I-O 4260 LaserCard™ Twinax/Coax Interface

for Hewlett-Packard Laser Printers

User's Guide

Version 1.4

I-O 4260 LaserCard User's Guide Version 1.4
HPCIDX-OMAN01-140 Version Date: July, 1999

U.S.A.: I-O Corporation
2256 South 3600 West
Salt Lake City, Utah 84119
(801) 973-6767 • Fax: (801) 974-5683

U.K.: I-O Corporation (UK)
9 Centurion Court, Brick Close
Kiln Farm, Milton Keynes
England MK11 3JB
44(0)1908 567722 • Fax: 44(0)1908 565599

International: I-O Corporation
2256 South 3600 West
Salt Lake City, Utah 84119
(801) 973-6767 • Fax: (801) 974-5683

Customer Support: I-O Corporation
2256 South 3600 West
Salt Lake City, Utah 84119
(801) 972-1446 • Fax: (801) 973-8042

Internet: http://www.iocorp.com

PREFACE

I-O Corporation is pleased to introduce you to the I-O 4260 LaserCard™. With I-O's exciting new Duax™ technology, you have twinax or coax connectivity on a single board. With the wide range of printing environments found in business today, you can depend on the quality and reliability that has made I-O the leader in printer interface technology.

The following five sections contained in this user's guide will give you the information you need to get the most from your I-O LaserCard.

INTRODUCTION - Provides an overview of the I-O LaserCard, including printer emulations, supported Hewlett-Packard printers, and the adapter cables required for either twinax or coax connectivity.

INSTALLATION - Explains how to install the I-O LaserCard into the HP LaserJet printer, perform a self-test, and how to connect to the twinax or coax host.

CONFIGURATION - Explains the use of the printer's front panel setup and twinax and coax configuration. Twinax configuration instructions begin on page 3-1; coax configuration instructions begin on page 7-1 of the User's Guide.

OPERATION - Provides a detailed overview of coax and twinax host printing, emulations, font change commands, user-defined command strings, and Command Pass-Thru™. Twinax operation instructions begin on page 4-1; coax operation instructions begin on page 8-1 of the User's Guide.

PROBLEM RESOLUTION - Provides a detailed troubleshooting guide. Twinax problem resolution instructions begin on page 6-1; coax problem resolution instructions begin on page 10-1 of the User's Guide.

Great care has been taken in the preparation of this manual. If you encounter inaccuracies or omissions, please contact us at the address listed in this manual, Attn: Product Manager, Printer Interface Division.

Caution! The I-O LaserCard™ is static sensitive. Make sure you do not damage the card with static electricity. Take ESD (electrostatic discharge) precautions as you would with any static sensitive device. These precautions include:

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

2. If available, wear a wrist strap or similar static-discharge device during installation. If 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.

3. Where available, stand on an anti-static mat or use an anti-static work surface when installing the card.

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

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

This page left intentionally blank.

1 INTRODUCTION

The I-O 4260 LaserCard™ is a twinax/coax interface for internal installation in Hewlett-Packard printers with the new PCI-based EIO slot.

With the LaserCard 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, or a 3287/3812-1 (non-IPDS) printer when attached to a 3270 type controller.

The I-O interface determines which host environment is needed by detecting which host adapter cable has been attached. If the auto-terminating twinax V-cable is attached, the I-O LaserCard expects an AS/400 or System/3X host. If the 9-pin to coax host adapter cable is attached, the I-O LaserCard expects a 43XX, 30XX, 973X host or a 3174, 3274 or 3276 controller.

Printer auto-sharing in the HP LaserJet printer is accomplished using the printer's additional option slots or integrated parallel or serial ports. The HP printer will handle data from the parallel/serial ports as well as the internal option ports. This allows you to attach your printer to a personal computer (PC) or LAN, as well as the IBM host and automatically change between host and PC/LAN printing without changing cables or switches.

You can choose setup options to control the printer's output by using the printer's LCD display or making selections using host download commands.

Unpacking

When you receive the interface, 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 interface needs to be moved or shipped.

The following items are included in the package:

- I-O 4260 LaserCard™
- Auto-terminating twinax V-cable or 9-pin to coax adapter cable
- I-O 4260 LaserCard User's Guide
- Getting Started Guide
- Screwdriver

2 I-O 4260 INSTALLATION

To install the I-O 4260 LaserCard™, follow these simple steps. Consult the I-O 4260 Getting Started Guide for more information.

Warning: The I-O 4260 LaserCard™ is static sensitive. Follow the static sensitivity instructions in the front of this manual when handling the card.

1. Power ON the printer and perform a printer self-test as described in the printer's manual. Do not continue until the printer passes the self-test.
2. Power OFF the printer and remove all cables.
3. Locate an available EIO slot. Using the I-O screwdriver, remove the bracket covering it.
4. Insert the I-O LaserCard and tighten the thumb screws.
5. Attach the twinax or coax adapter cable. Do NOT attach the host cable(s) to the adapter yet.
6. Re-attach the power cord and other printer cables.

Interface Self-Test

Verify proper installation of the interface by performing an interface self-test. The self-test printout contains the current software version, memory condition (RAM and ROM) and the current setup selections for reference. Follow the steps below to print the self-test.

1. Make sure the proper (twinax or coax) 9-pin adapter cable is securely attached to the interface.
2. Power ON the printer and wait for it to go into "Ready" mode.
3. Press **Menu** repeatedly until TWINAX/COAX CARD is displayed.
4. Press **Item -** to display "98=TEST MENU"
5. Press **Value -** to display "98=PRINT SETUP".
6. Press **Select**. An asterisk will appear: "98=PRINT SETUP*".
7. Press **Go**. The interface will perform the self-test and print the self-test pages. Samples of the twinax and coax self-test pages are shown on the following pages. The numbers at the left margin correspond to the Host Download command numbers. Refer to the *Configuration* chapter for more information on these options.

If the interface self-test does not print, the interface failed the self-test. Contact your I-O dealer or I-O Customer Support for more information.

TWINAX EIO INTERFACE
Software Version 3.00
Twinax Functional Level 2.10

RAM OK
ROM BAD

#00 - Twinax Address	:	0	
#01 - Alt. CPT Start Delimiters	:	2625	(&%)
#02 - Alt. CPT End Delimiters	:	2625	(&%)
#05 - Host Language	:	01	USA/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 - IBM Paper Drawer 1	:	1	PCL Tray Command
#14 - IBM Paper Drawer 2	:	4	PCL Tray Command
#15 - IBM Paper Drawer 3	:	5	PCL Tray Command
#16 - Override Formatting Cmds	:	0	Normal Oper
#17 - Character Set	:	1	Code Page 850
#18 - Starting Vertical Position	:	0	
#19 - Starting Horizontal Position	:	0	
#30 - IBM Paper Drawer 4	:	1	PCL Tray Command
#31 - IBM Paper Drawer 5	:	1	PCL Tray Command
#42 - Buffer Hex Dump	:	0	Off
#43 - Ascii Hex Dump	:	0	Off

#11 - Host Port Initialization:
HP:

#04 - User Defined Strings:
U0:
U1:
U2:
U3:
U4:
U5:
U6:
U7:
U8:
U9:

#21 - User Defined Fonts
0:
1:
2:
3:
4:
5:
6:
7:
8:
9:

EBCDIC to ASCII Translate Table

```
   40 50 60 70 80 90 A0 B0 C0 D0 E0 F0
0: 20 26 2D 9B 9D F8 E6 BD 7B 7D 5C 30   &-øØ°µ¢{}\0
1: 20 82 2F 90 61 6A 7E 9C 41 4A 00 31   é/Éaj~£AJ-1
2: 83 88 B6 D2 62 6B 73 BE 42 4B 53 32  âêÂÊbks¥BKS2
3: 84 89 8E D3 63 6C 74 FA 43 4C 54 33  äëÄËclt·CLT3
4: 85 8A B7 D4 64 6D 75 9F 44 4D 55 34  àèÀÈdmuƒDMU4
5: A0 A1 B5 D6 65 6E 76 F5 45 4E 56 35  áíÁÍenv§ENV5
6: C6 8C C7 D7 66 6F 77 F4 46 4F 57 36  ãîÃÎfow¶FOW6
7: 86 8B 8F D8 67 70 78 AC 47 50 58 37  åïÅÏgpx¼GPX7
8: 87 8D 80 DE 68 71 79 AB 48 51 59 38  çìÇÌhqy½HQY8
9: A4 E1 A5 60 69 72 7A F3 49 52 5A 39  ñßÑ`irz¾IRZ9
A: 5B 5D 7C 3A AE A6 AD AA 2D FB FD FC  []¦:«ª¡¬-¹²³
B: 2E 24 2C 23 AF A7 A8 B3 93 96 E2 EA  .$,#»º¿¯ôûÔÛ
C: 3C 2A 25 40 D0 91 D1 EE 94 81 99 9A  <*%@ðæÐ¨öüÖÜ
D: 28 29 5F 27 EC F7 ED F9 95 97 E3 EB  ()_'ý¸Ý¨òùÒÙ
E: 2B 3B 3E 3D E8 92 E7 EF A2 A3 E0 E9  +;>=Þ Æþ´óúÓÚ
F: 21 5E 3F 22 F1 CF A9 F2 E4 98 E5 20  !^?"±¤®‗õÿÕ
```

IBM 3270 Printer Interface
Software Functional 3.00
Coax Functional Level 1.51
Copyright 1997 SDE
RAM OK
ROM OK

#01 - Buffer Size (Characters) . . . . . .: 2 1920
#02 - LPI . . . . . .: 6
#03 - CPI . . . . . .: Undefined
#04 - Line Spacing . . . . . .: 1 Single (6 or 8 LPI)
#05 - Form Length (MPL) . . . . . .: 66
#06 - Maximum Print Position (MPP) . . . . . .: 80
#07 - Print Case . . . . . : 1 Dual
#08 - LU1 Language . . . . . .: 01 English (US)
#11 - Paper Path . . . . . .: 2 Primary
#12 - FF Before Local Screen Copy . . . . . .: 0 No
#13 - FF After Local Screen Copy . . . . . .: 0 No
#14 - LU3 Print Image (NON-SCS Mode) . . . . .: 0 LU3 and Local Copy Null Line suppress
#15 - CR at MPP + 1 . . . . . .: 0 Next Line
#16 - NL at MPP + 1 . . . . . .: 0 Current Line + 2
#17 - Valid FF Followed by Data . . . . . .: 0 2nd PP
#18 - Valid FF at End of Buffer . . . . . .: 1 Line 1
#19 - FF Valid Location . . . . . .: 0 FF valid at 1st PP or MPP + 1
#20 - Auto Function at End of Job . . . . . .: 0 NL
#25 - IBM Motion Commands . . . . . .: 0 Use FF
#26 - Suppress Empty Forms . . . . . .: 0 No
#27 - Form Feed After TimeOut . . . . . .: 0 No
#30 - Override Formatting Cmds . . . . . .: 0 Disabled
#31 - Truncate/Wrap Select . . . . . .: 0 Wrap text beyond MPP
#32 - Paper Size . . . . . .: 0 Letter (8.5 " x 11")
#34 - Interv Required (IR) Timeout . . . . . .: 120 x 5 Seconds
#36 - Suppress IBM Control Codes . . . . . .: 0 No control codes suppressed
#37 - Vertical Channel Select (VCS) . . . . . .: 1 3268/4224
#38 - True LPI Spacing . . . . . .: 0 Compressed (Normal)
#39 - CPT End Delimiter(ASCII) . . . . . .: 2625 (&%)
#40 - CPT Start Delimiter(ASCII) . . . . . .: 2625 (&%)
#41 - ALT Command ID Char (ASCII) . . . . . .: 5A (Z)
#42 - Buffer Hex Dump . . . . . .: 0 Off
#43 - Ascii Hex Dump . . . . . .: 0 Off
#45 - SCS TRN Translate . . . . . .: 1 3287 emulation emulation, SCS code 35
#51 - Host Port Timeout . . . . . .: 8 Seconds
#55 - Custom User Strings:
U0:
U1:
U2:
U3:
U4:
U5:

#57 - Host Port Init String:
HP:

#61 - Auto Print Orientation . . . . . .: 0 Active
#62 - Primary Tray Orientation . . . . . .: 0 COR
#63 - Alternate Tray Orientation . . . . . .: 0 COR
#64 - Manual Feed Orientation . . . . . .: 0 COR
#65 - Character Set Selection . . . . . .: 2 Code Page 850

SCS (LU1) EBCDIC to ASCII Translate Table

EBCDIC	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0	456789ABCDEF
0	20	26	2D	9B	9D	F8	E6	5E	7B	7D	5C	30	&-½Ì^{}\0
1	20	82	2F	90	61	6A	7E	9C	41	4A	20	31	/aj~AJ 1
2	83	88	B6	D2	62	6B	73	BE	42	4B	53	32	ÑØbksƒBKS2
3	84	89	8E	D3	63	6C	74	FA	43	4C	54	33	Æclt°CLT3
4	85	8A	B7	D4	64	6D	75	9F	44	4D	55	34	ñådmuDMU4
5	A0	A1	B5	D6	65	6E	76	F5	45	4E	56	35	Àçøenv¼ENV5
6	C6	8C	C7	D7	66	6F	77	F4	46	4F	57	36	óúæfow¶FOW6
7	86	8B	8F	D8	67	70	78	AC	47	50	58	37	Ägpx˜GPX7
8	87	8D	80	DE	68	71	79	AB	48	51	59	38	ßhqy"HQY8
9	A4	E1	A5	60	69	72	7A	F3	49	52	5A	39	ÊÃË`irzµIRZ9
A	BD	21	DD	3A	AE	A6	AD	5B	F0	D5	FD	FC	§!ï:ÛÎÙ[Þí»■
B	2E	24	2C	23	AF	A7	A8	5D	93	96	E2	EA	.$,#£Ï´]ãõ
C	3C	2A	25	40	D0	91	D1	EE	94	81	99	9A	<*%@ÅîŸ
D	28	29	5F	27	EC	F7	ED	F9	95	97	E3	EB	()_'š¼ÚªÐŠ
E	2B	3B	3E	3D	E8	92	E7	EF	A2	A3	E0	E9	+;>=ÒÓÿÂÈÁÕ
F	7C	AA	3F	22	F1	CF	A9	F2	E4	98	E5	20	|^?"þü`·ðÍ

DSC (LU3) DBC to ASCII Translate Table

DBC	00	10	20	30	40	50	60	70	80	90	A0	B0	0123456789AB
0	00	20	30	26	85	84	B7	8E	61	71	41	51	0&ñaqAQ
1	00	3D	31	2D	8A	89	D4	D3	62	72	42	52	=1-åÆbrBR
2	00	27	32	2E	8D	8B	DE	D8	63	73	43	53	'2.ßÄcsCS
3	00	22	33	2C	95	94	E3	99	64	74	44	54	"3,ÐdtDT
4	00	2F	34	3A	97	81	EB	9A	65	75	45	55	/4:ŠeuEU
5	00	5C	35	2B	C6	83	C7	B6	66	76	46	56	\5+óúÑfvFV
6	00	7C	36	AA	E4	88	E5	D2	67	77	47	57	|6^ðÍØgwGW
7	00	DD	37	EE	98	8C	59	D7	68	78	48	58	ï7ŸYæhxHX
8	3E	3F	38	F8	85	93	41	E2	69	79	49	59	>?8½AãiyIY
9	3C	21	39	00	8A	96	45	EA	6A	7A	4A	5A	<!9 EõjzJZ
A	5B	24	E1	5E	82	A0	45	B5	6B	91	4B	92	[$Ã^ EçkK
B	5D	BD	F5	7E	8D	82	49	90	6C	9B	4C	9D	]§¾~IlL
C	29	9C	23	F9	95	A1	4F	D6	6D	86	4D	8F	)#ªÀOømM
D	28	BE	40	60	97	A2	55	E0	6E	87	4E	80	(ƒ@`ÂUÁnN
E	7D	FA	25	EF	81	A3	59	E9	6F	3B	4F	3B	}°%ÿÈYÕo;O;
F	7B	CF	5F	F7	87	A4	43	A5	70	2A	50	2A	{ü_¼ÊCËp*P*

Connecting to the Host

Before connecting the I-O LaserCard to a twinax host, you must set the device cable address properly. Please refer to the next section "Front Panel Setup" for instruction.

Take the following steps to connect the printer through the I-O 4260 LaserCard to your IBM host system.

1. Power OFF the printer.

2. With I-O's adapter cable connected to the interface's 9-pin port, attach the host cable(s) to the I-O adapter cable. The twinax V-connector automatically terminates when only one cable is attached and automatically cables through when two cables are attached.

3. After configuring the interface (see sections "Front Panel Setup" and "Configuration"), send a print job from the host to verify that it is printing correctly.

Front Panel Setup

You can use the printer operator panel to change the various interface settings. Alternately you can use host download commands, a series of command strings that are embedded in the datastream sent from the IBM host to the I-O interface. The active interface configuration is shown on the interface's self-test printout.

Follow the steps below to change interface configuration settings using the printer's operator panel:

1. Press **Menu** repeatedly until TWINAX/COAX CARD is displayed.

2. Press **Item +/-** to display the various I-O configuration parameters. They are listed below in the order that they appear on the printer's operator panel. Note that the number on the left margin corresponds to the Host Download number. Refer to the *Configuration* chapter for more information on these options.

3. When the desired configuration parameter is displayed, press **Value +/-** to scroll through the available command values.

4. To select a displayed value, press **Select**.

5. Then move on to the next configuration parameter by pressing **Item +/-** or return the printer to operating mode by pressing **Go**.

A complete description of the interface configuration options is found under “Twinax Host Download Commands” (p. 4-2) or “Coax Host Download Command” (p. 8-1).

Front Panel Menus

The following pages show the organization of the menu system by listing the available selections and menus. The numbers in front of the configuration items refer to the corresponding Twinax or Coax Host Download Commands. Use these numbers to find a more detailed explanation of the configuration options.

TWINAX CARD
- 00=TX ADDRESS
- 05=HOST LANGUAGE
- 07=ORIENTATION
- 08=APO
- 09=PAPER SIZE
- 10=LPI SETTING
- 13=IBM DRAWER 1
- 14=IBM DRAWER 2
- 15=IBM DRAWER 3
- 16=OVERRIDE FP
- 17=CHARACTER SET
- 18=VERT. MARGIN
- 19=HORIZ.MARGIN
- 30=IBM DRAWER 4
- 31=IBM DRAWER 5
- 33=DUPLEXING
- 42=EBCDIC HEX
- 43=ASCII HEX DMP
- 98=TEST MENU
  - 98=PRINT SETUP
  - 98=FACTORY DEF
  - DIAGNOSTIC

COAX CARD
- 01=BUFFER SIZE
- 02=DEFAULT LPI
- 03=DEFAULT CPI
- 04=LINE SPACING
- 05=MPL (Max. Print Lines)
- 06=MPP (Max. Print Position)
- 07=PRINT CASE
- 08=LU1 LANGUAGE
- 11=PAPER PATH
- 12=LOCAL COPY (FF Before)
- 13=LOCAL COPY (FF After)
- 14=LU3 PRT IMAGE
- 15=CR at MPP+1
- 16=NL at MPP+1
- 17=DATA AFTER FF
- 18=FF AT EOB
- 19=FF VALID
- 20=EOJ FUNCTION
- 25=FF USAGE
- 26=EMPTY FORMS (Suppress)
- 27=AFTER TIMEOUT
- 30=FRMT OVERRIDE
- 31=TEXT AT MPP
- 32=PAPER SIZE
- 34=IR TIMEOUT
- 36=HOST CMDS
- 37=VCS (Vertical Channel Select)
- 38=TRUE LPI
- 42=EBCDIC HEX
- 43=ASCII HEX DMP
- 45=SCS TRN
- 51=HOST TIMEOUT
- 61=APO
- 62=PRIMARY TRAY (Orientation)
- 63=ALT. TRAY (Orientation)
- 64=MANUAL TRAY (Orientation)
- 65=CHARACTER SET
- 98=TEST MENU
  - 98=PRINT SETUP
  - 98=FACTORY DEF

This page left intentionally blank.

