestige Elite	R-8/850	P/L	12	10	86
Prestige Elite Bold	R-8/850	P/L	12	10	111
Prestige Elite Italic	R-8/850		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-8/850	P/L	27	3.6	290
Letter Gothic	R-8/850	P/L	12	12	87
Letter Gothic Bold	R-8/850	P/L	12	12	110
Letter Gothic Italic	R-8/850	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

# HPIIISI TWINAX CARD

Typeface	Symbol	Orient	Pitch	Point	Font/ID
<b>Persuasive Presentations® Cartridge</b>					
Letter Gothic	ASCII	P/L	10	14	49
Letter Gothic	Legal	P/L	10	14	48
Presentation Bold	ASCII	P/L	10	14	5
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
Helvetica Outline	ASCII	P/L	Prop.	24	34115
Helvetica Outline	Legal	P/L	Prop.	24	34116
Serifa™	ASCII	P/L	Prop.	24	34215
Serifa	Legal	P/L	Prop.	24	34216
Line Draw	LinDrw	P/L	10	14	31
PC Line Bold	PCLin	P/L	10	14	32
<b>Forms, Etc.® Cartridge</b>					
Univers	R-8/850	P/L	Prop.	6	33101
Univers	R-8/850	P/L	Prop.	8	33102
Univers Bold	R-8/850	P/L	Prop.	8	33122
Univers Bold	R-8/850	P/L	Prop.	10	33123
Univers Bold	R-8/850	P/L	Prop.	12	33124
Univers Bold	R-8/850	P/L	Prop.	14	33125
Helvetica Cond Black	Tax Num	P/L	Prop.	24	34128
OCR-A	OCR-A	P	10	12	19
Tax Line Draw	LinDrw	P/L	10	12	30

Typeface	Symbol	Orient	Pitch	Point	Font/ID
<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 Bd	UPC	P	Prop.	12	171
USPS Zip	ZIP	P/L	Prop.	12	172
Line Draw	LinDrw	P/L	10	12	33
<b>Text Equations Cartridge</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
<b>Global Text Cartridge</b>					
CG Century Schoolbook™	R-8/850	P/L	Prop.	8	16950
CG Century Schoolbook	R-8/850	P/L	Prop.	10	16951
CG Century Schoolbook Bd.	R-8/850	P/L	Prop.	10	16971
CG Century Schoolbook It.	R-8/850	P/L	Prop.	10	17079
CG Triumvirate™	R-8/850	P/L	Prop.	10	33335
CG Triumvirate Bold	R-8/850	P/L	Prop.	14	33357

**HPIIISI TWINAX CARD**

Typeface	Symbol	Orient	Pitch	Point	Font/ID
<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 Zapf Dingbats	ITC	P	Prop.	36	5980
ITC Zapf Dingbats	ITC	P	Prop.	18	5990

# Appendix B: Character Sets

The IBM 3812-1 printer emulation uses either Code Page 850 or Roman 8 character sets. Refer to your printer's manual for illustrations and information on character sets.

An EBCDIC-to-ASCII translation table is printed at the bottom of the interface self-test printout as shown on the following pages. This table illustrates how EBCDIC characters (from the twinax host) are converted to the ASCII characters in Code Page 850 and Roman 8 character sets.

The first digit of the EBCDIC hex code is at the top of the table, and the second digit is on the left side. The corresponding ASCII hex code is where the two digits intersect. The character that corresponds to the ASCII hex code is in the chart to the right.

For example, EBCDIC 61 is translated to ASCII 2F, which is a “/” character.



