# I-O 4430/4431Printer Interface
# for
# ASCII printing from IBM Twinax
# and IBM Coax Mainframe Systems

# User's Guide

Version 201

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| I-O 4430/4431 Interface | Version 201 |
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## TABLE OF CONTENTS

# INTRODUCTION

The I-O **4430/4431** Print Box you have purchased is a powerful, yet easy-to operate external printer interface. The Print Box can easily be set up through the rotary switch, or Host download commands. This Print Box was engineered and manufactured by I-O Corporation, the largest third-party supplier of IBM compatible printer interfaces in the world.

The I-O Print Box **4430** attaches virtually any parallel ASCII printer to an AS/400, System/3X host, or IBM 3270 Coax Mainframe. It offers reliable emulations of IBM 3812, 4214, 5224, 5225, 5256, or 3287 printers. When connected to a laser printer operating in PCL mode, the I-O Print Box allows Computer Output Reduction (COR) and Automatic Print Orientation (APO). In addition, paper can be pulled from several sources, jobs can be printed on both sides of the paper, and a multitude of fonts (printer resident or from optional cartridges) are supported.

The I-O Print Box **4431** offers the same functionality as the 4430 except for use with serial printers.

The I-O **4430/4431** automatically adjusts to the host environment by sensing which host adapter cable has been attached. The interface comes in either a Centronics compatible parallel (4430) or RS-232 serial (4431) configuration. Its low power consumption (less than 80 mA) allows the interface to be used with no external power supply when connected to a parallel printer with +5volts on pin #18.

## Unpacking

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 package should include the following:

- I-O 4430 parallel, or 4431 serial interface
- Auto-terminating 9-pin twinax V-cable or coax adapter cable
- This I-O 4430/4431 Interface User's Guide
- External power supply (5V DC output)

# INSTALLATION

Before connecting the I-O 4430/4431 Interface to the printer, verify that the printer functions properly by performing a printer self-test. Consult the printer's user's guide for instructions on how to start and evaluate the printer self-test. If the printer functions properly, proceed with the installation of the I-O 4430/4431 interface.

1. Configure the interface for the printer to which it is to be used. From the chart below, select the appropriate emulation that the printer requires. This operation is easier when holding the 4430/4431 in your hands before attaching it to the printer.

    a. Attach the provided 9-pin Host cable adapter (Twinax V-cable, Coax adapter cable), to the 4430/4431. (attach the adapter cable only, do not attached the Twinax or Coax cables to the host)
    b. Set the rotary switch to position "C"
    c. Using the supplied power supply, apply power to the interface and observe the LED's "3-flash" pattern.
    d. Now move the rotary switch to the position number for the desired printer emulation listed in the chart below.
    e. Observe the LED, after 30 seconds, the LED will "flicker" rapidly, indicating it is saving the selection.
    f. When the LED displays a single flash pattern, power should be removed.

2. Attach the interface to the printer's parallel or serial port (depending on the interface model).

    **Note:** For serial printers, you may need to set the serial parameters (Baud, Bits, Stop, Parity) by following instructions in the "Configuration" section of this manual. Also, not all serial printers are wired the same. The 4431 will work directly with the majority of existing serial printers. Some printers may require that you obtain a Null Modem or M/F gender changer. These inexpensive devices must be installed between the 4431's serial connector and the printer's serial port.

3. Set the rotary switch to position "**7**" to select a "self-test" printout.

4. Apply power to the printer. If the parallel printer can supply power to the 4430, it will start to function now and you will see the LED flash. For a 4431 and those parallel printers that do not supply power, you now plug the power supply into the 4433/4430 after the printer is powered on.

5. The LED should Flash a single flash pattern until the printer is "READY". When the 4430/4431 detects that the printer is "READY" it will send its "self-test" pattern to the printer.

6. Examine the "self-test" to see if other settings need to be changed. These can be set, following directions in the "Configuration" section. If the self-test did not print, or other problems were observed, refer to the "Problem Resolution" section.

7. When you are satisfied with the configuration settings listed on the "self- test", you are ready to use the interface. You may now attach the host cables to the adapter cable ends. For Twinax installations, be sure that you have set the proper cable address. This can be easily done by setting the rotary switch to the desired address, and applying power to the interface.

8. Congratulations, you are ready to start sending print jobs from your host system.

| Switch Setting | Printer Type |
|---|---|
| 0 | IBM PPDS (dot matrix) |
| 1 | Epson ESC/P2 |
| 2 | HP PCL (with PJL commands) |
| 3 | Twinax = I-O 8215 emulation<br>Coax = IBM PPDS (Laser) |
| 4 | HP PCL (without PJL commands) |
| 5 | IBM Proprinter |
| 6 | Epson LQ |
| 7 | Epson DFX+ (supports 15cpi) |
| 8 | Epson FX (emulates 15cpi) |
| 9 | Generic Printer |

**Note:** Settings 2 and 4 (HP PCL) will automatically override the IBM printer emulation setting to 3812.

# CONFIGURATION - TWINAX

## Host Configuration

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

1. Make sure you have selected and permanently stored the desired IBM emulation on the interface. This can be done using the rotary switch selection “C” (refer to next section), or Host download command Z24 (to select emulation) followed by command Z99,0 (to save).
2. Make sure the interface is properly connected to the twinax host and the correct device address is set.
3. Power on the printer and the interface. The AS/400 will auto-configure the printer address according to the interface settings.