3 CONFIGURATION - TWINAX

Twinax Configuration

Before operating the interface card in twinax mode, the IBM host must be configured with a device address and device ID for the printer. See your system operator or system manuals for details. With the correct address selected, an AS/400 will automatically configure itself. If you are using a S/3X host, you must configure the host manually. The table below shows the recommended device ID on the different host systems.

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

1. Make sure the interface is properly connected to the twinax host and the correct device address is set.

2. Power on the printer. The AS/400 will auto-configure the printer address according to the interface settings.

Twinax Host Download Commands

Host download commands are used to configure your printer for entering custom printer commands such as: printer sharing timeout, character set and page orientation. These commands can be sent to the interface/printer from the IBM host. They are placed in a host document or screen. The commands take effect when the print job or screen print is sent to the printer.

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, and so on). If any part of the command is printed, the interface did not recognize the command because of a problem in the format. Check the syntax of the command and send the command again.

Host download commands sent to the I-O LaserCard take effect immediately and stay only in the interface's active memory. If it is desired for the commands to be active when the printer is powered on, they must be stored permanently by the download command Z99.

The table on the following pages provides a description of each command and how it is used.

Take the following steps to enter a host download command.

1. Type the delimiter &% (or a custom delimiter as described in the table) in the document at the point you want the command to take effect.

2. Type an upper case "Z".

3. Type the command number for the command you want to use, as shown in the table.

4. Type a comma.

5. Type the command. No spaces are allowed. A space or invalid character in a command causes the interface to ignore the command and resume printing from the point the error occurred.

For example, to change the timeout value from the default of 8 seconds to 20 seconds, enter:

&%Z03,20

Host Download Command Overview

The following table shows the Host Download commands for the I-O interface and corresponding command numbers in alphabetical order:

Host/PC Download Command	Command Number
Alternate CPT Start Delimiter	01
Alternate CPT End Delimiter	02
Automatic Print Orientation	08
Character Set	17

Configuration Options

Asterisks (*) identify factory default settings. Invalid commands are ignored.

COMMAND 01: ALTERNATE CPT START DELIMITER

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

VALUE	DESCRIPTION
New characters	Alternate CPT start delimiter
Two spaces	Deletes alternate CPT start delimiter

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

COMMAND 02: ALTERNATE CPT END DELIMITER

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

VALUE	DESCRIPTION
New characters	Alternate CPT end delimiter
Two spaces	Deletes the alternate delimiter

COMMAND 04: USER-DEFINED STRINGS

Creates up to ten user-defined strings to send to the printer later. Place the hex codes representing the desired printer command inside the parentheses (up to 25 hex pairs). Spaces between hex pairs are allowed to aid in readability. Consult the printer's user's guide for proper hex codes. Only characters from 01 to FF are recognized (alphabetic characters must be in upper case). Errors in the hex string will cause the interface to ignore the command and printing will resume at the point the error occurred. The user-defined string is stored in the interface's memory under the selected value number (0 to 9). To activate the command, place a &%UX (where X is the value number) in the document.

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

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

COMMAND 05: HOST LANGUAGE

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

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

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

COMMAND 07: PRINT ORIENTATION

Determines the print orientation, if the print orientation is not already determined through the host or the interface's APO feature (Command 08).

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

Note: Refer to page 4-8 for a detailed description regarding print orientation.

COMMAND 08: AUTOMATIC PRINT ORIENTATION

Selects or deselects Automatic Print Orientation (APO).

VALUE	DESCRIPTION
0	APO Off
*1	APO On

Note: Refer to page 4-9 for a detailed description regarding APO.

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

COMMAND 09: PAPER SIZE

Selects paper size setting

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

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

COMMAND 10: TRUE LPI

Selects compressed or true LPI (lines per inch) printing

VALUE	DESCRIPTION
0	No, compressed LPI
1	Yes, true LPI
2	Xpoint Twinax Controller Compatibility

Example: &%Z10,1 selects true LPI.

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

COMMAND 11: HOST PORT INITIALIZATION STRING

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

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

Example: &%Z11,0(1B266C3844) sets LPI to 8 LPI on a PCL Laser Printer.

COMMAND 13: PAPER DRAWER 1 COMMAND

Matches the host's Paper Drawer 1 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 1, the printer will feed from the paper source assigned to paper drawer 1. Consult the printer's user's guide for the available paper sources and respective numbers. Refer to page 4-6 in this User's Guide for more information of this feature.

VALUE	DESCRIPTION
01 to 99	Paper sources available on the printer
*01	Default

Example: &%Z13,08 assigns the optional third 250 sheet feeder (Tray 4) to the host's paper drawer 1 command.

COMMAND 14: PAPER DRAWER 2 COMMAND

Matches the host's Paper Drawer 2 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 2, the printer will feed from the paper source assigned to paper drawer 2. Consult the printer's user's guide for the available paper sources and respective numbers. Refer to page 4-6 in this User's Guide for more information on this feature.

VALUE	DESCRIPTION
01 to 99	Paper sources available on the printer
*04	Default

Example: &%Z14,08 assigns the optional third 250 sheet feeder (Tray 4) to the host's paper drawer 2 command.

COMMAND 15: PAPER DRAWER 3 COMMAND

Matches the host's Paper Drawer 3 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 3, the printer will feed from the paper source assigned to paper drawer 3. Consult the printer's user's guide for the available paper sources and respective numbers. Refer to page 4-6 in this User's Guide for more information on this feature.

VALUE	DESCRIPTION
01 to 99	Paper sources available on the printer
*06	Default

Example: &%Z15,08 assigns the optional third 250 sheet feeder (Tray 4) to the host's paper drawer 3 command.

COMMAND 16: FRONT PANEL OVERRIDE

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

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

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

COMMAND 17: CHARACTER SET

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

VALUE	DESCRIPTION
0	Roman 8
*1	Code Page 850
2	Latin 1 Euro

Example: &%Z17,2 selects the Latin 1 character set which includes the Euro symbol.

COMMAND 18: VERTICAL MARGIN

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

VALUE	DESCRIPTION
-128 to 127	Adjustment of vertical position in 1/60 of an inch
*0	Default

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

COMMAND 19: HORIZONTAL MARGIN

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

VALUE	DESCRIPTION
-128 to 127	Adjustment of horizontal position in 1/60 inch.
*0	Default

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

COMMAND 21: USER FONT STRINGS

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

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

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

This selects the third font string to be font #12345 and selects for Lexmark Optra printer:

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

COMMAND 30: PAPER DRAWER 4 COMMAND

Matches the host's Paper Drawer 4 command (print file) with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 4, the printer will feed from the paper sources currently assigned to this command. Consult the printer's user's guide for available paper sources and respective numbers. Refer to page 4-6 in this User's Guide for more information on this feature.

VALUE	DESCRIPTION
01 to 99	Paper sources available on the printer.
*01	Default

Example: &%Z30,08 assigns the optional third 250 sheet feeder (Tray 4) to the host's paper drawer 4 command.

COMMAND 31: PAPER DRAWER 5 COMMAND

Matches the host's Paper Drawer 5 command (print file) with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 5, the printer will feed from the paper sources currently assigned to this command. Consult the printer's user's guide for available paper sources and respective numbers. Refer to page 4-6 in this User's Guide for more information on this feature.

VALUE	DESCRIPTION
01 to 99	Paper sources available on the printer
*01	Default

Example: &%Z31,08 assigns the optional third 250 sheet feeder (Tray 4) to the host's paper drawer 5 command.

COMMAND 33: DUPLEX PRINTING

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

VALUE	DESCRIPTION
*0	No
1	Yes
2	Tumble

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

COMMAND 42: START AND STOP EBCDIX HEX DUMP

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

VALUE	DESCRIPTION
*0	No action taken
1	Start EBCDIC hex dump

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

Example: &%Z42,1 Start buffer hex dump printing.

COMMAND 43: START/STOP ASCII HEX DUMP

After receiving a start command, the interface, starting with the next buffer received, translates all host data into ASCII (from EBCDIC) and then causes the ASCII data to print in hexadecimal form. The ASCII hex dump is performed until the printer is powered off.

VALUE	DESCRIPTION
*0	No action taken
1	Start ASCII Hex Dump

Example: &%Z43,1 Starts ASCII hex dump printing.

COMMAND 98: RESTORE DEFAULTS OR PRINT CONFIGURATION

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

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

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

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

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

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

COMMAND 99: SAVE ALL CURRENT SETTINGS

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

VALUE	DESCRIPTION
0	Save all current settings

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

Restoring the Factory Defaults

The factory default configuration can be restored to the NV memory of the interface by either a host download command Z98,0 or by performing the following steps:

1. Press **Menu** repeatedly until TWINAX CARD is displayed.
2. Press **Item -** to display “98=TEST MENU”.
3. Press **Value +** twice to display “98=FACTORY DEF”.
4. Press **Select** and then **Go** to select and activate the setting.

4 OPERATION - TWINAX

When the printer is turned on, the interface checks for a proper 9-pin host attachment cable to decide which mode of operation is desired. If a twinax or coax cable is not attached, the LaserCard will cause an error page to be printed. Power OFF the printer, attach the adapter, and then power ON the printer again.

Printer Sharing

The I-O 4260 LaserCard allows your printer to automatically share printing from an attached PC (any parallel or serial source), an attached LAN (through an additional network card), and an IBM twinax host. The interface uses a timeout after each host print job before the interface allows the printer to honor PC/LAN jobs. Make sure the printer is loaded with paper and "READY" is displayed before printing.

When the printer receives PC/LAN (ASCII) data and the host attachment is not active, it honors the ASCII job. At the completion of the ASCII job, the printer has a timeout setting so it will wait and not accept data from another source.

Note: If the printer does not print host data for an extended time after an ASCII job, please check and possibly change the printing sharing timeout in the printer.

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

Note: If the interface's timeout setting is too short (less than 4 seconds), it is possible the interface will interpret an interruption of a host print job as the end of the job and switch to PC/LAN printing.

Host Port Initialization

After shared printing, the I-O LaserCard reconfigures the printer according to the active configuration settings. If you want to further modify the printer configuration (e.g select a different font for all host printing) take advantage of the host port initialization string. The Host Port Initialization String is not sent to the printer until after the interface has reconfigured the printer for host printing. The Initialization String is sent at the beginning of each printed page.

Host Printing

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

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

The table below shows which fonts can be used as system defaults for a System/36 or System/38 host.

Data Processing Fonts - S/36 and S/38			
Typestyle Number	**Font ID (Hex)**	**Pitch (CPI)**	**Description**
05	05	10	Presentation
11	0B	10	Courier
80	50	12	Courier
85	55	12	Courier
86	56	12	Prestige Elite
87	57	12	Letter Gothic
91	5B	12	Courier Italic
158	9E	Prop.	Times Roman
159	9F	Prop.	Times Roman Bold
160	A0	Prop.	Helvetica
162	A2	Prop.	Helvetica Italic
223	DF	15	Letter Gothic

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 the Font (FGID) Reference chart in Appendix A for a list of font IDs.

To change fonts, use the following format to type in a font change command.

¬Q2304

where ¬ is a "logical not" or alternately the carat “^” symbol, Q indicates a font change, and 2304 is the font ID.

To select a resident scalable font with a specific point size, use the following format:

¬F5687,14

where ¬ is a "logical not" or alternately the carat “^” symbol, F indicates a resident scalable font change, 5687 is the font number, and 14 is the desired point size. The resident scalable font numbers are located in Appendix C.

All text following the command will be printed in the new font until you specify another font change command.

Note: The host may send the original font code 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 may continue to format each line according to the original font ID pitch. For Text Management/38 and other word processing programs, you may not be able to specify more than one font ID per line.

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 only allows 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.

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 interface only recognizes these paper sizes:

Letter Paper	8.5 x 11 in. (215.9 x 279.4 mm)
A4 Paper	8.27 x 11.69 in. (210 x 297 mm)
Legal Paper	8.5 x 14 in. (215.9 x 355.6 mm)
Executive Paper	7.25 x 10.5 in. (184.2 x 266.7 mm)

If you choose any other paper dimensions in the word processing program, the interface ignores it and uses the previous paper size choice.

You can also choose a paper size override through a host download command, or front panel selection as described in Chapter 3, Configuration. The "Any Paper Size" selection uses the paper installed in the tray, regardless of size. The "A4 Size" selection uses A4 paper only.

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

The following describes 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 “Load Paper, Tray #, Legal” Install the legal size paper tray into the printer, and the printer will start printing.

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

1. Select a paper size in the program.

2. Install the correct paper size into the printer.

3. Power off the printer for about five seconds, then power it back on again.

4. Release the job for printing at the printer's controlling workstation.

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

Paper Input Bin Selections

The IBM host give users the option to select different paper sources when printing. This can be done through the print file or through the Page Layout/Paper Options menu of OfficeVision/400 (see figures below). On the host, these paper sources are called Source Drawer (printer file) or Paper Drawer (Office Vision/400). On the printer, the actual paper sources are usually called trays. The I-O interfaces will map the host’s drawer values 1 through 5 to actual paper trays on the attached printer.

Users can easily change the default tray mapping through Host download commands 13, 14, 15, 30, 31. These commands can also be accessed through the printer’s operator panel.

OPERATION - TWINAX

Command 13 will map the IBM drawer #1 to the paper tray of your choice. Paper trays are identified through a number. These tray numbers are printer specific and are listed as PCL printer commands in your printer's user's guide.

For example, to change the mapping for the IBM paper drawer #1 from the default Tray 2 (the 250 sheet feeder just below the printer) to Tray 4 (the optional third 250 sheet feeder) of your HP LaserJet 4000, do the following:

1. Press **Menu** on the printer's operator panel to scroll to the TWINAX CARD.
2. Press **Item +** repeatedly until "13=IBM DRAWER 1" is displayed.

3. Press **Value +** repeatedly until "13=8 TRAY CMD" is displayed.

4. Press **Select** to select this setting. The display will show "13=8 TRAY CMD*".

5. Press **GO** to return the printer to operating mode.

The next time you send a host print job that is to pull paper form the IBM drawer #1, the printer will actually feed paper from the optional third 250 sheet feeder.

The I-O interface can be configured in a similar manner using Host Download commands. To accomplish the remapping described above, simply send the command &%Z13,08 to the I-O interface.

IBM Drawer #	Interface's default tray mapping	PCL Command*	I-O Command
1	1	ESC&l1H	13
2	4	ESC&l4H	14
3	5	ESC&l5H	15
4	1	ESC&l1H	30
5	1	ESC&l1H	31

Up to 5 different IBM drawers can be mapped to your printer's paper input trays. Review the following table for information on default settings and to determine which I-O command to use to change the tray mapping.

***Note:** It is important that you reference your printer's user's guide to determine which PCL escape sequence corresponds to the desired input tray.

Paper Output Bin Selection

The I-O LaserCard allows you to direct host print jobs to available output bins.

To send a host job to a particular output bin, insert an I-O output command on the first line (line 1, position 1) of the document/report. The I-O output command consists of the "logical not" (¬) or the 'carat" (^) symbol followed by a capital letter "O" (for Output) and a two digit number designating a destination bin. The two digit number corresponds to the printer's PCL command for the particular output bin.

This command appears on the screen but will not print. The output command will take effect immediately and continues until the next output command is sent. Note, that ^O00 causes the interface to not send any output instructions to the printer. All print jobs will be directed to the output bin set through the printer's operator panel.

The I-O output commands are as follows:

I-O Output Command	Description	PCL Command
^O00	Automatic Selection	ESC&l0G
^O01	Selects output bin #1	ESC&l1G
^O02	Selects output bin #2	ESC&l2G
^O03	Selects output bin #3	ESC&l3G
^O04	Selects output bin #4	ESC&l4G
^O05	Selects output bin #5	ESC&l5G
^O06 to 99	Selects bins #6 to 99	not yet assigned

Print Orientation

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

1. Page Rotation specified in the print file of a data processing document or in the document format menu of a word processing document.

2. Automatic Print Orientation (APO) setting on the printer interface.

3. Print Orientation setting on printer interface.

As you read the following explanation, refer to the diagram on page 4-11 for an illustration of the print orientation logic.

1. Page Rotation

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

a. With 0, 90, 180, and 270 degrees you can specify the desired rotation directly from the host.

b. The COR setting will always print COR, unless the print quality (AS/400 and S/38) is set to NLQ or STD, or Text (S/36) is set to YES. If the page rotation is set to COR and print quality/text is one of the above mentioned settings, the print job will print in portrait in the requested font.

c. With the DEVD and AUTO settings the host does not influence the print orientation. Rather, the print orientation is determined by the settings on the printer interface.

2. Automatic Print Orientation

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

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

b. If the dimensions of the print job are 8.5 x 14 inches or smaller, the interface compares the width to the height and automatically rotates the print job to portrait if the height is larger than the width or landscape if the width is larger than the height.

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

Width = Page Width (in number of columns) / CPI
Length = Page Length (in number of lines) / LPI

3. Print Orientation Settings

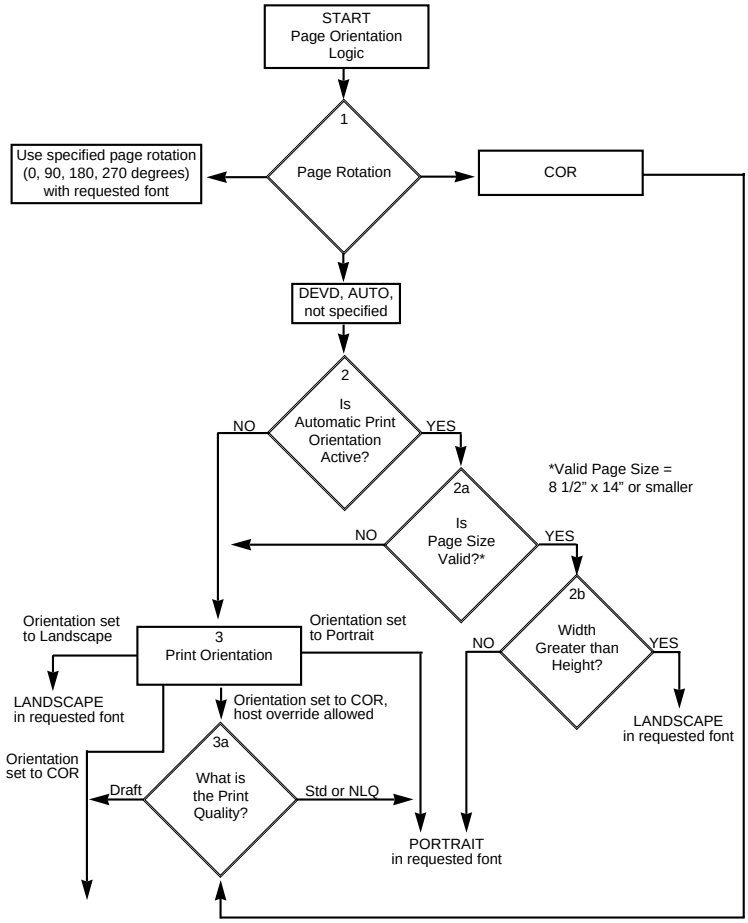
The interface's print orientation settings determine the orientation of the host document/report AFTER the host's page rotation setting AND the interface's APO setting have been obeyed.

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

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

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

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



Computer Output Reduction (COR)
0.5" margins top and left
LANDSCAPE in reduced font:
10 pitch font to 13 pitch
12 pitch font to 15 pitch
15 pitch font to 20 pitch
Vertical spacing is:
6 LPI = 8.7
8 LPI = 11.6

OPERATION - TWINAX

The following tables 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.

Host System	Page Rotation Setting	Print Quality Setting causing portrait orientation
AS/400	*DEVD (print file)	*NLQ, *STD
AS/400	*AUTO (OfficeVision/400)	NLQ, Text
S/36	not specified	Text - Yes
S/38	not specified	*NLQ, *STD

COR is defined as printing in landscape orientation, top and left margins set at 0.5", with CPI and LPI reduced according to the following tables:

Host CPI	Reduced to:
10	13.3
12	15
15	20

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

The table on the following page shows the print orientation results desired and recommends a combination of settings required to obtain that result. Most print orientation results can be achieved with different setting combinations. Refer to the diagram and accompanying text on page 4-11.