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	▶		0	@	P	˘	p	ç	É	á	⋮	L	đ	ó	-	
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	⊞	⊥	Đ	£	±
2	☺	↕	"	2	B	R	b	r	é	Æ	ó	⊞	⊥	Ê	Ô	==
3	♥	!!	#	3	C	S	c	s	â	ô	ú		⊥	Ë	Ò	<sup>3</sup> / <sub>4</sub>
4	♦	¶	\$	4	D	T	d	t	ã	ö	ñ	⊥	—	È	ö	¶
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	⊥	ı	Ö	§
6	♠	—	&	6	F	V	f	v	á	û	*	Â	ã	Í	μ	÷
7	•	↕	'	7	G	W	g	w	ç	ù	°	À	Ã	î	þ	,
8	◻	↑	(	8	H	X	h	x	ê	ÿ	¿	©	℄	İ	þ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	®	⊥	⊥	⊥	Ú	"
A	◻	→	*	:	J	Z	j	z	è	Û	¬		≡	Γ	Û	.
B	♂	←	+	;	K	[	k	{	ï	ø	<sup>1</sup> / <sub>2</sub>	⊥	⊥	■	Û	<sup>1</sup>
C	♀	↳	,	<	L	\	l		î	£	<sup>1</sup> / <sub>4</sub>	⊥	⊥	■	Ý	<sup>3</sup>
D	♪	↔	-	=	M	]	m	}	ï	∅	ı	ç	≡	ı	Ý	<sup>2</sup>
E	♪	▲	.	>	N	^	n	~	Ä	x	«	¥	⊥	İ	—	■
F	☼	▼	/	?	O	_	o	⏏	Å	f	»	⌒	€	■	˘	

**Figure B-1. Code Page 850 Character Set.**

	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	Ḁ
1	SOH	DC1	!	1	À	Q	a	q			À		ê	î	Ã	Ḃ
2	STX	DC2	"	2	B	R	b	r			Â		ô	ø	ă	
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	*
A	LF	SUB	*	:	J	Z	j	z			^	€	ò	Ö	õ	°
B	VT	ESC	+	;	K	[	k	{			"	£	ù	Ü	š	«
C	FF	FS	,	<	L	\	l				~	¥	ă	É	š	■
D	CR	GS	-	=	M	]	m	}			Û	§	ë	ï	Ú	»
E	SO	RS	.	>	N	^	n	~			Û	f	ö	ß	ÿ	±
F	SI	US	/	?	O	_	o	DEL			£	ç	ü	Ô	ÿ	

Figure B-2. Roman 8 Character Set.

## Appendix C: Parallel-Port Pinouts

Table C-1 shows the pinouts for the parallel printer connector on the HPIIISi Twinax Card.

DIRECTION is the direction of signal flow from the interface.

RETURN PIN is the twisted-pair return, to be connected at signal ground level. For the interface wiring, be sure to use twisted-pair cable for each signal and to complete the connection on the return side. The cable should be shielded and connected to the chassis of the host computer and printer.

All interface conditions are based on TTL levels. Both the rise and the fall times of each signal must be less than 0.2  $\mu$ sec.

Data transfer is carried out by observing the ACKNLG or BUSY signals. Data transfer to the printer occurs only after receipt of the ACKNLG signal or when the BUSY signal is LOW.

Data must be present a minimum of 0.5  $\mu$ sec before and after a minimum of 0.5  $\mu$ sec STROBE pulse. BUSY goes high before the end of the STROBE signal and remains high until the end of an ACKNLG pulse of 0.5  $\mu$ sec.

**Table C-1. Parallel-Interface Specifications.**

Signal Pin	Return Pin	Signal	Parallel Cable Pin	Direction	Description
1	19	STROBE	1	IN	Strobe pulse to read data in. Pulse width must be more than 0.5 $\mu$ sec. at the Card.
2	20	DATA1	2	IN	These signals represent information in bits 1-8 of parallel data. Each signal is HIGH when data is logical 1 and LOW when it is logical 0.
3	21	DATA2	3	IN	
4	22	DATA3	4	IN	
5	23	DATA4	5	IN	
6	24	DATA5	6	IN	
7	25	DATA6	7	IN	
8	26	DATA7	8	IN	
9	27	DATA8	9	IN	
10	28	ACKNLG	10	OUT	A LOW pulse of minimum width of 4 $\mu$ sec. A LOW indicates that data has been received and that the printer is ready to accept more data.
11	29	BUSY	11	OUT	A HIGH signal indicates that the printer cannot receive data. The signal goes HIGH when it is off line; or in the error state, when serving the IBM host and a byte of parallel data is received; or during data entry.
12	30	PE	12	OUT	HIGH when printer is out of paper.
13	—	SLCT	13	OUT	HIGH when the printer is ready.