		Printer Interface Setting for	
Result	**Host Setting**	**APO**	**Print Orientation**
Data processing: Print reports with a width of 80 columns or less (at 10 CPI) in portrait AND print reports with a width of 132 (at 10 CPI) or 198 (at 15 CPI) columns in landscape with reduced font (COR) **Word processing**: 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)	Degree of Page Rotation .... *AUTO Rotate Paper.....=1 (Automatic)	ON	COR
Print all reports/documents in landscape with reduced font (COR)	Degree of Page Rotation .... *AUTO; Rotate Paper .....=1 (Automatic)	OFF	COR
Print all reports/documents in landscape with requested font	Degree of Page Rotation .... *AUTO; Rotate Paper .....=1 (Automatic)	OFF	Landscape
Print all reports/documents in portrait with requested font	Degree of Page Rotation .... *AUTO; Rotate Paper .....=1 (Automatic)	OFF	Portrait

Changing Page Rotation Settings

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

1. Press F20 "Format options."

2. Press 1 "Document options" then ENTER.

3. Press 1 "Document format" then ENTER.

4. Press 4 "Page layout/paper options" then ENTER.

5. Press Page Down to scroll to the second screen.

6. Locate "Rotate Paper . . . option."

7. Move the cursor to the currently selected rotation setting and type in the desired selection.

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

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

To change the print file:

1. Type **CHGPRTF** on the command line of the host, and press Enter.

2. Type in the name of the print file to be changed.

3. Press **F10** to display additional parameters.

4. Press **Page Down** to scroll to the fourth screen.

5. Locate "Degree of page rotation . . ." option.

6. Move the cursor to the beginning of the dashed line and enter the desired selection.

7. Press ENTER to activate the selection and exit the print file menu.

To override the print file:

1. Type **OVRPRTF** on the command line of the host, and press Enter.

2. Type the name of the print file to be changed.

3. Press **Page Down** to scroll to the third screen.

4. Locate "Degree of page rotation . . ." option.

5. Move the cursor to the beginning of dashed line and enter the desired selection.

6. Press ENTER to activate the selection and exit the print file menu.

Envelope Printing

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

1. 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.

2. 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 prints envelopes from the paper tray.

3. Select "Envelope Feed" in the word processing program's paper feed selections, a paper width of 7.5" or 9.5" (or 220 mm), and paper length of 11.0". The printer automatically finds the envelope feeder (if installed) and prints from the feeder.

Document/Envelope Printing

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, such as No. 11, 86, etc., then press **<Enter>**.

4. From the Document Format screen, select option 4 for "Page Layout/Paper Options." Scroll to the second screen of these options and select a paper size of 8.5 (width) x 11 (length) inches and a paper source of 1. If the letter is more than one page, select a paper source of 1 for the following pages. 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, such as 5, and press **<Enter>** to return to the Alternate Format screen.

6. Select 4, "Page Layout/Paper Options." Choose a first typing line of 1, then scroll down to the second screen of the options and choose a paper width of 7.5 (monarch size) or 9.5 (commercial, or #10 size) and a paper length of 4 inches. For a paper source, select 5 for "Envelope Feed." Press **<Enter>** to return to the Alternate Format screen.

7. Select option 1 for "Margins and Tabs" and make the left margin 1. Press **<Enter>** and CMD3 until you are back in your document.

8. Type in the text. When you're done, add in a "page end" by pressing **<Alt><P>**.

9. Now load in your alternate format for the envelope. To do this, press the CMD5 key, "Goto," and type in **rf** for "Resetting Format." Press **<Enter>**. Select option 4 on the Alternate Format screen, "Begin Alternate Format." Press **<Enter>**.

10. The document will now be displayed with the alternate format. The cursor will be on the first typing line of 1 with a left margin of 1. Type in the envelope address, and send the file to print. The letter will print out first, followed by the envelope.

Note: The printer may eject a blank page when you change printing orientation. If the Buffer light and Ready light remain steady, press the Print/Check button on the printer's operator panel to eject the last page.

Duplex Printing

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

The I-O LaserCard allows access to the printer's duplexing capability in a variety of ways:

1. If you are running OS/400 V2R3 or later 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.

2. 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.

3. Insert the I-O duplex printing command on the first line (line 1, position 1) of the document. The I-O duplex printing commands are:

¬D0 for simplex printing
¬D1 for duplex printing
¬D2 for duplex printing (tumble)

4. Set the interface to duplexing mode through the printer's front panel or Host Download command 33. The Host Download options are:

   0 = simplex
   1 = duplex
   2 = duplex (tumble)

   Type &%Z33,1 or &%Z33,2 into the document or on the screen and print the document or the screen to set the interface to duplex printing. 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 printing 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.

Other Printer Commands

You can also enter commands into your document that allow you to control true LPI and response to host commands. These commands (shown below) are similar to font change commands.

Command	Function
¬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

The ¬E command allows you to send a PCL escape character 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 or escape commands).

The printer may compress line spacing to fit 66 lines onto the page. This may be undesirable, such as when using pre-printed forms that must align correctly. In these cases, the ¬TY command prevents the printer from compressing the line spacing.

Use the ¬I and ¬S commands to remove unwanted host commands from a print file. For example, when printing with 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 interface to remove the host carriage return and line feed commands and send only the data to the printer.

This page left intentionally blank.

5 ADVANCED FEATURES - TWINAX

There are several advanced features in the I-O interface for accessing special functions of the attached printers, which are not normally available on the IBM 3812-1 printer. These features include:

Command Pass-Thru™
User-Defined Strings
User-Defined Fonts
Printing Bar Codes
I-O Graphics Language
Color Printing

Each of these features is described on the following pages.

Command Pass-Thru™

The Command Pass-Thru feature allows you to access all of the built-in features of your printer, even if these features aren't normally available through the host software. Command Pass-Thru lets you place printer-specific command sequences into the data sent to the printer. The interface recognizes these special sequences and "passes the command through" to the printer. The steps below describe how to use Command Pass-Thru.

1. Find the command for the print feature in the printer's manual.

2. Convert the printer command to hexadecimal.

3. Place the EBCDIC delimiter, as defined by a host download command (refer to Chapter 3, Configuration) in the document at the point you want the feature to take effect. This signals the start of the print feature. Enter the beginning printer command, then enter the delimiter again. You may enter a space between hexadecimal code pairs to make the command easier to read, but do not put spaces between the delimiter and the hexadecimal characters. Only characters from 01 to FF are recognized (alphabetic characters must be in upper case). Errors in the hex string will cause the interface to ignore the command and printing will resume at the point the error occurred.

4. Move the cursor to the point in the text that you want to end the print feature. Enter the delimiter, followed by the ending printer command, and then the delimiter again, into the document.

For example:

The command **ESC&d0D** begins underlining and **ESC&d@** ends underlining. First convert the start command to the hexadecimal **1B 26 64 30 44** and the ending command to **1B 26 64 40**. And, if the delimiter is the default **&%** (hex 50 6C), then enter the commands as follows:

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

To print on the printer as:

This is an underlined word.

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

Errors in the Command Pass-Thru sequence will cause the I-O interface to ignore the command and printing will resume at the point the error occurred.

Although the command is displayed on the screen, the I-O printer interface 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 hexadecimal characters.

Command Pass-Thru may invalidate horizontal spacing. Avoid sending codes that would move the print position during Command Pass-Thru. Since the I-O card does not process these commands, it cannot keep track of the print position changes; this may affect the position of following characters and page layout.

You can also send the I-O Command Pass-Thru strings to the printer by typing them on the host screen and pressing the screen print key.

Alternate Command Pass-Thru delimiters may be assigned by using the Z01 Command. Please refer to page 3-3.

User-Defined Strings

To avoid keying-in frequently used printer commands (which would appear in the document as hex values imbedded in Command Pass-Thru delimiters), you should take advantage of the User-Defined Strings feature. Using Host download command 04, assign the numbers 0 through 9 to frequently used printer command strings.

After a command string has been defined, activate it by typing the delimiter (&% or alternate CPT start delimiter) followed by the string number (U0 through U9) into the document or on the screen. When the document or screen is printed, the interface will recognize the &%U and send the command assigned to the string number to the printer.

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

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

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

User-Defined Fonts

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

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

In the same manner, personalized font IDs can be assigned to printer resident fonts or to fonts from an optional font SIMM. 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.

Printing Bar Codes

For a complete description of I-O's internally generated bar codes, refer to Appendix D.

I-O Graphics Language

For a complete description of I-O's Graphics Language, refer to Appendix E.

Color Printing

For a complete description of I-O's color support, refer to Appendix F.

6 PROBLEM RESOLUTION - TWINAX

This chapter provides instructions for performing diagnostic tests on the I-O 4260 LaserCard. This chapter also contains a problem resolution guide that describes common problems with the interface or the printer and their solutions. If you are unable to solve a problem by following the procedures outlined in this chapter, contact your I-O dealer or I-O Customer Support.

Before calling, verify that the I-O LaserCard is installed correctly, that the interface 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 interface
- Description of the problem
- Results of diagnostic tests
- Type of host system or controller

You may also need to print a "hex dump" or "buffer print" by enabling the Buffer Print option in the front panel setup options. This causes all printing to be in hexadecimal code, just as it's received from the host, to help in tracing problems.

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

Buffer Print (EBCDIC Hex)

The interface can be set up to print the buffer in hexadecimal code. This can be useful for a technician to diagnose problems with the interface 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 in twinax.

You can start the buffer print from the printer's operator panel as follows:

To start the EBCDIC hex dump through Host Download:

1. Verify that the interface is installed properly and the printer is in "READY" mode.
2. Type the Host Download command "&%Z42,1" on the screen.
3. Send the Host Download command to the printer (i.e. press the Print screen Button or print the document/file that contains the command).
4. Send the host data in question to the printer.
5. To stop the EBCDIC hex dump, power off the printer.

To start the EBCDIC hex dump through the printer's operator panel:

1. Press **Menu** on the printer's operator panel to scroll to the TWINAX CARD.
2. Press **Item +** repeatedly until "42=EBCDIC HEX" is displayed.
3. Press **Value +** to change the display to "42=HEX DMP Y".
4. Press **Select** to select this setting. The display will show "42=HEX DMP Y*".
5. Press **Go** to return the printer to operating mode.
6. To end the EBCDIC hex dump, power off the printer or repeat steps 1 through 5 changing the display from "42=HEX DMP Y*" to "HEX DMP N*".

ASCII Hex Dump

The interface can be set up to print the buffer in hexadecimal ASCII code. This differs from the EBCDIC hex dump in that the buffer is first translated into ASCII code before it is printed. This can be useful to diagnose problems with the interface or the printer.

To start the ASCII hex dump through Host Download:

1. Verify that the interface is installed properly and the printer is in "READY" mode.
2. Type the Host Download command "&%Z43,1 on the screen.
3. Send the Host Download command to the printer (i.e. press the Print Screen Button or print the document/file that contains the command).
4. Send the host data in question to the printer.
5. To stop the ASCII hex dump, power off the printer.

To start the ASCII hex dump through the printer's operator panel:

1. Press **Menu** on the printer's operator panel to scroll to the TWINAX CARD.
2. Press **Item +** repeatedly until "43=ASCII HEX DMP Y".
3. Press **Value +** to change the display to "43=ASCII DMP Y*".
4. Press **Select** to select this setting. The display will show "43=ASCII DMP Y*".
5. Press **Go** to return the printer to operating mode.
6. To send the ASCII hex dump, power off the printer or repeat steps 1 through 5 changing the display from "43=ASCII DMP Y*" to "43=ASCII DMP N*".

The interface will start printing in buffer print after the selection is made active and the printer is again "Ready". As soon as the buffer print is selected, hexadecimal printing begins (there may be a delay while the printer finishes printing previously formatted data from the buffer).

Self-Diagnostics

The I-O LaserCard has an additional twinax test to aid in the diagnosis of problems. You can set up the interface to perform a complete analysis of its functions. The interface transmits data to itself and then analyzes how that data is processed. If an error is detected, an error message is printed on the printer. Otherwise the interface prints the following message:

TEST SEQUENCE COMPLETE

The diagnostics repeat continuously. The 4260 LaserCard will fill up the entire test report page, which can take several minutes.

Power the printer OFF to end the testing.

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

Note: The twinax host must not be connected to the V-connector during this test.

PROBLEM RESOLUTION - TWINAX

Follow the steps below to perform the interface self-diagnostic:

1. Turn OFF the printer.
2. Disconnect the host cable(s) from the twinax V-adapter. Remove all other cables from the printer.
3. Press **Menu** on the printer's operator panel to scroll to the TWINAX CARD.
4. Press **Item -** to display "TEST MENU".
5. Press **Value +** twice to change the display to "DIAGNOSTIC".
6. Press **Select** to select his setting. The display will show "DIAGNOSTIC*".
7. Press **Go** to start the diagnostic test. The interface will go into a continuous diagnostics cycle until you turn OFF the printer.

Problem Resolution Guide

The following is a general guide to resolve common problems that may occur. Please refer to this guide before contacting your I-O customer support representative.

Problem or Message	Probable Cause	Action
"Printer not ready" message at host	Printer not in a ready status	Make sure printer is on line, has paper, etc.
Line sync LED is not on when connected to the host	Host is not configured for a printer at the address specified	Make sure the host is properly configured for the printer.
	Configuration or address is incorrect	Make sure the host is configured for the 3812-1 (non-IPDS) printer at the proper address.
	Host is not operating	Check host system
	Damaged or improper cabling	Check host cabling for damage for improper connection.
	Twinax cabe improperly terminated	Make sure the prior device is not terminated (some PC emulation cards may terminate mid-line).
Line sync LED blinks on and off	Address conflict with another twinax device on the cable	Make sure no other devices on this cable has the same address.
	Damaged or improper host cables	Check twinax cabling for damage or improper connection.
	Printer fault, such as paper out, paper jam, etc.	Make sure the printer has paper, is clear of jams, etc.
Printer loses host communication (drops off line)	Improper or damaged cabling	Check host cabling for improper connections or damage.

PROBLEM RESOLUTION - TWINAX

Problem or Message	Probable Cause	Action
Right margin is cut off	Page width in word processing program is not wide enough	Change to a wider page.
	Page width 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.
Form length is incorrect	Form length incorrect in software	Change form length
	Incorrect configuration at the host	Make sure the host configuration matches the printers.
Printer won't change fonts	Incorrect typestyle number	Make sure the font ID used is valid. Invalid font IDs are ignored by the printer.
	Wrong optional fonts loaded	Load the font that corresponds to the font ID.
	Font SIMM damaged or not seated into the printer properly	If possible, try a known good SIMM to determine if SIMM is faulty. Make sure the SIMM is loaded properly.

Problem or Message	Probable Cause	Action
Printer does not print in landscape orientation	Did not select a rotation in the word processing program	Select 90º or 270º orientation int the program.
	Did not select a rotation in the data processing OCL statement.	Add a 90º or 270º orientation instruction to the OCL statement.
	APO feature is ON and page size is 8 1/2 x 14: or less; and width is less than height.	Turn APO off or increase page size so it is larger than 8 1/2" x 14"; or change width and height so width is greater than height. Refer to the APO/COR section on page 4-6 for additional information.
	APO feature is OFF and orientation is set to COR; COR, host override allowed; or portrait.	Set I-O LaserCard orientation to landscape.
Printer does not print portrait in requested font.	Selected a rotation in the word processing program.	Deselect rotation setting in the word processing program.
	Selected a rotation in the data processing OCL statement.	Deselect rotation setting in OCL statement.
	APO feature is ON and page size is 8 1/2" x 14" or less; and width is greater than height	Turn APO off or increase page size so it is larger than 8 1/2" x 14"; or change width tand height so width is less than height. Refer to the APO/COR section on page 4-6 for additional information.

PROBLEM RESOLUTION - TWINAX

Problem or Message	Probable Cause	Action
(Continued)	APO feature is OFF and orienation is set to COR; COR, host override allowed; or landscape.	Set I-O LaserCard orientation to protrait.
Printer does not print COR	APO feature is ON and page size is 8 1/2" x 14" or less.	Turn APO off or increase page size so it is larger than 8 1/2" x 14".
	APO feature is OFF and orientation is set to portrait of landscape	Set orientation to COR.
	APO feature is ON and orientation is set to portrait of landscape	Turn APO off or increase page size so it is larger than 8 1/2" x 14".
	APO feature is OFF and orientation is set to portrait or landscape	Set orientation to COR.
	APO feature is OFF and orientation is set to COR; COR, host override allowed.	Set orientation to COR or change host settings (see the APO/COR section, Block 5 on page 4-9).
	AS/400 only: Rotation in data processing printer file is set to *COR and other host print quality in printer file is *STD	Select orientation to COR or change host settings (see the APO/COR section, Block 5 on page 4-9).
Only part of the display station setup screen appears on the display station	Cable to host is not disconnected	Make sure all devices on the twinax cable are powered off then disconnect the cable to the host.

Problem or Message	Probable Cause	Action
DisplayWrite/36 or Office Vision/400 document prints incorrectly	There might be a mistake in using Display/Write/36 or Office Vision/400	Choose “yes” to printer error log **on page 3 of the Print Option** Screen.

This page left intentionally blank.

7 CONFIGURATION - COAX

After installation and self-test, the I-O LaserCard is ready to operate in most 3270 environments. The factory default configuration settings will be satisfactory for many programs and applications. The interface also can be configured to meet the special needs of an application program using coax host download commands (see below) or the printer front panel setup (see page 2-8).

Coax Host Download Commands

Host download commands are placed in a host document or screen. The commands take effect when the print job is sent to the printer.

The command itself will not be printed if it was entered correctly, but the effect of the command should be evident (change in the line spacing, page length, and so on). If the command is printed, the interface did not recognize the command because of a problem in the format. Check the syntax of the command and send the command again.

If you wish to confirm the active setup configuration for the printer, you can print a listing page by selecting 98=Print Setup in the COAX CARD's TEST MENU through the printer's front panel, or by sending the Z98,1 command to the interface (see page 7-28).

Host download commands sent through the printer's front panel to the interface take effect immediately and stay in the interface's memory until the printer is powered off. If you want the command to be permanent, send the Z99,0 command to the interface (see page 7-29). This stores the selection in the printer's permanent memory so the commands are active each time the printer is powered on.

Host download commands use the following format:

&%Z[command number],[value and/or data][space or control character]

The "&%" is the delimiter that signals the interface that the information is a command. The uppercase "Z" is the default command ID character. You can select an alternate value for the command character using command 41 (see page 7-21). The space or control character signals the end of the command.

Multiple commands can be chained together by using a slash (/) or back slash (\) to separate the commands (no spaces are allowed). Each chained command string must be preceded by **&%** and terminated by one space or a control character (i.e., LF, NL, CR, or FF).

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.

For example, to set the characters per inch, line spacing, and form length (commands 3, 4 and 5) in one command string, place **&%Z3,15/Z4,2/Z5,70** followed by a space, in the document. This selects 15 CPI, double spacing, and 70 lines.

Host Download Command Overview

The following table lists the host download commands used to configure the interface to fit your application needs. These commands can be sent to the interface/printer from the 3270 host in a document or through a screen print.

A description of each command and how it is used is located directly after the table.

Description	Command
Alternate Tray Options	63
Auto Print Orientation (APO)	61
Automatic Function at End of Job	20
Buffer Size	01
Character Set	65
Characters Per Inch	03
Coax Port Initialization String	57
Coax Port Timeout	51
Command ID Character	41
CPT Beginning Delimiter Characters	40
CPT Ending Delimiter Characters	39
CR at MPP+1	15
Custom User Strings	55
FF After Time Elapse	27
FF Valid Location	19
Form Feed After Local Screen Copy	13
Form Feed Before Local Screen Print	12
Form Feed Usage	25
Form Length	05
Intervention Required (IR) Timeout	34
Line Spacing	04
Lines Per Inch	02
LU1 Language	08
LU3 Print Image (Non-SCS Mode)	14
Manual Feed Tray Orientation	64
Maximum Print Position	06

CONFIGURATION - COAX

Description	Command
NL at MPP+1	16
Override of Formatting Commands	30
Overwrite DSC (LU3) Translation Table	71
Overwrite EBCDIC (SCS/LU1) Translation Table	70
Paper Path	11
Paper Size	32
Primary Paper Tray Orientation	62
Print Case	07
Restore Defaults or Print Configuration	98
SCS TRN Translate	45
Start and Stop Buffer Hex Dump	42
Store Configuration in Permanent Memory	99
Suppress Empty Foms	26
Suppress IBM Control Codes	36
True LPI Spacing	38
Truncate/Wrape Select	31
Valid FF at End of Print Buffer	18
Valid FF Followed by Data	17
Vertical Channel Select (VCS)	37

Configuration Options

In the command descriptions an asterisk (*) identifies the factory default selection. Commands take effect immediately unless noted otherwise. Any errors cause the interface to ignore the command and continue printing. For a command to be permanently stored in permanent memory, the command Z99,0 must be used. RPQs are only active in LU3 (non-SCS) mode.

COMMAND 1: BUFFER SIZE

Selects logical default buffer size.

VALUE	DESCRIPTION
1	960 characters
*2	1920 characters
3	2560 characters
4	3440 characters
5	3564 characters

Notes: This command, along with the Z99,0 command, changes the logical buffer size selection in the non-volatile memory of the interface. The logical buffer size is only reported to the host the next time the unit is powered up.

The physical buffer size is permanently set at 4K.

Example: &%Z1,3 Sets logical buffer size to 2560 characters.

COMMAND 2: LINES PER INCH

Selects default LPI.

VALUE	DESCRIPTION
3	3 LPI
4	4 LPI
*6	6 LPI
8	8 LPI

Notes: This default emulates the front panel selection on an IBM printer.

The IBM host can control the LPI unless Command 36 is used to override the host LPI commands.

Example: &%Z2,8 Sets the printer to 8 LPI default

COMMAND 3: CHARACTERS PER INCH

Selects default CPI

VALUE	DESCRIPTION
0	No default sent to printer
*10	10 CPI
12	12 CPI
15	15 CPI
16	16.7 CPI

Note: The IBM host can control CPI unless Command 36 is used to select override of host CPI commands.

Example: &%Z3,15 Sets the printer to 15 CPI default

COMMAND 4: LINE SPACING

Selects default Line Spacing

VALUE	DESCRIPTION
*1	Single Space
2	Double Space

Example: &%Z4,2 Sets the printer to double space default

COMMAND 5: FORM LENGTH

Selects default Form Length (MPL = Maximum Print Lines).

VALUE	DESCRIPTION
000	No form length control
001 to 255	Set form length in number of lines
*066	Factory Default

Note: The 000 value enables the front panel selection on the printer to control the form length when Command 25 is set to value 0.

Example: &%Z5,70 Sets form length to 70 lines for A4 paper

COMMAND 6: MAXIMUM PRINT POSITION

Selects current and default Maximum Print Position, the maximum number of characters which can be printed on each line.

VALUE	DESCRIPTION
000	Infinite line length
001 to 255	Set MPP in number of characters
*80	Factory Default

Notes: Normal values are 80, 132, or 198 characters. This default emulates the front panel selection on an HP printer.

MPP and the current position will not be changed by changes in CPI.

The infinite line length will place no limits on the number of characters that can be sent to the printer on a single line.

Example: &%Z6,63 Sets MPP to 63 characters

CONFIGURATION - COAX

COMMAND 7: PRINT CASE

Selects default print case.

VALUE	DESCRIPTION
0	Mono case
*1	Dual case

Notes: This default only affects LU3 printing

Example: &%Z7,0 Sets default to mono case

COMMAND 8: LU1 LANGUAGE

Selects default LU1 language.

VALUE	DESCRIPTION
*01	English (U.S.) EBCDIC
03	Austrian/German
04	Belgian
05	Brazilian
06	Canadian (French)
07	Danish/Norwegian
08	Danish/Norwegian (alt.)
09	Finnish/Swedish
10	Finnish/Swedish (alt.)
11	French
12 (same as 11)	French (alt.)
13	Austrian/German (alt.)
14	International Set 5
15	Italian
16	Japanese (English)
19	Spanish
20	Spanish (alt.)
21	Spanish Speaking
22	English (U.K.)
23 (same as 07)	Norwegian
24 (same as 09)	Swedish
25 (same as 01)	EBCDIC (alt.)
26 (same as 08)	Norwegian (alt.)
27 (same as 10)	Swedish (alt.)

28	Portuguese
29 (same as 06)	Canadian (Bilingual)
30 (same as 11)	French AZERTY (105 character)
31 (same as 14)	Swiss German
32 (same as 14)	Swiss French

Notes: This command, along with command Z99,0, changes the default LU1 language selection in the permanent memory of the interface. The command value should match the language number used in IBM CU configuration sequence number 121.

Example: &%Z8,04 Sets LU1 language to Belgian

COMMAND 11: PAPER PATH

Selects default paper path for the Page Presentation Media (PPM) command.

VALUE	DESCRIPTION
0	Ignore the host PPM command and select the paper tray through the printer's front panel
*2	Cut sheet feeding from primary bin is default
3	Cut sheet feeding from alternate bin 1 is default
4	Envelope feeder default
5	Manual sheet feed default
6	Manual envelope feed default
9	Cut sheet feeding from alternate bin 2 is default

Notes: This command defines the default paper source for the Page Presentation Media (PPM) command in SCS mode. If the PPM command is received from the host, the interface always sends the paper source to the printer unless value 0 is selected.

If the printer does not have a secondary paper bin or an envelope feeder, it ignores the command, but it will be used for Commands 62-64 logic.

The printer ignores the command if it does not have a secondary paper bin or an envelope feeder.

A manual sheet feed command in the SCS PPM causes the printer to wait for the operator to insert paper in the manual feed tray. This command takes effect immediately if placed on the first position of the page (line 1, position 1); otherwise, it takes effect on the next page.

Example: &%Z11,5 Selects manual sheet feed as the default source of paper

COMMAND 12: FORM FEED BEFORE LOCAL SCREEN PRINT

Specifies whether a form feed is performed before doing local screen print.

VALUE	DESCRIPTION
*0	No form feed before local screen dump
1	Form feed before local screen dump

Notes: This command only affects the local screen copy function, not the host-initiated local copy printing, and functions only in LU3 (non-SCS) operations

Example: &%Z12,1 Performs a FF before local screen dump

COMMAND 13: FORM FEED AFTER LOCAL SCREEN COPY

Specifies whether a form feed is performed after a local screen hard copy.

VALUE	DESCRIPTION
*0	No Form Feed after local screen dump
1	Form Feed performed after local screen dump

Notes: To use this function, the RPQ should be:
IBM 3268 RPQ SC9508
IBM 3287 RPQ MC3750
IBM 4214 OPT 20=3

This command only affects the local screen copy, not the host-initiated local copy printing, and functions only in LU3 (non-SCS) operations

Example: &%Z13,1 Performs a FF after local screen dump

COMMAND 14: LU3 PRINT IMAGE (Non-SCS Mode)

Selects Null Line Suppression or True Screen Image in LU3 printing mode.

VALUE	DESCRIPTION
*0	Null line suppression in local copy and non-SCS print
1	Null line suppression in non-SCS print and true screen image in local copy
2	True screen image in non-SCS print and null line suppression in local copy
3	True screen image in non-SCS print and true screen image in local copy

Notes: To use this function, the RPQ should be:
IBM 3268 RPQ SC9505
IBM 3287 RPQ SC3741
IBM 4214 OPT 18=2

Available only in LU3 (non-SCS) operations

0 and 1 are only functional from CUT terminals.

Example: &%Z14,3 Prints true screen image in non-SCS print and local copy

COMMAND 15: CR at MPP + 1

Sets the printer in accordance with the RPQ installed in the control unit.

VALUE	DESCRIPTION
*0	First print position (PP) of next line
1	First PP of current line

Notes: To use this function, the RPQ should be:
IBM 3268 RPQ SC9501
IBM 3287 RPQ S30219
IBM 4214 OPT 15=1
Available only in LU3 (non-SCS) operation

Example: &%Z15,1 Prints first PP of current line as the next PP when a CR is received at MPP+1.

COMMAND 16: NL at MPP + 1

Sets the printer in accordance with the RPQ installed in the control unit.

VALUE	DESCRIPTION
*0	First PP of current line + 2 lines
1	First PP of next line

Notes: To use this function, the RPQ should be:
IBM 3268 RPQ SC9502
IBM 3287 RPQ S30219
IBM 4214 OPT 15=1

Available only in LU3 (non-SCS) operation.

Example: &%Z16,1 Performs first PP of next line as the next PP when an NL is received at MPP+1.

COMMAND 17: VALID FF FOLLOWED BY DATA

Sets the printer in accordance with the RPQ installed in the control unit.

VALUE	DESCRIPTION
*0	Second print position of first line on next form
1	First print position (PP) of first line on next form

Notes: For the Value 1 selection, the RPQ would be:
IBM 3268 RPQ SC9503
IBM 3287 RPQ N/A
IBM 4214 OPT 16=2

Available only in LU3 (non-SCS) operation.

Example: &%Z17,1 Performs first PP of first line on next form as the next PP when a valid FF is not positioned at the end of an IBM print buffer.

COMMAND 18: VALID FF AT END OF PRINT BUFFER

Sets the printer in accordance with the RPQ installed in the control unit

VALUE	DESCRIPTION
0	First PP of second line on next form
*1	First PP of first line on next form

Notes: To use this function, the RPQ should be:
IBM 3268 RPQ SC9504
IBM 3287 RPQ SC3749
IBM 4214 OPT 17=2

Available only in LU3 (non-SCS) operation.

Example: &%Z18,1 Performs first PP of first line on next form as the next PP when a valid FF is received at the end of an IBM print buffer.

COMMAND 19: FF VALID LOCATION

Sets the printer in accordance with the RPQ installed in the control unit

VALUE	DESCRIPTION
*0	FF is valid only at the first print position or at position MPP+1.
1	FF is valid anywhere it occurs.

Notes: To use this function, the RPQ should be:
IBM 3268 RPQ SC9506
IBM 3287 RPQ SC3739
IBM 4214 OPT 19=1

Available only in LU3 (non-SCS) operation.

Example: &%Z19,1 Makes FF valid anywhere it occurs

COMMAND 20: AUTOMATIC FUNCTION AT END OF JOB

Sets the printer in accordance with the RPQ installed in the control unit.

VALUE	DESCRIPTION
*0	NL is automatically executed after the buffer is completed (unless a FF, NL, or CR was last in the buffer).
1	FF is automatically executed after the print buffer is completed (unless a FF was last in the buffer).

Notes: To use this function, the RPQ should be:
IBM 3268 RPQ SC9507
IBM 3287 RPQ SC3740
IBM 4214 OPT 20=2

Available only in LU3 (non-SCS) operation.

Do not press the form feed or line feed buttons on the front of the printer. This will cause the host and printer to lose synchronization of paper position. This command reduces the need to advance the paper.

Example: &%Z20,1 Sets the printer to issue a FF automatically at the end of the print buffer.

COMMAND 25: FORM FEED USAGE

Enables a Forms Feed from the host system to be converted to the required number of line feeds (beneficial when forms length is controlled by the interface).

VALUE	DESCRIPTION
*0	Pass FF from host to the printer
1	Count the lines in Command 5 and send multiple line feeds to the printer in place of the host FF
2	Ignore all IBM Motion Commands

Example: &%Z25,1 Sets the printer to count the lines specified in Command 5.

COMMAND 26: SUPPRESS EMPTY FORMS

Suppresses blank printout pages caused by form feed commands that occur at the top of a form.

VALUE	DESCRIPTION
*0	No, do not suppress empty forms
1	Yes, suppress empty forms

Notes: If selected, the interface ignores form feed commands located at the top of form position.

This command affects printing in both DSC and SCS modes. This differs from the IBM 3287, which suppresses form feed only in DSC mode.

Example: &%Z26,1 Sets the interface to suppress empty forms

COMMAND 27: FF AFTER TIME ELAPSE

Sends a Form Feed if unprinted data remains in the print buffer for the specified coax port timeout interval in Command 51.

VALUE	DESCRIPTION
*0	No extra FF is sent
1	Send FF after timeout value

Notes: In most cases, the host application generates a termination FF and there is no need to change this command from the default.

Example: &%Z27,1 Sends a FF after time delay selected by command 51 (default = 5 sec.) when unprinted data remains in the print buffer.

COMMAND 30: OVERRIDE OF FORMATTING COMMANDS

Enables the printer's front panel selections to control how a job is printed.

VALUE	DESCRIPTION
*0	Normal operation (disabled)
1	Formatting commands are not sent to the printer (enabled)

Notes: When active, this command overrides the interface's default selections for CPI, LPI, font, orientation, bin selection, paper size, COR and line compression.

A reset command is sent to the printer before a coax print job in order to restore the printer's front panel default selections.

This command has no effect on the special features Command Pass-Thru, user strings, initialization strings and coax host RPQs.

Example: &%Z30,1 Sets override of formatting commands

COMMAND 31: TRUNCATE/WRAP SELECT

Selects whether the interface truncates or wraps the text if the maximum print position is exceeded.

VALUE	DESCRIPTION
*0	Allow text to print on next line when maximum print position is exceeded
1	Truncate text beyond the maximum print position

Example: &%Z31,1 Causes text that exceeds the maximum print position to be truncated (not printed)

COMMAND 32: PAPER SIZE

Specifies the paper size used for printing

VALUE	DESCRIPTION
*0	Selects 8 1/2” x 11” letter paper
1	Selects A4 (210mm x 297mm, 8.27” x 11.69”) paper
2	Selects 8 1/2” x 14” legal paper

Example: &%Z32,1 Selects A4 paper

COMMAND 34: INTERVENTION REQUIRED (IR) TIMEOUT

Sets the time interval before an intervention required signal is sent to the host after a printer error occurs. Note that the interface's setup switch #4 must be set to "0" (enabled).

VALUE	DESCRIPTION
000	Never send an IR
001 to 255	IR is sent (value *5) seconds after printer error occurs
*120	Default, send IR after ten minutes.

Example: &%Z34,036 Sets IR time interval to 3 minutes (=6 *5/60)

COMMAND 36: SUPPRESS IBM CONTROL CODES (Host Commands)

This function is used to select suppression of all or some IBM control codes sent from the host system.

VALUE	DESCRIPTION
*0	Obey all IBM control codes (Supp None)
1	Suppress all IBM control codes (Supp All)
2	Suppress LPI, CPI, MPP and MPL control codes (Supp CPI/LPI)
3	Suppress CPI and MPP control codes (Supp CPI)
4	Suppress LPI and MPL control codes (Supp LPI)
5	Suppress print quality specified in the PPM command (Supp Quality)

Notes: If this command is set to 1, documents need to be formatted by sending transparent control codes to the printer using Command Pass-Thru or SCS mode transparent data.

If value 2 is selected, the SCS pitch (CPI), line density (LPI), SHF (MPP), and SVF (MPL) commands will be suppressed (not sent to the printer).

Example: &%Z36,2 No LPI, CPI, MPP or MPL commands are sent to the printer. The document prints using the printer's defaults.

COMMAND 37: VERTICAL CHANNEL SELECT (VCS)

Specifies vertical channel select (VCS) emulation. Functions similarly to a vertical tab, except the 3287 does LF only.

VALUE	DESCRIPTION
0	3287 VCS emulation
*1	3268/4214/4224 VCS emulation

Example: &%Z37,0 Selects 3287 VCS emulation

COMMAND 38: TRUE LPI SPACING

Because laser printers have a non-printable border around the edge of single sheet pages, 6 LPI and 8 LPI spacing is compressed slightly to enable 66 lines and 88 lines to be printed on 11-inch long paper. This can occasionally cause a problem, especially when using preprinted forms that must align precisely. Command 38 enables a user to override the laser printer LPI compression.

VALUE	DESCRIPTION
0	Compress the vertical LPI spacing
*1	Print using true 6 and 8 LPI spacing

Note: If true LPI is selected, the user needs to adjust the document formats to allow for the reduced number of lines that can be printed per page, or the extra lines may print onto another sheet of paper.

Example: &%Z38,1 Specifies that vertical spacing prints using true 6 and 8 LPI

COMMAND 39: CPT ENDING DELIMITER CHARACTERS

Specifies the two characters to be used for the ending delimiter characters or Command Pass-Thru.

VALUE	DESCRIPTION
XXYY	XX is the ASCII hexadecimal value of the first character and YY is the ASCII hexadecimal value of the second character.

Notes: If an ending delimiter is not selected with this command, the delimited selected with Command 40 will be used as a default.

The default delimiter will no longer be active if the command is used to change it. If Command 39 and Command 40 are both entered, Command 39 must be sent after Command 40 to be active.

One delimiter character can be specified instead of two by entering the hex code for the character followed by two zeros (e.g., &%Z39,2500 selects & as the delimiter).

A hex code that starts with 00 is invalid.

Example: &%Z39,253F Specifies the %? characters as the alternate ending delimiter characters (% ASCII hex value is 25 and ? ASCII hex value is 3F).

COMMAND 40: CPT START DELIMITER CHARACTERS

Specifies the two characters to be used for the beginning delimiter characters for Command Pass-Thru.

VALUE	DESCRIPTION
XXYY	XX is the ASCII hexadecimal value of the first character and YY is the ASCII hexadecimal value of the second character

Notes: Host download commands use the CPT beginning delimiter characters as well. The new character(s) replace the &% in front of the Z.

If you do not select an ending delimiter with Command 39, the delimiter selected with this command will be used as the default ending delimiter.

The default beginning delimiter will no longer be active if you use this command to change it.

One delimiter character can be specified instead of two by entering the hex code for the character followed by two zeros (e.g., &%Z40,2500 selects & as the delimiter).

A hex code that starts with 00 is invalid.

Example: &%Z40,253F Specifies the %? characters as the beginning delimiter characters (% ASCII hex value is 25 and ? ASCII hex value is 3F).

COMMAND 41: COMMAND ID CHARACTER

Specifies the character that is used for the command identifier that follows the delimiter characters.

VALUE	DESCRIPTION
00	Deletes the previously selected character
ZZ	ZZ is the ASCII HEX value of the command ID character

Note: The character selected must not be 0 through 9 or A through F (valid hex values), or L, P, U.

Example: &%Z41,59 Specifies "Y" as the command ID character

COMMAND 42: START AND STOP EBCDIC HEX DUMP

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

VALUE	DESCRIPTION
*0	No action taken
1	Start EBCDIC hex dump
2	Stop EBCDIC hex dump

Notes: This command enables the user to print only the section of the document that is in question in buffer hex dump format. Hex printing starts with the buffer after the start command.

Example: &%Z42,1 Starts buffer hex dump printing

COMMAND 43: START/STOP ASCII HEX DUMP

After receiving a start command, the interface, starting with the next buffer received, translates all host data into ASCII (from EBCDIC) and then causes the ASCII data to print in hexadecimal form. The ASCII hex dump is performed until the printer is powered off.

VALUE	DESCRIPTION
*0	No action taken
1	Start ASCII Hex Dump
2	Stop ASCII Hex Dump

Example: &%Z43,1 Starts ASCII hex dump printing.

COMMAND 45: SCS TRN TRANSLATE

Specifies how transparent data sent using SCS code 35 is handled.

VALUE	DESCRIPTION
0	Binary Transparent
*1	Emulate IBM 3287 Printer

Notes: Value 1 causes valid graphic characters to be printed normally (i.e., converted from EBCDIC to ASCII), while control codes and invalid graphics are printed as hyphens, and normal page formatting is maintained.

Value 0 causes the 8-bit binary codes to be sent directly to the printer just as they are received from the host.

SCS code 36 functions the same as code 35.

Available in SCS (LU1) mode only.

Example: &%Z45,0 All SCS Code 35 data is sent to the printer as binary codes without translation.

COMMAND 51: HOST PORT TIMEOUT

Selects the time interval that the interface waits for receipt of additional data from the coax host before automatically switching to check for data from the alternate (PC/LAN) host.