**Table C-1 (continued). Parallel-Interface Specifications.**

Signal Pin	Return Pin	Signal	Parallel Cable Pin	Direction	Description
14	—	AUTO FEED	14	IN	This signal is NOT supported. Defined by many printers to add a LF to each CR. The IBM 5250 protocol does not support this signal.
15	—	NC	—	—	Not used.
16	—	GND	19	—	Logic Ground.
17	—	CGND	—	—	Chassis Ground.
18	—	NC	—	—	Not used.
19-30	—	GND	21-24	—	Twisted-pair ground returns listed above.
31	—	INIT	16	IN	Defined to reset and clear the printer when LOW; the reset and clear are NOT supported by the Card. The IBM host can't be interrupted by this signal. An ACKNLG is generated for handshaking.
32	—	ERROR	15	OUT	This signal goes LOW when the printer is in an error state.
33	—	GND	25	—	Logic Ground.
34	—	NC	—	—	Not used.
35	—	HIGH	—	—	Not used.
36	—	SLCTIN	17	—	Not supported.

# Appendix D: HP MIO Resident Scalable Font Numbers

Font	Font ID No.
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
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
Garamond Kursiv	8631
Garamond Kursiv Halbfett	8651
Cornet	8759

<b>Font</b>	<b>Font ID No.</b>
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
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	24251
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 E: Transferring Power to Pin 18

The HP11Si Twinax Card has the ability to supply 5 VDC at up to 350 mA to an external device attached to its PC parallel (“Auto Sharing/Parallel”) port. If you want the Card to supply this power on Pin 18 of this port, you have to close the Card’s J6 jumper. Follow these steps:

1. Turn OFF the printer.
2. Disconnect all cables from the printer and the Card.
3. Take the Card out of the printer.
4. Locate the plastic jumper on the Card’s circuit board, near the parallel port labeled “Parallel In From PC/LAN” (see Figure E-1).
5. Remove the plastic jumper from the pin it’s on.
6. Locate the two pins labeled “J6”.
7. Insert the plastic jumper so it covers both pins, shown as “J6 CLOSED” below.

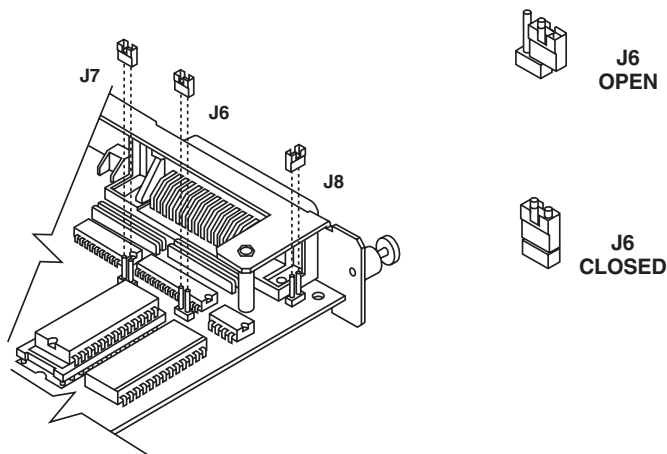


Figure E-1. The Card’s jumpers.



8. Reinstall the Card and reconnect all cables to the printer and the Card.
9. Turn the printer back ON.
10. To stop the Card from providing power on Pin 18, repeat Steps 1 through 3; then remove the plastic jumper from the J6 pins and put it back on its original pin, or back on only one of the J6 pins (shown as “J6 OPEN” in Figure 8-1); then repeat Steps 8 and 9.



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