VALUE	DESCRIPTION
04 to 60	Time interval in number of seconds
*08	Factory default is 8 seconds

Notes: The alternate (PC/LAN) host is responsible for sending any needed format commands required by the printer prior to sending printable data.

If your printer supports Intelligent Emulation Switching (IES), make sure the printer's IES timeout period is less than the command 50 timeout setting.

COMMAND 55: CUSTOM USER STRINGS

Allows the user to define up to six custom user strings, of up to 25 bytes each, which are stored in the memory of the interface and sent to the printer whenever the character delimiter, letter U, and number of the string appears in the text of the document (i.e. &%U3).

VALUE	DESCRIPTION
0-5(max. 25 bytes of ASCII hex code)	Defines the custom user string
0-5()	Deletes custom user string

Notes: To aid in readability, a single space is allowed between hex bytes, but is not included in the string.

The strings could specify a special font selection command or other custom command to be sent directly to the printer.

This command, if placed as the first printable data at the top of the page (position 1, line 1), will be sent to the printer prior to the data.

To change a custom user string, simply input the new custom user string values; the old string is automatically erased.

Example: &%Z55,3(1B01) Defines the &%U3 custom user string to send an "Escape and SOH" (1B and 01 hex) to the printer which is the double wide command).

CONFIGURATION - COAX

COMMAND 57: HOST PORT INITIALIZATION STRING

Allows the user to define an initialization string of up to 25 bytes, which is stored in the memory of the interface and is sent to initialize the printer for host printing after shared port printing has occurred. The interface also restores the host page format parameters after sending this string and prior to host printing. The initialization string is sent at the beginning of each page.

VALUE	DESCRIPTION
1(max. 25 bytes of ASCII hex code)	Defines the host port init string
1()	Deletes the host port init string

Notes: To aid in readability, a single space is allowed between hex bytes but is not included in the string.

The coax port initialization string is only sent to the printer when you turn the printer on and after printing by the shared parallel port has occurred.

Host SCS commands and download commands have priority over the initialization string instructions.

To change the initialization string simply input the new command values. The old string is automatically erased.

To delete the initialization string from the permanent memory, simply type the parentheses with nothing between them.

Example: &%Z57,1( ) Deletes from permanent memory any hex string that had been previously defined for the coax port initialization string

COMMAND 61: AUTOMATIC PRINT ORIENTATION (APO)

Laser printers have the ability to automatically control page orientation if the user decides to activate Auto Print Orientation (APO). Refer to the page orientation logic chart in the Computer Output Reduction section of this manual.

VALUE	DESCRIPTION
*0	APO is ACTIVE. The page dimensions of a document are checked to determine if the data should be printed in landscape because the width is greater than the length.
1	APO is NOT ACTIVE. Print orientation is controlled the orientation selections specified in Commands 62, 63, and 64.

Note: APO active is the recommended selection. A user can manipulate the page dimensions using SCS commands to control the orientation of the printing as long as the page size required is 8 1/2 x 11" or smaller.

Example: &%Z61,1 Disables APO

COMMAND 62: PRIMARY PAPER TRAY ORIENTATION

The SCS (LU1) PPM command specifying the source for the paper can have a printing orientation assigned to the paper tray that is assigned. Refer to the page orientation logic chart in the Computer Output Reduction section of the manual. This command duplicates the IBM 3812 and 4028 printer's feature with the additional selection of option 3 below.

VALUE	DESCRIPTION
*0	Computer Output Reduction (COR) Mode is active when paper is specified to be selected from the primary tray
1	Prints PORTRAIT orientation using the active font when the primary tray is specified
2	Prints LANDSCAPE orientation using the active font when the primary tray is specified
3	User Defined mode. Documents are printed using the fonts and orientation that the user specifies through use of the &% font ID commands.

Example: &%Z62,3 Specifies that the document is printed as formatted when the primary paper tray is specified as the paper source.

COMMAND 63: ALTERNATE PAPER TRAY ORIENTATION

This command functions identically to Command 62 except it controls the orientation for printing that specifies the alternate tray for the paper source.

Even if the printer does not have an alternate paper tray, the SCS (LU1) host specifies the alternate tray, and the interface prints the document in accordance with the selection in Command 63.

Values are the same as Command 62 except substitute "alternate tray" for "primary tray" in the descriptions.

Note: The value 3 is an excellent choice when COR is not required, since the user can decide the fonts and orientation he desires by using &% font ID commands.

Example: &%Z63,2 Specifies that landscape orientation will be used for all printing in which the SCS (LU1) PPM code specifies the alternate paper tray be used.

COMMAND 64: MANUAL FEED TRAY ORIENTATION

This command functions identically to Command 62 except it controls the orientation for printing when the PPM Command specifies the manual feed tray for the paper source.

Values are the same as Command 62 except substitute "manual feed tray" in place of "primary tray" in the descriptions.

Note: The laser printer will, upon receipt of the manual feed tray command, not print until paper is placed into the manual feed slot. This allows the user to insert special forms, letter head, or colored paper into the manual feed slot.

Example: &%Z64,1 Specifies all printing using paper from the manual feed slot be printed in portrait orientation

COMMAND 65: CHARACTER SET SELECTION

Enables the user to select the ASCII character set that is used in the conversion from EBCDIC (SCS/LU1) or DSC (LU3) to ASCII.

VALUE	DESCRIPTION
1	Roman 8 character set
*2	Code Page 850 character set

Notes: The character set substitutions defined in Commands 70 and 71 must be adjusted if the ASCII character set is changed.

All previously defined substitutions are lost from NV memory when the character set selection is changed.

Refer to the character set summary tables at the end of the self test to confirm which ASCII character is printed for each of the 3270 hex codes. Both the EBCDIC and DSC tables are provided.

Example: &%Z65,2 Selects the Code Page 850 character set

COMMAND 70: OVERWRITE EBCDIC (SCS/LU1) TRANSLATION TABLE

Custom substitutions defined by this command and stored in permanent memory are written into the EBCDIC (SCS/LU1) to ASCII translation table.

VALUE	DESCRIPTION
XX	The EBCDIC character to be changed (in hex)
YY	The substitute ASCII character for the EBCDIC character above

Notes: Previously stored substitutions are automatically changed to the new selection when the same hex location is specified in the EBCDIC table.

Previously stored substitutions are cancelled if an ASCII hex sequence of 00 is specified.

Command Z99,0 must be used to store the substitutions in permanent memory for them to be effective when the printer is next turned on.

The active EBCDIC (SCS/LU1) translation table prints out at the end of the interface self-test summary.

Example: &%Z70,7B,40/Z99,0 Prints a 40 ASCII hex (a @ symbol) when the interface receives an EBCDIC 7B (a # symbol). The command is followed by a command Z99,0 which stores the active setup selections in permanent memory.

COMMAND 71: OVERWRITE DSC (LU3) TRANSLATION TABLE

Custom substitutions defined by this command, and stored in the permanent memory, are overwritten into the DSC (LU3) to ASCII translation table.

Notes: This command functions similarly to Command 70 except the substitutions are applicable to the DSC (LU3) translation table. Refer to the Command 70 instructions.

The active DSC (LU3) translation table prints out at the end of the interface self-test summary.

COMMAND 98: RESTORE DEFAULTS OR PRINT CONFIGURATION

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

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

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

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

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

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

COMMAND 99: STORE CONFIGURATION IN PERMANENT MEMORY

Send this command after all desired host download configuration commands have been sent to the interface. It stores the active setup in the permanent memory of the interface so it will be in effect whenever the printer is powered on. Otherwise, active configuration commands are lost when the printer is turned off.

VALUE	DESCRIPTION
0	To complete the command, the value 0 must be used

Notes: Host download selections followed by a Command Z99,0 will be stored in permanent memory and active when the printer is turned on. Only use Command Z99,0 when the host download selection needs to be permanently stored in the memory of the interface.

Example: &%Z99,0 Stores the currently active setup selections in the permanent memory of the interface.

This page left intentionally blank.

8 OPERATION - COAX

When the printer is turned on, the interface checks for a proper 9-pin host attachment cable to decide which mode of operation is desired. If a twinax or coax cable is not attached, the LaserCard will cause an error page to be printed. Power OFF the printer, attach the adapter, and then power ON the printer again.

Printer Sharing

The I-O LaserCard allows your printer to automatically share printing from an attached PC (any parallel or serial source), an attached LAN (through an additional network card), and an IBM coax host. The interface uses a timeout after each host print job before the interface allows the printer to honor PC/LAN jobs. Make sure the printer is loaded with paper and "READY" is displayed before printing.

When the printer receives PC/LAN (ASCII) data and the host attachment is not active, it honors the ASCII job. At the completion of the ASCII job, the printer has a timeout setting so it will wait and not accept data from another source.

Note: If it seems that the printer is not printing host data for a extended time after an ASCII job, check and possibly change, the printing sharing timeout in the printer.

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

Note: If the interface's timeout setting is too short (less than 4 seconds), it is possible the interface will interpret an interruption of a host print job as the end of the job and switch to PC/LAN printing.

OPERATION - COAX

Coax Host Printing

With the I-O LaserCard interface installed and a 9-pin to coax host adapter cable attached, your printer emulates a 3287, 3262, 3268, 3812-1, 4028, 4214 or 4224 (non-IPDS) printer on your 3270-type host system.

Selecting Fonts

You can select a printer resident font or a font from an optional font cartridge in the printer by entering a font change command in the document. The font change commands take the following format:

&%[P or L][font ID]

The &% (or the alternate beginning delimiter selected with command 40) is the delimiter that signals the interface that the information following is a command. The letter P (portrait) or L (landscape) controls the orientation of the printing. The font ID number (5 digits) selects the font to be used for printing. Refer to Appendix A for a list of fonts and their font IDs.

For example:

&%L00086 selects Prestige 12 CPI font in landscape orientation.

The font ID number must select a font available in the printer or in the installed cartridge. If the proper cartridge is not installed, or the font does not exist on the cartridge, then the printer will automatically select an alternate landscape font for printing. Multiple font changes can be made in a document as long as all fonts are in the same orientation. Changes in orientation (portrait or landscape) automatically eject the page. A font ID that changes the orientation from the previous page must be on the first line and first position of the page or a blank page will be ejected. A blank page at the first of a print job is often caused by a change in orientation.

Computer Output Reduction (COR)

Computer Output Reduction (COR) is an IBM printer feature that automatically rotates data processing reports to landscape orientation and compresses the text to fit 198 columns x 66 lines on the page. COR is enabled by doing the following:

1. Select APO active with command 61 (value 0) or through the front panel.

2. Select COR for the paper source with commands 62-64 (value 0) or through the front panel.

When COR is enabled, the following format changes are automatically made to data processing reports:

- The page is printed in landscape orientation.
- Vertical line height is 70% of that specified.
- An 0.5-inch blank area is provided on the top and left edge of the paper.
- The selected pitch is changed: 10 pitch to 13.3 pitch; 12 pitch to 15 pitch; 15 pitch to 19 pitch.

A combination of control codes in the printer data stream and the settings in the configuration are used to determine page orientation when processing DSC, DSE, or LU1 (SCS) data streams.

Some applications will not allow the user to insert the data stream commands required to achieve orientation and format selection. Where the insertion of the required data stream commands is not possible, the user can select the orientation and format desired by using the printer configuration settings. Use of the Write Control Character (WCC) in the DSC/DSE data streams for orientation and format selection is not recommended.

Automatic Print Orientation (APO)

When Automatic Print Orientation (APO) is activated (command 61, value 0) or through the front panel, the interface notes the format of the print image and calculates the required print dimensions. The illustration on the following page shows how the page size determines the orientation for coax COR.

If a calculated paper size is larger than 8 1/2" x 11", the paper tray orientation selection (commands 62-64) determines the orientation.

In LU3 (DSC/DSE) mode, the values used in the calculations are specified by the interface's active configuration selections. In LUl (SCS) mode, the values are specified in the data stream by the SCS controls. If a value has not been set in the SCS data stream, the interface's active configuration is used instead.

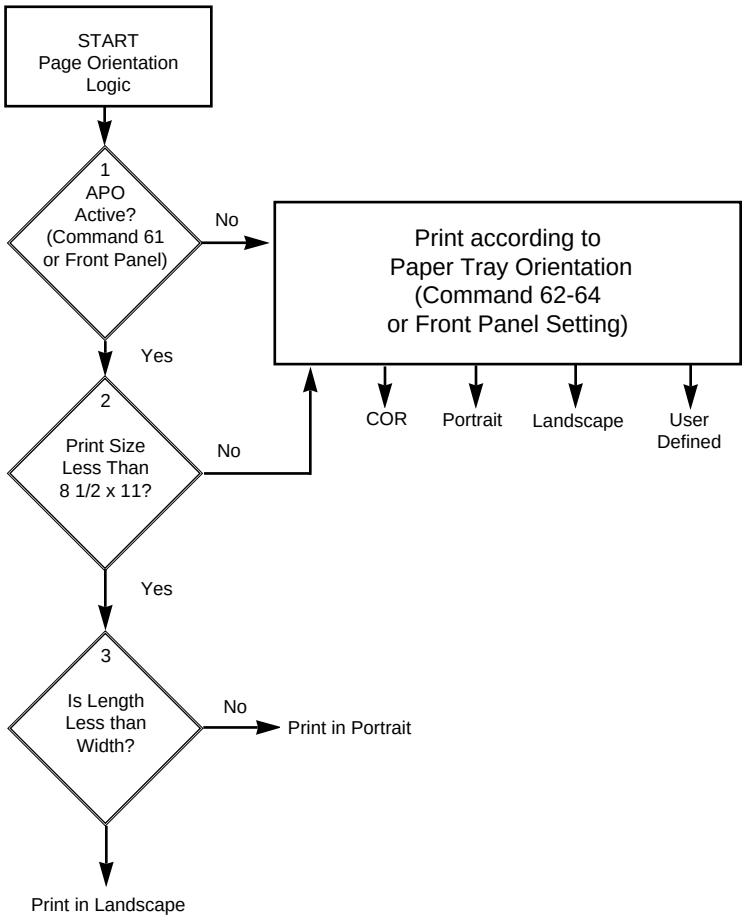
The APO feature also uses the calculated print width and length to determine the print orientation when the dimensions are less than 8 1/2" x 11". When the width is greater than the length and APO is active, the document prints in landscape, even if the font is specified as portrait.

The steps below describe printing with the APO feature (refer to the illustration on the following page).

1. If APO is not active (command 61, value 1; or front panel), the interface uses the paper source selections (commands 62-64, or front panel) to control orientation in the active font. If APO is active, the report continues to block 2.

2. The interface calculates the page size. If the page size is more than 8 1/2" x 11" the interface uses the paper source selections to control the orientation in the active font. If the report is less than 8 1/2" x 11" it continues to block 3.

3. At block 3, the interface checks the length and width. If the report is longer than it is wide, it prints in portrait. If the report is wider than it is long, the report prints in landscape.


START
Page Orientation
Logic
1
APO
Active?
(Command 61
or Front Panel)
No
Print according to
Paper Tray Orientation
(Command 62-64
or Front Panel Setting)
Yes
COR
Portrait
Landscape
User
Defined
2
Print Size
Less Than
8 1/2 x 11?
No
Yes
3
Is Length
Less than
Width?
No
Print in Portrait
Print in Landscape

Print Position and Page Length

The table below outlines the PMPP (Physical Maximum Print Position) and PMPL (Physical Maximum Page Length) for letter, legal, and A4 size paper.

	PMPP at				PMPL at			
Paper Size	**10 CPI**	**12 CPI**	**15 CPI**	**17.1 CPI**	**6 LPI**	**8 LPI**	**True 6 LPI**	**True8 LPI**
Letter								
Portrait	80	96	120	136	66	88	63	84
Landscape	105	126	157	178	50	87	48	84
COR	136	154	201	201	66	89	--	--
Legal								
Portrait	80	96	120	136	84	112	81	108
Landscape	135	162	202	230	50	67	48	64
A4								
Portrait	78	93	117	133	70	93	67	89
Landscape	112	134	167	191	49	66	47	62

9 ADVANCED FEATURES - COAX

There are three advanced features in the I-O LaserCard for accessing special functions of the printers, which are not normally available on the IBM 3287 or 4224 printers. These features include:

- Command Pass-Thru™
- Custom User Strings
- SCS Mode Transparent Data
- Printing Bar Codes
- I-O Graphics Language
- Color Printing

Command Pass-Thru™

The Command Pass-Thru feature allows access to all of the built-in features of your printer, even if these features aren't normally available through the host software. Command Pass-Thru lets you place printer-specific command sequences into the data sent to the printer. The interface recognizes these special sequences and "passes the command through" to the printer. The steps below describe how to use Command Pass-Thru.

1. Find the command for the print feature in the printer's user's guide.

2. Convert the printer command to hexadecimal.

3. Place the beginning delimiter **&%** (or the custom delimiter as defined with command 40) in the document at the point you want the feature to take effect. This signals the start of the print feature. Enter the beginning printer command, then enter the ending delimiter **&%** (or the custom delimiter as defined with command 39). No spaces are allowed. Only characters from 01 to FF are recognized (alphabetic characters must be in upper case). Errors in the hex string will cause the interface to ignore the command and printing will resume at the point the error occurred.

4. Move the cursor to the point in the text that you want to end the print feature. Enter the beginning delimiter followed by the ending printer command and then the ending delimiter into the document.

For example:

If **ESC E** begins bold printing and **ESC F** ends bold printing on your printer, first convert ESC E to the hexadecimal **1B45** (ESC = 1B and E=45) and ESC F to **1B46**. Then enter the commands as follows:

This is a &%1B45&%bold&%1B46&% word.

to print on the printer as:

This is a **bold** word.

Notes: Only numbers or the upper case letters A F are allowed.

Errors in the Command Pass-Thru sequence will cause the interface to ignore the command and resume printing at the point the error occurred.

Command Pass-Thru may invalidate horizontal spacing.

Custom User Strings

Host download command 55 allows you to define up to six (0 through 5) custom user strings. A user string can be a font ID, a form feed, or another printer command that is frequently used. The information on page 7-23 describes how to define the custom user strings.

After the custom user string is defined, the string is activated by placing the delimiter (&% or the beginning delimiter defined with command 40), a capital letter U, and the number of the desired custom user string into the text of a document.

For example, use command 55 to define user string number 3 to send a form feed as follows (FF = 0C in hex):

&%Z55,3(0C)

Then, to send a form feed at the end of a print job, enter the following at the end of the document:

&%U3

Print the document, and the interface will send the 0C, or form feed, command to the printer when it encounters the &%U3 code.

SCS Mode Transparent Data

SCS transparent mode (SCS TRN code 35) provides a method for transparent data transmission when operating in LU1 mode. To use this method, you must be connected to a system using SNA protocol and be operating as a Logical Unit Type 1.

An SCS TRN sequence begins with a one-byte binary count immediately following the TRN code. The count indicates the number of bytes, not including the count byte, of transparent data to follow. Up to 256 bytes of transparent data can be sent in each sequence.

SCS TRN data is user-defined and is not scanned for SCS control codes. However, to emulate the characteristics of the IBM 3287, non-printable characters (i.e., control characters) are converted to hyphens. Data is translated to ASCII with undefined characters printed as hyphens. The I-O LaserCard offers a configurable option to emulate the IBM 3287 or to pass the data without translation. Refer to command 45, SCS TRN translate, on page 7-22 for information.

Other Printer Commands

Commands can also be entered into the document to allow control of host formatting commands. These command are:

¬I Ignores all host formatting commands
¬S Acknowledges all host formatting commands

Use the ¬I and ¬S commands to remove unwanted host commands from a print file. For example, placing a ¬I at the end of a line (before a carriage return and line feed command) and ¬S at the beginning of the next line, causes the interface to remove the host carriage return and line feed commands and send only the data to the printer.

ADVANCED FEATURES - COAX

Printing Bar Codes

For a complete description of I-O's internally generated bar codes, refer to Appendix D.

I-O Graphics Language

For a complete description of I-O’s Graphic Language, refer to Appendix E.

Color Printing

For a complete description of I-O’s color support, refer to Appendix F.

10 PROBLEM RESOLUTION - COAX

This chapter provides instructions for performing diagnostic tests on the I-O LaserCard. This chapter also contains a problem resolution guide that describes common problems with the interface or the printer and their solutions. If you are unable to solve a problem by following the procedures outlined in this chapter, contact your I-O dealer or I-O Customer Support.

Before calling, verify that the I-O LaserCard is installed correctly, that the interface 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 interface
- Description of the problem
- Type of host system or controller

You may also need to print a "hex dump" or "buffer print" by enabling the Buffer Print option in the front panel setup options. This causes all printing to be in hexadecimal code, just as it's received from the host, to help in tracing problems.

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

Buffer Print (EBCDIC Hex)

The interface can be set up to print the buffer in hexadecimal code. This can be useful for a technician to diagnose problems with the interface 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 the side in coax.

To start the EBCDIC hex dump through Host Download:

1. Verify that the interface is installed properly and the printer is in "READY" mode.
2. Type the Host Download command "&%Z42,1" on the screen.
3. Send the Host Download command to the printer (i.e. press the Print Screen Button or print the document/file that contains the command).
4. Send the host data in question to the printer.
5. To stop the EBCDIC hex dump, power off the printer.

To start the EBCDIC hex dump through the printer's operator panel:

1. Press **Menu** on the printer's operator panel to scroll to the COAX CARD.
2. Press **Item +** repeatedly until "42=EBCDIC HEX" is displayed.
3. Press **Value +** to change the display to "42=HEX DMP Y".
4. Press **Select** to select this setting. The display will show "42=HEX DMP Y*".
5. Press **Go** to return the printer to operating mode.
6. To end the EBCDIC hex dump, power off the printer or repeat steps 1 through 5 changing the display from "42=HEX DMP Y*" to "42=HEX DMP N*".

ASCII Hex Dump

The interface can be set up to print the buffer in hexadecimal ASCII code. This differs from the EBCDIC hex dump in that the buffer is first translated into ASCII code before it is printed. This can be useful to diagnose problems with the interface or the printer.

To start the ASCII hex dump through Host Download:

1. Verify that the interface is installed properly and the printer is in "READ" mode.
2. Type the Host Download command "&%Z43,1" on the screen.
3. Send the Host Download command to the printer (i.e press the Print Screen Button or print the document/file that contains the command).
4. Send the host data in question to the printer.
5. To stop the ASCII hex dump, power off the printer.

To start the EBCDIC hex dump through the printer's operator panel:

1. Press **Menu** on the printer's operator panel to scroll to the COAX CARD.
2. Press **Item +** repeatedly until "43=ASCII HEX DMP" is displayed.
3. Press **Value +** to change the display to "43=ASCII DMP Y".
4. Press **Select** to select this setting. The display will show "43=ASCII DMP Y*".
5. Press **Go** to return the printer to operating mode.
6. To end the ASCII hex dump, power off the printer or repeat steps 1 through 5 changing the display from "43=ASCII DMP Y*" to "43=ASCII DMP N*".

The interface will start printing in buffer print after the selection is made active and the printer is again "Ready". As soon as the buffer print is selected, hexadecimal printing begins (there may be a delay while the printer finishes printing previously formatted data from the buffer).

Problem Resolution Guide

The following is a general guide to resolve common problems that may occur. Please refer to this guide before contacting your I-O customer support representative.

PROBLEM RESOLUTION - COAX

Problem or Message	Probable Cause	Action
“Printer not ready” message at host	Printer not in a ready status	Make sure printer is on line, has paper, etc.
Line sync LED is not on when connected to the host	Host is not operating	Check host system.
	Damaged or improper cabling	Check host cabling for damage or improper connection.
Line sync LED blinks on and off	Damaged or improper host cables	Check host cabling for damage or improper connection.
	Printer fault such as paper out, paper jam, etc.	Make sure the printer has paper, is clear of jams, etc.
Printer loses host communication (drops off line)	Improper or damaged cabling	Check host cabling for improper connections or damage.
Right margin is cut off	Page width in word processing program is not set wide enough	Change to wider page.
	Page width 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.
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.

Problem or Message	Probable Cause	Action
Printer won't change fonts	Incorrect typestyle number	Make sure the font ID used is valid. Invalid font IDs are ignored by the printer.
	Wrong optional fonts loaded	Load the font that corresponds to the font ID.
	Font SIMM damaged or not seated into the printer properly	If possible try a known good SIMM to determine if SIMM is faulty. Make sure the SIMM is loaded properly.
Printer does not print in specified orientation (host download command or front panel setting)	APO is active (ON) and paper size is less than 8 1/2" x 11"	Turn APO off.
CPT delimiter characters were accidently set to 00XX	CPT delimiter characters starting with 00 are invalid	Restore factory defaults.

This page left intentionally blank.

APPENDIX A

Font (FGID) Reference

The following chart lists standard resident fonts of HP LaserJet printers and optional fonts available through various 3rd parties along with the font ID number used to select the font. These font selections are valid for both twinax and coax printing.

If you are using an IBM font card, a best fit will be required with one of the fonts listed below. For information on selecting fonts, refer to Chapters 4 and 9 (Operation).

APPENDIX A

Below is a key for the character set in the Symbol column in the tables on the following pages:

L1	Latin 1 Euro character set
R8	Roman 8 character set
850	Code Page 850 character set

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
Line Printer	L1/R8/850	P/L	13.33	8.5	204
Line Printer	L1/R8/850	P/L	15	8.5	223
Line Printer	L1/R8/850	P/L	17.1	8.5	254
Line Printer	L1/R8/850	P/L	19	8.5	281
Courier	L1/R8/850	P/L	10	12	11
Courier Bold	L1/R8/850	P/L	10	12	46
Courier Italic	L1/R8/850	P/L	10	12	18
Courier	L1/R8/850	P/L	12	10	85
Courier Bold	L1/R8/850	P/L	12	10	88
Courier Italic	L1/R8/850	P/L	12	10	89
Letter Gothic	L1/R8/850	P/L	12	12	87
CG Times	L1/R8/850	P/L	Prop.	6	4605
	L1/R8/850	P/L	Prop.	8	4606
	L1/R8/850	P/L	Prop.	10	4607
	L1/R8/850	P/L	Prop.	12	4608
	L1/R8/850	P/L	Prop.	14	4609
	L1/R8/850	P/L	Prop.	18	4611
	L1/R8/850	P/L	Prop.	24	4614
	L1/R8/850	P/L	Prop.	30	4617

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
CG Times Bold	L1/R8/850	P/L	Prop.	6	4625
	L1/R8/850	P/L	Prop.	8	4626
	L1/R8/850	P/L	Prop.	10	4627
	L1/R8/850	P/L	Prop.	12	4628
	L1/R8/850	P/L	Prop.	14	4629
	L1/R8/850	P/L	Prop.	18	4631
	L1/R8/850	P/L	Prop.	24	4634
	L1/R8/850	P/L	Prop.	30	4637
CG Times Italic	L1/R8/850	P/L	Prop.	6	4645
	L1/R8/850	P/L	Prop.	8	4646
	L1/R8/850	P/L	Prop.	10	4647
	L1/R8/850	P/L	Prop.	12	4648
	L1/R8/850	P/L	Prop.	14	4649
	L1/R8/850	P/L	Prop.	18	4651
	L1/R8/850	P/L	Prop.	24	4654
	L1/R8/850	P/L	Prop.	30	4657
CG Times Bold Italic	L1/R8/850	P/L	Prop.	6	4665
	L1/R8/850	P/L	Prop.	8	4666
	L1/R8/850	P/L	Prop.	10	4667
	L1/R8/850	P/L	Prop.	12	4668
	L1/R8/850	P/L	Prop.	14	4669
	L1/R8/850	P/L	Prop.	18	4671
	L1/R8/850	P/L	Prop.	24	4674
	L1/R8/850	P/L	Prop.	30	4677

APPENDIX A

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
Univer Medium	L1/R8/850	P/L	Prop.	6	4805
	L1/R8/850	P/L	Prop.	8	4806
	L1/R8/850	P/L	Prop.	10	4807
	L1/R8/850	P/L	Prop.	12	4808
	L1/R8/850	P/L	Prop.	14	4809
	L1/R8/850	P/L	Prop.	18	4811
	L1/R8/850	P/L	Prop.	24	4812
	L1/R8/850	P/L	Prop.	30	4813
Univers Med Italic	L1/R8/850	P/L	Prop.	6	4825
	L1/R8/850	P/L	Prop.	8	4826
	L1/R8/850	P/L	Prop.	10	4827
	L1/R8/850	P/L	Prop.	12	4828
	L1/R8/850	P/L	Prop.	14	4829
	L1/R8/850	P/L	Prop.	18	4831
	L1/R8/850	P/L	Prop	24	4834
	L1/R8/850	P/L	Prop.	30	4837
Univers Med Condensed	L1/R8/850	P/L	Prop.	6	4845
	L1/R8/850	P/L	Prop.	8	4846
	L1/R8/850	P/L	Prop.	10	4847
	L1/R8/850	P/L	Prop.	12	4848
	L1/R8/850	P/L	Prop.	14	4849
	L1/R8/850	P/L	Prop.	18	4851
	L1/R8/850	P/L	Prop.	24	4854
	L1/R8/850	P/L	Prop.	30	4857

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
Univers Med Cond. Italic	L1/R8/850	P/L	Prop	6	4865
	L1/R8/850	P/L	Prop.	8	4866
	L1/R8/850	P/L	Prop.	10	4867
	L1/R8/850	P/L	Prop.	12	4868
	L1/R8/850	P/L	Prop.	14	4869
	L1/R8/850	P/L	Prop.	18	4871
	L1/R8/850	P/L	Prop.	24	4876
	L1/R8/850	P/L	Prop.	30	4877
Univers Bold	L1/R8/850	P/L	Prop.	6	4905
	L1/R8/850	P/L	Prop.	8	4906
	L1/R8/850	P/L	Prop.	10	4907
	L1/R8/850	P/L	Prop.	12	4908
	L1/R8/850	P/L	Prop.	14	4909
	L1/R8/850	P/L	Prop.	18	4911
	L1/R8/850	P/L	Prop.	24	4914
	L1/R8/850	P/L	Prop.	30	4917
Univers Bold Italic	L1/R8/850	P/L	Prop.	6	4925
	L1/R8/850	P/L	Prop.	8	4926
	L1/R8/850	P/L	Prop.	10	4927
	L1/R8/850	P/L	Prop.	12	4928
	L1/R8/850	P/L	Prop.	14	4929
	L1/R8/850	P/L	Prop.	18	4931
	L1/R8/850	P/L	Prop.	24	4934
	L1/R8/850	P/L	Prop.	30	4937
Univers Bold Condensed	L1/R8/850	P/L	Prop.	6	4945
	L1/R8/850	P/L	Prop.	8	4946

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
(Continued)	L1/R8/850	P/L	Prop.	10	4948
	L1/R8/850	P/L	Prop.	12	4949
	L1/R8/850	P/L	Prop.	18	4951
	L1/R8/850	P/L	Prop.	24	4954
	L1/R8/850	P/L	Prop	30	4957
	L1/R8/850	P/L	Prop.	24	4954
	L1/R8/850	P/L	Prop.	30	4957
Univers Bold Cond. Italic	L1/R8/850	P/L	Prop.	6	4965
	L1/R8/850	P/L	Prop.	8	4966
	L1/R8/850	P/L	Prop.	10	4967
	L1/R8/850	P/L	Prop.	12	4968
	L1/R8/850	P/L	Prop.	14	4969
	L1/R8/850	P/L	Prop.	18	4971
	L1/R8/850	P/L	Prop.	24	4974
	L1/R8/850	P/L	Prop.	30	4977
ITC Zapf Dingbats	14L	P/L	Prop.	6	4985
	14L	P/L	Prop.	8	4986
	14L	P/L	Prop.	10	4987
	14L	P/L	Prop.	12	4988
	14L	P/L	Prop.	14	4989
	14L	P/L	Prop.	18	4991
	14L	P/L	Prop.	24	4994
	14L	P/L	Prop.	30	4997

Optional Fonts as originally found in ProCollection Cartridge					
Line Printer	ASCII	P/L	17.1	8.5	253
Courier Bold	ASCII	P/L	10	12	45
Courier Italic	ASCII	P/L	10	12	17
Courier	ASCII	P/L	12	10	84
Courier Bold	ASCII	P/L	12	10	108
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	10	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	281
Letter Gothic	ASCII	P/L	17.1	9.5	257
Letter Gothic	ASCII	P/L	12	12	66
Letter Gothic Bold	ASCII	P/L	12	12	69
Letter Gothic Italic	ASCII	P/L	12	12	68
Times Roman	ASCII	P	Prop.	8	163

APPENDIX A

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
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	173
Times Roman	Legal	P	Prop.	10	174
Times Roman Bold	Legal	P	Prop.	10	175
Times Roman Italic	Legal	P	Prop.	10	176
Times Roman	Legal	P	Prop.	12	177
Times Roman Bold	Legal	P	Prop.	12	178
Times Roman Italic	Legal	P	Prop.	12	179
Helvetica	ASCII	P	Prop.	8	183
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
Helvetic 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
Optional Fonts as originally found in WordPerfect Cartridge					
CG Times	DskTop	P	Prop.	6	4685
CG Times	DskTop	P	Prop.	8	4686

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
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
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
Optional Fonts as originally found in Microsoft Cartridge					
Helvetica	L1/R8	P	Prop.	8	34102
Helvetica	L1/R8	P	Prop.	10	34103
Helvetica Bold	L1/R8	P	Prop.	10	34123
Helvetica Italic	L1/R8	P	Prop.	10	34231
Helvetica	L1/R8	P	Prop.	12	34104
Helvetic Bold	L1/R8	P	Prop.	12	34124
Helvetica Italic	L1/R8	P	Prop.	12	34232
Helvetica Bold	L1/R8	P	Prop.	14	34125

APPENDIX A

Typeface	Symbol	Orient	Pitch	Point	Type-syle No.
TmsRmn	L1/R8	P	Prop.	8	5686
TmsRmn	L1/R8	P	Prop.	10	5687
TmsRmn Bold	L1/R8	P	Prop.	10	5707
TmsRmn Italic	L1/R8	P	Prop.	10	5815
Times Roman	L1/R8	P	Prop.	12	5688
Times Roman Bold	L1/R8	P	Prop.	12	5708
Times Roman Italic	L1/R8	P	Prop.	12	5816
Times Roman Bold	L1/R8	P	Prop.	14	5709
Line Printer	L1/R8	P	Prop.	835	223
Optional Fonts as originally found in Polished Worksheet Cartridge					
Prestige Elite	L1/R8/850	P/L	15	7	221
Prestige Elite	L1/R8/850	P/L	12	10	86
Prestige Elite Bold	L1/R8/850	P/L	12	10	111
Prestige Elite Italic	L1/R8/850	P/L	12	10	112
Prestige Elite	Legal	P/L	15	7	219
Prestige Elite	Legal	P/L	12	10	97
Prestige Elite Bold	Legal	P/L	12	10	98
Prestige Elite Italic	Legal	P/L	12	10	99
Letter Gothic	L1/R8/850	P/L	27	3.6	290
Letter Gothic	L1/R8/850	P/L	12	12	87
Letter Gothic Bold	L1/R8/850	P/L	12	12	110
Letter Gothic Italic	Legal	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

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
Presentation Bold	ASCII	P/L	8.1	16	434
Presentation Bold	Legal	P/L	8.1	16	431
Optional Fonts as originally found in Persuasive Presentations Cartridge					
Letter Gothic	ASCII	P/L	10	14	39
Letter Gothic	Legal	P/L	10	14	38
Presentation Bold	ASCII	P/L	10	14	6
Presentation Bold	Legal	P/L	10	14	7
Presentation bold	ASCII	P/L	8.1	16	434
Presentation bold	Legal	P/L	8.1	16	431
Presentation bold	ASCII	P/L	6.5	18	435
Presentation bold	Legal	P/L	6.5	18	432
Presentation bold	ASCII	P/L	5.7	24	436
Presentation bold	Legal	P/L	5.7	24	433
Helv Outline	ASCII	P/L	Prop.	24	34115
Helv Outline	Legal	P/L	Prop.	24	34116
Serifa	ASCII	P/L	Prop.	24	34215
Serifa	Legal	P/L	Prop.	24	34216
Line Draw	LinDrw	P/L	10	14	31
PC Line bold	PCLin	P/L	10	14	32
Optional Fonts as originally found in Forms, Etc. Cartridge					
Univers	L1/R8/850	P/L	Prop.	6	33101
Univers	L1/R8/850	P/L	Prop.	8	33102
Univers bold	L1/R8/850	P/L	Prop.	8	33122
Univers bold	L1/R8/850	P/L	Prop.	10	33123
Univers bold	L1/R8/850	P/L	Prop.	12	33124
Univers bold	L1/R8/850	P/L	Prop.	14	33125
Helv Cond. Black bold	TXNum	P/L	Prop.	24	34128
OCR-A	OCR-A	P	10	12	19

APPENDIX A

Typeface	Symbol	Orient	Pitch	Point	Type-style No.
Tax Line Draw	Taxlin Drw	P/L	10	12	30
Optional Fonts as originally found in Bar Codes & More Cartridge					
Letter Gothic	L1/R-8	P/L	15	9.5	230
Letter Gothic	L1/R-8	P/L	112	12	87
Letter Gothic	L1/R-8	P/L	10	14	40
OCR-A	OCR-A	P	10	12	19
OCR-B	OCR-B	P	10	12	3
Code 3 of 9	3 of 9	P	8.1	12	60
Code 3 of 9	3 of 9	P	4.6	12	240
EAN/UPC 10 Mil	UPC	P	Prop.	12	170
EAN/UPC 13 Mil bold	UPC	P	Prop.	12	171
USPS Zip	ZIP	P/L	Prop.	12	172
Line Draw	LinDrw	P/L	10	12	33
Optional Fonts as originally found in Text Equations Cartridge					
Prestige Elite	L1/R-8	P	15	7	221
Prestige Elite	L1/R-8	P	17.1	7	256
Prestige Elite	L1/R-8	P	12	10	86
Prestige Elite bold	L1/R-8	P	12	10	111
Prestige Elite italic	L1/R-8	P	12	10	112
CG Times	L1/R-8	P	Prop.	8	157
CG Times	L1/R-8	P	Prop.	10	158
CG Times bold	L1/R-8	P	Prop.	10	159
CG Times italic	L1/R-8	P	Prop.	10	155
Optional Fonts as originally found in Global Text Cartridge					
CG Century Schoolbook	L1/R-8/850	P/L	Prop.	8	16950
CG Century Schoolbook	L1/R-8/850	P/L	Prop.	10	16951
CG Century Schlbk Bold	R-8	P/L	Prop.	10	16971
CG Century Schlbk Italic	R-8	P/L	Prop.	10	17079

Typeface	Symbol	Orient.	Pitch	Point	Type-style No.
CG Triumvirate	L1/R8	P/L	Prop.	10	33335
CG Triumvirate Bold	L1/R8	P/L	Prop.	14	33357
Optional Fonts as originally found in Pretty Faces Cartridge					
Microstyle	ASCII	P	Prop.	18	5910
Microstyle Bold	ASCII	P	Prop.	36	5920
Hobo Medium	ASCII	P	Prop.	30	5930
Hobo Medium	ASCII	P	Prop.	14	5940
Thunderbird	ASCII	P	Prop.	54	5950
Signet Roundhand	ASCII	P	Prop.	18	5960
Signet Roundhand	ASCII	P	Prop.	14	5970
ITC Dingbats	ITC	P	Prop.	36	5980
ITC Dingbats	ITC	P	Prop.	18	5990

This page left intentionally blank.

APPENDIX B

Character Sets

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

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

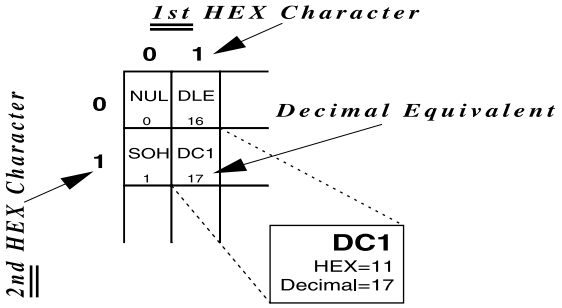
The first digit of the EBCDIC hex code is at the top of the table, and the second digit is on the left side. The corresponding ASCII hex code is where the two digits intersect. The character that corresponds to the ASCII hex code is in the chart to the right.

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

Roman-8 Symbol Set

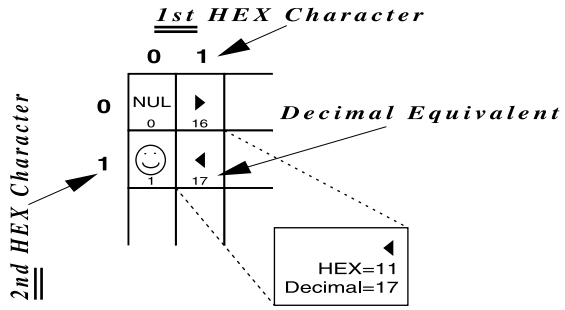
Includes US ASCII (dec. 1-127) and Roman Extension Symbol Sets

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL 0	DLE 16	32	0 48	@ 64	P 80	‘ 96	p 112	128	144	160	¯ 176	â 192	Å 208	Á 224	þ 240
1	SOH 1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	145	À 161	Ý 177	ê 193	î 209	Ã 225	þ 241
2	STX 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	146	Â 162	ý 178	ô 194	Ø 210	ã 226	. 242
3	ETX 3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	147	È 163	° 179	û 195	Æ 211	Đ 227	µ 243
4	EOT 4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	148	Ê 164	Ç 180	á 196	å 212	ð 228	¶ 244
5	ENQ 5	NAK 21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	Ë 165	ç 181	é 197	í 213	Í 229	¾ 245
6	ACK 6	SYN 22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	Î 166	Ñ 182	ó 198	ø 214	Ì 230	— 246
7	BEL 7	ETB 23	' 39	7 55	G 71	W 87	g 103	w 119	135	151	Ï 167	ñ 183	ú 199	æ 215	Ó 231	¼ 247
8	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	136	152	´ 168	¡ 184	à 200	Ä 216	Ò 232	½ 248
9	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	137	153	` 169	¿ 185	è 201	ì 217	Õ 233	ª 249
A	LF 10	SUB 26	* 42	: 58	J 74	Z 90	j 106	z 122	138	154	^ 170	¤ 186	ò 202	Ö 218	õ 234	º 250
B	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	139	155	¨ 171	£ 187	ù 203	Ü 219	Š 235	« 251
C	FF 12	FS 28	, 44	< 60	L 76	\ 92	l 108	| 124	140	156	~ 172	¥ 188	ä 204	É 220	š 236	■ 252
D	CR 13	GS 29	- 45	= 61	M 77	] 93	m 109	} 125	141	157	Ù 173	§ 189	ë 205	ï 221	Ú 237	» 253
E	SO 14	RS 30	. 46	> 62	N 78	^ 94	n 110	~ 126	142	158	Û 174	ƒ 190	ö 206	ß 222	Ÿ 238	± 254
F	SI 15	US 31	/ 47	? 63	O 79	_ 95	o 111	▩ 127	143	159	£ 175	¢ 191	ü 207	Ô 223	ÿ 239	255



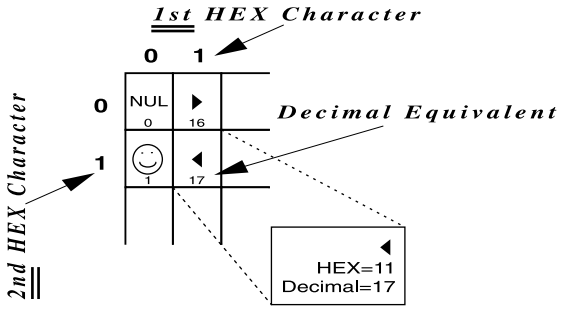
Code Page 850 Symbol Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL 0	▶ 16	32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	- 240
1	☺ 1	◀ 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▓ 177	┴ 193	Ð 209	ß 225	± 241
2	☻ 2	↕ 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	# 178	┬ 194	Ê 210	Ô 226	‗ 242
3	♥ 3	‼ 19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	♦ 4	¶ 20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	♣ 5	§ 21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	♠ 6	▬ 22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	• 7	↨ 23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	◘ 8	↑ 24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	○ 9	↓ 25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	◙ 10	→ 26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	♂ 11	← 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	Ù 235	¹ 251
C	♀ 12	∟ 28	, 44	< 60	L 76	\ 92	l 108	| 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	♪ 13	↔ 29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	♫ 14	▲ 30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	☼ 15	▼ 31	/ 47	? 63	O 79	_ 95	o 111	⌂ 127	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	255



Code Page 858 Symbol Set

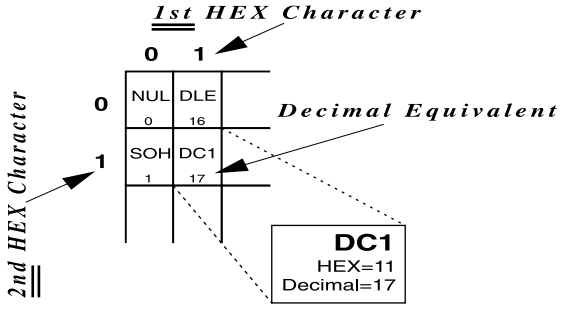
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL 0	▶ 16	32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	- 240
1	☺ 1	◀ 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▓ 177	┴ 193	Ð 209	ß 225	± 241
2	☻ 2	↕ 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	♥ 3	‼ 19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	♦ 4	¶ 20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	♣ 5	§ 21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	Á 181	┼ 197	€ 213	Õ 229	§ 245
6	♠ 6	▬ 22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	• 7	↨ 23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	◘ 8	↑ 24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	○ 9	↓ 25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	◙ 10	→ 26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	╗ 186	╩ 202	┌ 218	Û 234	· 250
B	♂ 11	← 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	ø 155	½ 171	┐ 187	╦ 203	▓ 219	Ù 235	¹ 251
C	♀ 12	∟ 28	, 44	< 60	L 76	\ 92	l 108	| 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▬ 220	ý 236	³ 252
D	♪ 13	↔ 29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	♫ 14	▲ 30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	☼ 15	▼ 31	/ 47	? 63	O 79	_ 95	o 111	⌂ 127	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▬ 223	´ 239	255



Latin 1 Euro Symbol Set

Includes US ASCII (dec. 1-127) and Windows 3.1 Latin 1 Extension Symbol Sets

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL 0	DLE 16	SP 32	0 48	@ 64	P 80	` 96	p 112	€ 128	144	NBS 160	° 176	À 192	Ð 208	à 224	ð 240
1	SOH 1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	‘ 145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	STX 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	, 130	’ 146	¢ 162	2 178	Â 194	Ò 210	â 226	ò 242
3	ETX 3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	*f* 131	“ 147	£ 163	3 179	Ã 195	Ó 211	ã 227	ó 243
4	EOT 4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	„ 132	” 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	ENQ 5	NAK 21	% 37	5 53	E 69	U 85	e 101	u 117	… 133	• 149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	ACK 6	SYN 22	& 38	6 54	F 70	V 86	f 102	v 118	† 134	– 150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	BEL 7	ETB 23	' 39	7 55	G 71	W 87	g 103	w 119	‡ 135	— 151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	ˆ 136	˜ 152	¨ 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	‰ 137	™ 153	© 169	1 185	É 201	Ù 217	é 233	ù 249
A	LF 10	SUB 26	* 42	: 58	J 74	Z 90	j 106	z 122	Š 138	š 154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	‹ 139	› 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	FF 12	FS 28	, 44	< 60	L 76	\ 92	l 108	| 124	Œ 140	œ 156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	CR 13	GS 29	- 45	= 61	M 77	] 93	m 109	} 125	141	157	- 173	½ 189	Í 205	Ý 221	í 237	ý 253
E	SO 14	RS 30	. 46	> 62	N 78	^ 94	n 110	~ 126	142	158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	SI 15	US 31	/ 47	? 63	O 79	_ 95	o 111	127	143	Ÿ 159	¯ 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255



This page left intentionally blank.

APPENDIX C

Resident Scalable Font Numbers

The following is a list of HP Resident Scalable fonts and font numbers for twinax printers. Fonts with ID numbers 410 through 490 are fixed pitch fonts. All others are proportional fonts. Refer to page 4-3 "Font Change Commands" to implement resident scalable font changes.

APPENDIX C

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
Symbol PS	3450
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

Font	Font ID No.
Arial italic	6327
Arial bold italic	6347
Garamond Antiqua	8503
Garamond Halbfett	8523
Garamond Kursiv	8631
Garamond Kursiv Halbfett	8651
Coronet	8759
Clarendon condensed	8779
Marigold	8887
Albertus medium	12855
Albertus extra bold	12875
Times New	16951
Times New bold	16971
Times New italic	17079
Times New bold italic	17099
Antique Olive	33335
Antique Olive bold	33355
Antique Olive italic	33463
Univers medium condensed	33591
Univers bold condensed	33601
Univers medium condensed italic	33719
Univers bold condensed italic	33729
Univers medium	34103
Univers bold	34123
Univers medium italic	34231
Univers bold italic	34251

APPENDIX C

Font	Font ID No.
Helvetica	33103
Helvetica bold	33123
Helvetica Oblique	33231
Helvetica Oblique bold	38251
Helvetica Narrow	31103
Helvetica Narrow bold	31123
Helvetica Narrow Oblique	31231
Helvetica Narrow Oblique bold	31251
Palatino Roman	6099
Palatino bold	6119
Palatino italic	6227
Palatino bold italic	6247
ITC Avant Garde Gothic Book	32591
ITC Avant Garde Gothic Demi	32601
ITC Avant Garde Gothic Book Oblique	32719
IC Avant Garde Gothic Demi Oblique	32729
ITC Bookman Light	4909
ITC Bookman Demi	4929
ITC Bookman Light italic	5037
ITC Bookman Demi italic	5057
New Century Schoolbook Roman	16941
New Century Schoolbook bold	16961
New Century Schoolbook italic	17069
New Century Schoolbook bold italic	17089

Font	Font ID No.
3812 Font Numbers which use the CG Times Typeface	
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

This page left intentionally blank.

APPENDIX D

Printing Bar Codes

Using the I-O bar code feature, the following bar codes can be easily printed from the IBM host.

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, therefore, any height or width specifications are ignored.

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

<type> — Specifies the bar code type according to the table shown above.

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

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

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

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

Width parameters can range from 1 to 9.

To determine the total length of the bar code, simply multiply the module length (found in the table on the following page) with 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 interface 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 inches.

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

Module width (from table below:) 3.6 mm (.14 inches)
Calculation: 11 x 3.6 mm = 39.6 mm = 3.96 cm; or 11 x .14 in = 1.54 inches

Module Width in mm (inches) - PCL Laser

Width	1	2	3	4	5	6	7	8	9
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)
Interleaved 2 of 5	2.3 (.09)	3.2 (.12)	4 (.16)	4.9 (.19)	5.8 (.23)	6.6 (.26)	7.5 (.3)	8.4 (.33)	9.3 (.36)
Postnet	5.7 (.23)								
EAN-13	1.5 (.06)	2 (.08)	2.5 (.1)	3.1 (.12)	3.6 (.14)	4.2 (.16)	4.7 (.18)	5.2 (.20)	5.8 (.23)
EAN-8	1.7 (.07)	2.3 (.09)	2.9 (.11)	3.6 (.14)	4.2 (.16)	4.8 (.19)	5.4 (.21)	6.1 (.24)	6.7 (.26)
UPC A	1.6 (.06)	2.2 (.08)	2.8 (.11)	3.4 (.13)	4 (.16)	4.6 (.18)	5.2 (.2)	5.8 (.23)	6.4 (.25)

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

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

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

<chkd> Indicates whether the I-O interface automatically calculates and causes a check digit to be printed. The following bar codes **require** a check digit, therefore, the interface automatically generates and adds a check digit to the bar code data: Code 128, POSTNET, UPC A, EAN 8, EAN 13 If any of the bar codes listed above has been selected, the <chkd> selection is ignored by the interface. However, one of the following values must be entered to ensure the bar

code command string is complete and valid. The options for the <chkd> parameter are:

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

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

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

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

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

<data> The data to be printed as a bar code. Some bar codes require a certain number of characters. Others only allow alphanumeric or numeric characters. Before the I-O interface 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 interface will print "Invalid Data" in the place of the bar code.

Notes:

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

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

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

   ¬B2,6,6,3,0,0,code128¬B

   The interface would cause all characters after the invalid value 3 to be printed:

   ,0,0,code128

   This helps quickly identify where the mistake occurred.

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

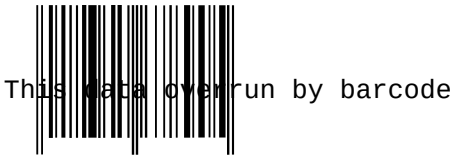
4. If invalid data (either too many characters or the wrong type of characters) is entered, the interface will print the error message: ** Invalid Data **

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

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

   ¬B5,7,1,0,0,0,1234567890¬B
   This data overrun by bar code

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



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

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

Overview and Examples

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

Code 3 of 9

Maximum number of data characters:	30
Valid numeric characters:	0-9
Valid alphanumeric characters:	A-Z
Valid other characters:	space $ % + - . / *

Example:
¬B1,4,1,1,1,1,0123456789¬B

POSTNET

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

Example:
¬B4,1,1,1,1,0,0123456789¬B

UPC A

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

Example:
¬B5,5,1,1,1,0,0123456789¬B

APPENDIX D

EAN 8

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

Example: ¬B6,3,1,1,1,0,1234567¬B

EAN 13

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

Example: ¬B7,3,1,1,1,0,012345678912¬B

Interleaved 2 of 5

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

Example:
¬B3,3,1,1,1,0,0123456789¬B

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 interface adds an "0" to the beginning of the bar code. If an even number of data characters (including the optional check digit) is entered, the interface prints the bar code exactly as it is input.

Code 128

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

1. Define which code set you want to use. For example, type "A" to represent code A; type "B" to represent Code B; and type "C" to represent code C.

2. If you are using code set B, enter the data characters directly. The ~ character and other special characters are represented by the Symbol Character Value found in the left column of the table on the following pages.

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

Maximum number of data characters:	30 (includes special characters)
Valid characters:	Differs with selected code set, see table on following pages

Example: ¬B2,3,2,1,1,0,BABCDEFGHIJKLMNOPQRSTUVWXYZ¬B

APPENDIX D

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 10PrintBoxes10

¬B2,...,A1716~6PrintBoxes~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
PrintBoxes:	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

Symbol Character Value	Data Character Code A	Code B	Code C
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

Symbol Character Value	Data Character Code A	Code B	Code C
21	5	5	21
22	6	6	22
23	7	7	23
24	8	8	24
25	9	9	25
26	:	:	26
27	;	;	27
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
56	X	X	56
57	Y	Y	57
58	Z	Z	58

APPENDIX D

Symbol Character Value	Data Character Code A	Code B	Code C
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	8
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	S	o	79
80	DLE	p	80
81	DC1	q	81
82	DC2	r	82
83	DC3	s	83
84	DC4	t	84
85	NAK	u	85
86	SYN	v	86
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

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

This page left intentionally blank.

APPENDIX E

I-O Graphics Language™ Overview

The following table is an overview of the I-O Graphics Language™ (IOGL) command strings and a brief description of the parameters used in the IOGL strings.

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

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

Parameter	Description	Units of Measurement	Valid Values
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
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

APPENDIX E

Helpful Hints

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

   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.

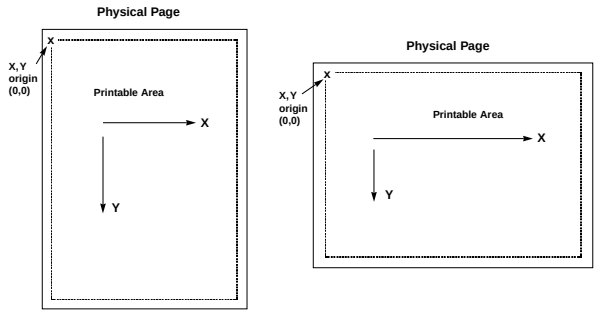


Figure 1

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 interface to print the string at the place the error occurred.

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

   ¬GL30;**A**;1;1;600

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

   A;1;1;600

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

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

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

Basic Description

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

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

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

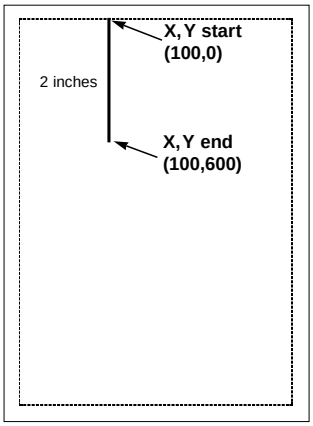


Figure 2

Boxes - ¬GB<line width>;<x start>;<y start>;<x end>;<y end>;<% shading>

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

For example: **¬GB2;300;300;600;600;30** draws a box with 2 mm wide border and 30% shading (Figure 3)

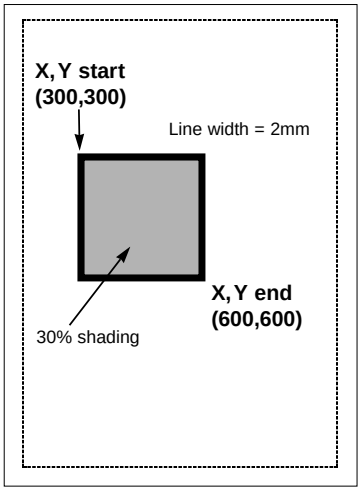


Figure 3

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 xy center.

For example: **¬GC2;900;2400;300;70** draws a circle with a radius of 1 inch (300/300 inches) (Figure 4)

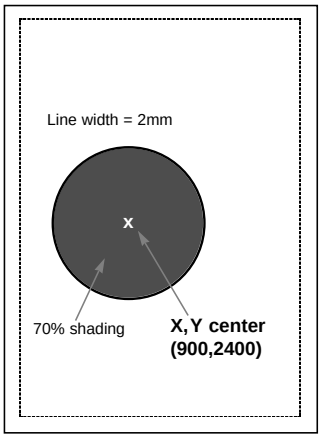


Figure 4

Note: To avoid cutting of 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.

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

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

For example: **¬GA1;500;900;900;900;180** draws an arc (semi-circle since rotation is 180 degrees) (Figure 5)

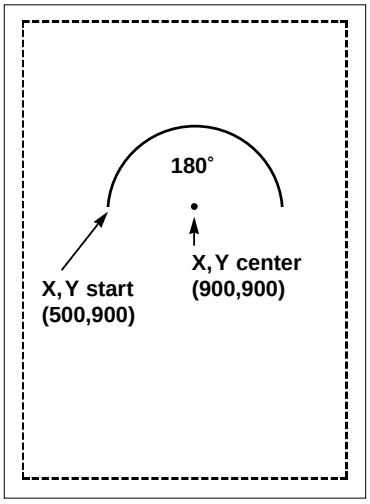


Figure 5

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

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

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

Pie Chart - ¬GP<line width>; <x center>;<y center>;<radius>;<# of segments>;<segment value 1>;<segment value 2>;....
Draws a pie chart around the xy center with the specified radius (in n/300 inches), number of segments (maximum of 9), and segment values. Segment values are entered as numeric and converted to percentages. Segment values can range from 0 to 100.

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

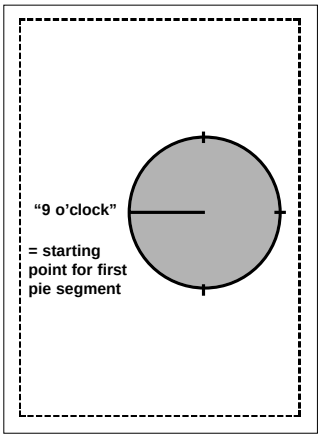


Figure 6a

For example: **¬GS3;01;20;02;50;04;80 ¬GP5;900;2400;600;3;10;20;30** draws a three-segment pie chart. If the attached printer is a PCL color printer, the first segment will be blue (01), the second segment will be red (02), and the third segment will be green (04). The segments will be shaded at 20%, 50%, and 80% respectively.

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

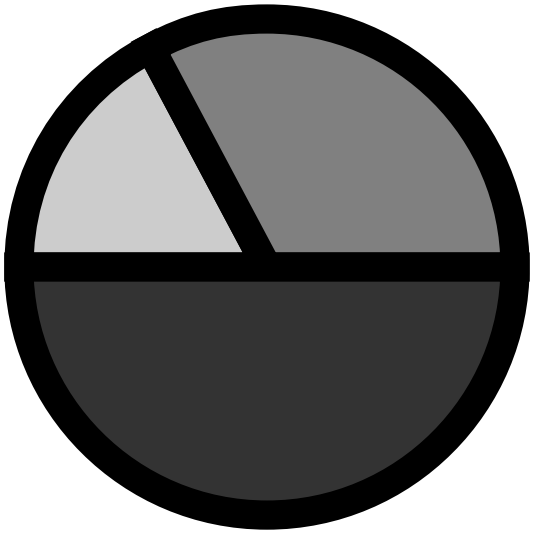


Figure 6b

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

Draws a bar chart. xy start specifies the bottom left hand corner of the first bar (the origin on the chart's xy-scale). The x increment specifies the horizontal movement before the next bar is printed. The y increment (in n/300 inches) determines the height of the bar (multiplied by the value). The bar width (in n/300 inches) specifies the width of the bar. Bar chart values can range from 0 to 3,000. Each bar will have the color and/or shading as specified in the shading command (bar 1 is color/shading value 1,...). A maximum of 12 bars can be printed.

For example: **¬GS3;01;20;02;50;04;80**
¬GH1;100;2400;300;1;100;3;500;600;800 draws three bars. If the attached printer is a PCL color printer, the first bar will be blue, the second red, and the third green. The bars will be shaded 20%, 50%, and 80% respectively (Figure 7).

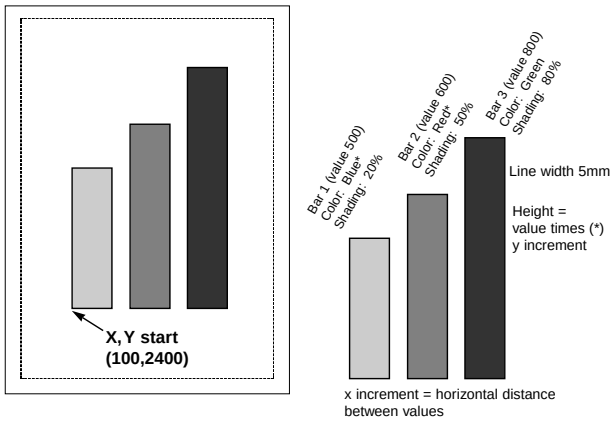


Figure 7

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

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

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

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

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

For example: **¬GR3;900;2400;150;1;5;100;300;200;500;400** draws a run (line) chart (Figure 8).

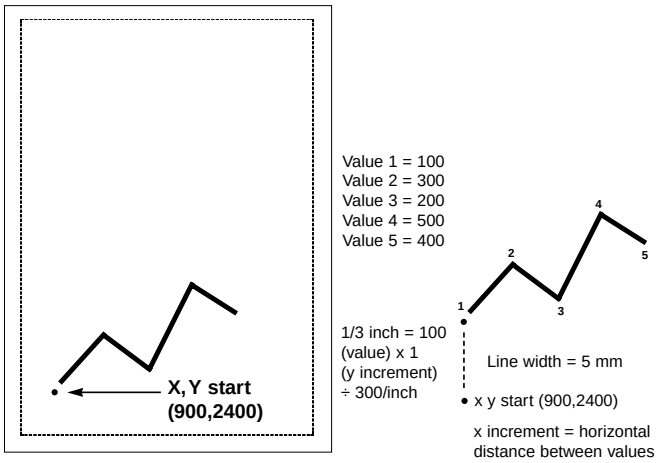


Figure 8

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

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

Prints the text ('text') in the active font, with the specified rotation and specified xy start. Text will be rotated counter clockwise.

For example: **¬GT1000;1000;90;'TEXT**' prints the word "TEXT" in the active font with 90 degree rotation (Figure 9).

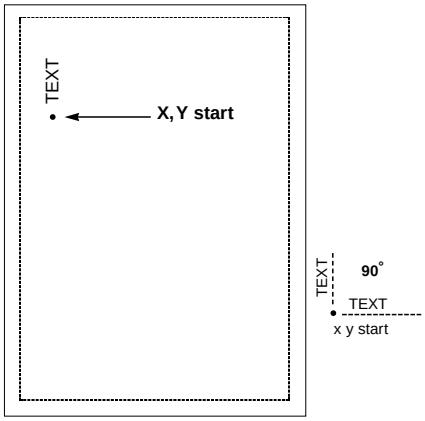


Figure 9

Comments - ¬GX<'text'>

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

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

APPENDIX E

I-O Graphic Language™ (IOGL) in Action

General Steps

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

1. Determine which IOGL elements are needed to create the desired output (i.e. the bar chart shown below uses four different IOGL elements).

2. Determine the printable area of the page.

3. Determine the positioning of the graphical elements relative to the top left hand corner of the printable area.

4. **PCL color printer only**. Determine the order in which to print the graphical elements. The lines of the last IOGL element will overlap (and cover) the previous IOGL elements.

5. Design the graphical output, one element at a time.

6. Link the graphical output with your host application.

Tutorial

The following example (Figure 10) shows how multiple IOGL elements interact to create a bar chart.

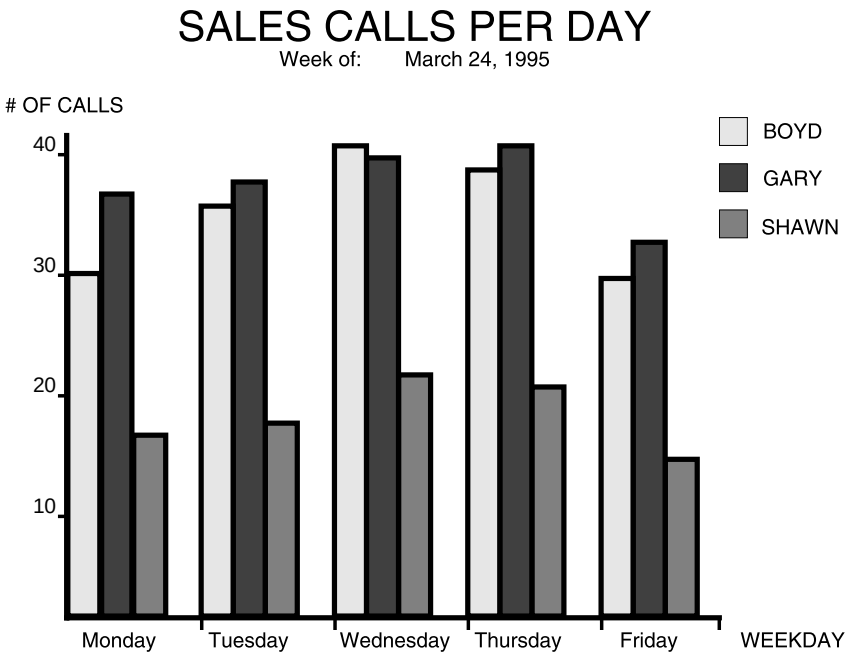


Figure 10

1. Following the above mentioned general steps, we first determined the makeup of this bar chart. The example consists of four IOGL elements: bar charts, lines, boxes, and text.

2. To determine the printable area of the paper, we printed a box using 0;0 as the x;y -start coordinates. This was done by typing ¬GB1;0;0;300;300;50 on the screen and sending it to the printer. The top left corner of the printed box marks the top left corner of the printable area of the page. For reference, we drew the printable area on the blank sheet of paper. All references to distances are made in respect to the printable page, not the actual physical page. Refer to Figure 1 on page 5-21.

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 (Figure 11).

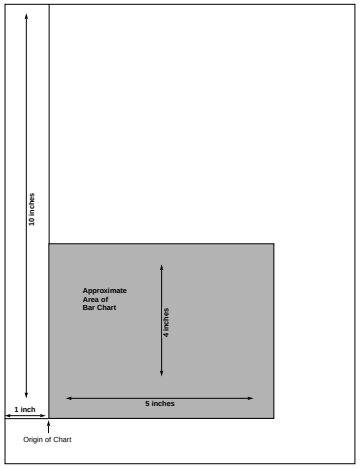


Figure 11

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

4. If the chart is being printed on a black and white PCL printer, the order in which these elements are created is irrelevant. However, if you are printing on a PCL color printer, the lines of the last element will always overlay (and cover) the element previously printed. In the example, the elements creating the x and y-axes should be entered last when printing on a PCL color printer.

5. Create the separate IOGL elements based on the order determined in Step 4. In the example, the bar charts were created first. Recall the IOGL formula for the bar chart and the preceding shading/color command string:

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

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

The bar chart shown on page 5-31 was created using the following parameters:

Bar Chart Boyd

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

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

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

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

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

APPENDIX E

Bar Chart Gary

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

```
300      (Boyd's)
+ 75     (Bar width)
375
```

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:

```
375      (Gary's)
+ 75     (Bar width)
450
```

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
```

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

¬GC'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

APPENDIX E

Labels/Title/Subtitle/Legend

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

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

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

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

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

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

Linking Graphical Output to a Host Application

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

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

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

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

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

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

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

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

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. These products are offered through

the printer manufacturer and/or various third party vendors. While the process of loading the cartridge or SIMM differs, the final result is the same. The stored image is assigned a macro ID number that must be called up by the application when the image is to be printed. Please refer to the documentation supplied with the cartridge or SIMM for instructions on how to store an image.

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

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

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

APPENDIX F

Color Printing

The I-O 4260 LaserCard allows color printing when using a color printer. Simply insert the I-O color command in front of the text you want to colorize. Return to the "normal" black color by inserting ¬C00 or ^C00. The I-O color commands are:

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

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

This prints ¬C02red¬C00 in red.

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

This page left intentionally blank.

Manufacturer's One Year Limited Warranty (United States)

The following warranty applies only to products purchased and operated within the United States.

I-O Corporation (I-O) warrants this product against defects in material and workmanship for a period of one year commencing from date of purchase by the original customer, when operated and maintained in accordance with I-O's published specifications. I-O's liability shall be limited, at its option and expense, to refund to buyer the actual amount paid by buyer or to repair or replace any defective or nonconforming product or part thereof, F.O.B. I-O's authorized repair depot. Buyer may obtain a replacement product by meeting the terms of the I-O Customer On-Site Exchange Repair Policy in effect at the time of the request.

THE EXPRESS WARRANTY SET FORTH ABOVE IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. OTHERWISE, THE PRODUCTS ARE SOLD AS IS WITHOUT FURTHER OBLIGATION OR LIABILITY ON THE PART OF I-O. I-O EXPRESSLY EXCLUDES ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCEPT AS EXPRESSLY SET FORTH HEREIN, IN NO EVENT SHALL I-O BE LIABLE FOR ANY CLAIMS OR DAMAGE ARISING DIRECTLY OR INDIRECTLY FROM THE FURNISHING OR FAILURE TO FURNISH PRODUCTS, SPARE OR REPLACEMENT PARTS, INFORMATION OR SERVICES HEREUNDER. UNDER NO CIRCUMSTANCES SHALL I-O BE LIABLE IN ANY WAY FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO LOST BUSINESS OR PROFITS, WHETHER OR NOT FORESEEABLE AND WHETHER OR NOT BASED ON BREACH OF WARRANTY, CONTRACT, OR NEGLIGENCE.

This page left intentionally blank.

Customer On-Site Exchange Repair Policy

Terms, Conditions, and Limitations
Effective May 1, 1994[a]

For products covered by the I-O Corporation (I-O) Manufacturer's Limited Warranty (United States), I-O's Customer On-Site Exchange (COE) Repair Policy provides customers with a replacement unit for a defective product, subject to the following terms and conditions:

Call Customer Support

- If a product fails call I-O Customer Support for assistance at (801) 972-1446.

Verify Product Failure

- I-O will verify the product serial number, warranty coverage and product failure.

* You are responsible for assisting in verifying the product failure.

- When I-O Customer Support verifies a product failure they will issue a Return Merchandise Authorization (RMA) number for the failed product.

Replacement Units

- Replacement units are shipped from I-O's stock of refurbished units, subject to availability.

- Replacement units carry the same warranty as remaining on the original product.

- I-O's COE Repair Policy applies only to warranted product failures. Buyer guarantees payment for non-warranted product repairs or replacement.

Customer On-Site Exchange Repair Policy
(Continued)

Return Your Failed Unit

- When you return the failed product it must be shipped freight prepaid. Always note the RMA number on the outside of the package.

Install the Replacement Unit

- You are responsible for installing the replacement unit.
- After receiving the replacement unit please call I-O Customer Support if any assistance is required.

[a] I-O reserves the right to change the terms and conditions of this policy without notice.

Manufacturer's One Year Limited Warranty (International)

The following warranty applies only to products purchased or operated outside the United States.

I-O Corporation (I-O) warrants this product against defects in material and workmanship for a period of one year commencing from date of purchase by the original customer, when operated and maintained in accordance with I-O's published specifications. I-O's liability shall be limited, at its option and expense, to refund to buyer the actual amount paid by buyer or to repair or replace any defective or nonconforming product or part thereof, F.O.B. I-O's authorized repair depot. Buyer may obtain warranty service by meeting the terms of the I-O Return-to-Depot Repair Policy in effect at the time of the request.

THE EXPRESS WARRANTY SET FORTH ABOVE IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. OTHERWISE, THE PRODUCTS ARE SOLD AS IS WITHOUT FURTHER OBLIGATION OR LIABILITY ON THE PART OF I-O. I-O EXPRESSLY EXCLUDES ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCEPT AS EXPRESSLY SET FORTH HEREIN, IN NO EVENT SHALL I-O BE LIABLE FOR ANY CLAIMS OR DAMAGE ARISING DIRECTLY OR INDIRECTLY FROM THE FURNISHING OR FAILURE TO FURNISH PRODUCTS, SPARE OR REPLACEMENT PARTS, INFORMATION OR SERVICES HEREUNDER. UNDER NO CIRCUMSTANCES SHALL I-O BE LIABLE IN ANY WAY FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO LOST BUSINESS OR PROFITS, WHETHER OR NOT FORESEEABLE AND WHETHER OR NOT BASED ON BREACH OF WARRANTY, CONTRACT, OR NEGLIGENCE.

This page left intentionally blank.

Return-to-Depot Repair Policy

Terms, Conditions, and Limitations
Effective May 1, 1994[a]

For products covered by the I-O Corporation (I-O) Manufacturer's Limited Warranty (International), I-O's Return-to-Depot (RTD) Repair Policy provides customers with warranty service for a defective product, subject to the following terms and conditions:

Call Customer Support

- If a product fails call I-O Customer Support for assistance at: (801) 972-1446 for all locations outside the United States.

Verify Product Failure

- I-O will verify the product serial number, warranty coverage and product failure.
- You are responsible for assisting in verifying the product failure
- When I-O Customer Support verifies a product failure they will issue a Return Merchandise Authorization (RMA) number to authorize return of the failed product.

Select Your Preferred Repair Location

- I-O's Customer Support Representative will assist you in identifying the nearest I-O authorized repair depot.
- I-O's Customer Support Representative will provide you with an RMA transmittal form referencing the assigned RMA number and the authorized repair depot address.

Return-to-Depot Repair Policy

(Continued)

Return Your Failed Unit

- Return the failed product to the I-O authorized repair depot previously identified, enclosing the RMA transmittal form. When you return the failed product it must be shipped freight prepaid.

- I-O's RTD Repair Policy applies only to warranted product failures. Buyer guarantees payment for non-warranted product repairs.

Install Your Repaired Unit

- I-O's authorized repair depot will service the faulty unit and return it to you, freight prepaid.

- You are responsible for installing the returned unit.

- After receiving the repaired unit please call I-O Customer Support if any assistance is required.

[a] I-O reserves the right to change the terms and conditions of this policy without notice.

Manufacturer's One Year Limited Warranty (European Area)

The following warranty applies only to products purchased and operated within the European Area.

I-O Corporation (I-O) warrants this product against defects in material and workmanship for a period of one year commencing from date of purchase by the original end-user, when operated and maintained in accordance with I-O's published specifications. I-O's liability shall be limited, at its option and expense, to refund to original end-user the actual amount paid by original end-user or to repair or replace any defective or nonconforming product or part thereof, F.O.B. I-O's authorized repair depot. Original end-user may obtain a replacement product by meeting the terms of the I-O Customer On-Site Exchange Repair Policy in effect at the time of the request.

THE EXPRESS WARRANTY SET FORTH ABOVE IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. OTHERWISE, THE PRODUCTS ARE SOLD AS IS WITHOUT FURTHER OBLIGATION OR LIABILITY ON THE PART OF I-O. I-O EXPRESSLY EXCLUDES ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCEPT AS EXPRESSLY SET FORTH HEREIN, IN NO EVENT SHALL I-O BE LIABLE FOR ANY CLAIMS OR DAMAGE ARISING DIRECTLY OR INDIRECTLY FROM THE FURNISHING OR FAILURE TO FURNISH PRODUCTS, SPARE OR REPLACEMENT PARTS, INFORMATION OR SERVICES HEREUNDER. UNDER NO CIRCUMSTANCES SHALL I-O BE LIABLE IN ANY WAY FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO LOST BUSINESS OR PROFITS, WHETHER OR NOT FORESEEABLE AND WHETHER OR NOT BASED ON BREACH OF WARRANTY, CONTRACT, OR NEGLIGENCE.

This page left intentionally blank.

Customer On-Site Exchange Repair Policy

Terms, Conditions, and Limitations
Effective June 1, 1997[a]

For products covered by the I-O Corporation (I-O) Manufacturer's Limited Warranty (European Area), I-O's Customer On-Site Exchange (COE) Repair Policy provides original end-users with a replacement unit for a defective product, subject to the following terms and conditions:

Call Customer Support

- If a product fails call I-O Customer Support for assistance at 44(0) 1908 567722.

Verify Product Failure

- I-O will verify the product serial number, warranty coverage and product failure.
- You are responsible for assisting in verifying the product failure.
- When I-O Customer Support verifies a product failure they will issue a Return Merchandise Authorization (RMA) number for the failed product.

I-O Ships Replacement Unit

- Replacement units are shipped from I-O's stock of refurbished units, subject to availability.
- I-O will invoice you for full retail value of the replacement unit upon shipment from I-O.
- Replacement units carry the same warranty as remaining on the original product.
- I-O's COE Repair Policy applies only to warranted product failures. You must pay for non-warranted product repairs or replacement.

Customer On-Site Exchange Repair Policy
(Continued)

Return Your Failed Unit

- When you return the failed product it must be shipped freight prepaid. To insure proper tracking always note the RMA number on the outside of the package.
- I-O will issue you a credit (reversing the replacement unit invoice amount) when the failed product is received by I-O.
- If you do not return the failed product (or pay the replacement unit invoice) within 14 calendar days of the date the replacement unit is shipped from I-O, your warranty coverage and service will be suspended on all I-O products you own.

Install the Replacement Unit

- You are responsible for installing the replacement unit.
- After receiving the replacement unit please call I-O Customer Support if any assistance is required.

[a] I-O reserves the right to change the terms and conditions of this policy without notice.

INDEX

INDEX

DECLARATION OF CONFORMITY

EUROPEAN COMMUNITY COMPLIANCE STATEMENT:

This product is in conformity with the protection requirements of EC Council Directives 72/23/EEC, and 89/336/EEC on the approximation of the laws of the Member States relating to: Standard EN60950 (Safety of Information Technology Equipment); Standard EN50082-1 (Generic Immunity Standard for Residential, Commercial, and Light Industrial Products); and Standard EN55022 (Limits and Methods of Measurement of Radio Interference from Information Technology Equipment).

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

DECLARATION OF CONFORMITY

This page left intentionally blank.