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

If you are using a S/3X host you must configure the host manually. The table below shows the recommended emulation and device ID for the different host systems.

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

## Rotary Setup Switch

The interface can be configured through the Rotary Setup Switch or by sending download commands from the host.

The following table shows the functions associated with the various Setup Switch positions. Please note that positions 9, B, C, D and E are "dual function" positions. They are read at initial power up and must be followed by a secondary switch setting to define the desired value. Tables 1 to 5 list these secondary settings.

| Switch No. | Function at power up | Function after power up |
|---|---|---|
| 0-6 | Twinax host address | No function |
| 7 | Self-test printout | No function |
| 8 | Restore factory defaults and print a self-test | No function |
| 9 | Code Page selection and twinax Printer emulation - See table 1<br>For secondary settings. | EBCDIC Hex Dump Mode |
| A | Normal Operation | Normal operation |
| B | Host default language - See Table 2 for secondary settings | ASCII Hex Dump mode |
| C | ASCII printer emulation - See Table 3 for secondary settings | No function |
| D | 4431 Printer Baud Rate – See Table<br>4 for secondary settings | No function |
| E | 4431 Serial settings – See Table 5 for secondary settings | No function |
| F | Diagnostic test – Remove all host cables prior to selection | No function |

## Secondary Switch Settings

If the Setup Switch is in the 9, B, C,D or E position when the I-O 4430/31 is powered up, a secondary selection is required. After the power-up, the interface's LED will blink in a three (3) flash pattern for approximately 30 seconds. During this time the Setup Switch must be changed to the appropriate secondary setting (see tables below). Simply turn the Setup Switch to the desired secondary setting and wait until the 30-second interval expires. At that time the LED will permanently save the information. The LED will briefly flicker during the saving process and then display a rapid one (1) flash pattern indicating that the interface is not in an operating mode. If an invalid selection was made, the LED will not display the rapid flicker nor the one (1) flash pattern.

### Table 1 - Secondary Settings for Position 9

Secondary switch settings of position "9" during the three (3) flash pattern. This selects the twinax printer emulation as well as the ASCII code page (character set) used. If both printer emulation and code page need to be changed, the process needs to be done twice. The emulation setting only applies to matrix printers, as the HP driver sets it to 3812.

| Switch Setting | Selected Value |
|---|---|
| 0 | 5256 Emulation |
| 1 | 5224 Emulation |
| 2 | 5225 Emulation |
| 3 | 4124 Emulation |
| 4 | No Change |
| 5 | Code Page 437 |
| 6 | Code Page 850 |
| 7 to F | No Change |

### Table 2 - Secondary Settings for Position B

Secondary switch settings of position "B" during the three (3) flash pattern. This is used to select the Host Default Language.

| Switch Setting | Twinax Language |
|---|---|
| 0 | Multinational |
| 1 | US / Canada |
| 2 | Austrian / Germany |
| 3 | Belgium |
| 4 | Brazil |
| 5 | French Canadian |
| 6 | Norway / Denmark |
| 7 | Finland / Sweden |
| 8 | France |
| 9 | Italy |
| A | Japan (English) |
| B | No Change |
| C | Portugal |
| D | Spain |
| E | Spanish Speaking |
| F | United Kingdom |

**Note :** The rotary switch number corresponds with the Host Download number for the command Z05,X. If the Switch is not moved from the position "B", no change is made.

### Table 3 - Secondary Settings for Position C

Secondary switch settings of position “C” during the 3 flash pattern. This is used to select printer ASCII command language to be used.

| Switch Setting | Value Selected |
|---|---|
| 0 | IBM PPDS (dot matrix) |
| 1 | Epson ESC/P2 |
| 2 | HP PCL (with PJL commands) |
| 3 | I-O 8215 emulation |
| 4 | Hp PCL (without PJL commands) |
| 5 | IBM Proprinter |
| 6 | Epson LQ |
| 7 | Epson DFX+ (prints 15cpi) |
| 8 | Epson FX (emulates 15cpi) |
| 9 | Generic Printer |
| A-F | No Change |

### Table 4 - Secondary Settings for Position D

Secondary switch settings of position “D” during the 3 flash pattern. This is used to select the Baud rate of the attached printer when using the serial 4431 interface. There is no function for a 4430.

| Switch Setting | Value Selected |
|---|---|
| 0 | 38.4K baud |
| 1 | 19.2K baud |
| 2 | 9600 baud |
| 3 | 4800 baud |
| 4 | 2400 baud |
| 5 | 1200 baud |
| 6 | 600 baud |
| 7 | 300 baud |
| 8-F | No Change |

### Table 5 - Secondary Settings for Position E

Secondary switch settings of position “E” during the 3 flash pattern. This is used to select serial settings to match the attached serial printer’ settings for the 4431. There is no function with the 4430.

| Switch Setting | Value Selected |
|---|---|
| 0 | No parity, 8 bits, 1 stop bit (N,8,1) |
| 1 | No parity, 8 bits, 2 stop bits (N,8,2) |
| 2 | No parity, 7 bits, 1 stop bit (N,7,1) |
| 3 | No parity, 7 bits, 2 stop bits (N,7,2) |
| 4 | Odd parity, 8 bits, 1 stop bit (O,8,1) |
| 5 | Odd parity, 8 bits, 2 stop bits (O,8,2) |
| 6 | Odd parity, 7 bits, 1 stop bit (O.7.1) |
| 7 | Odd parity, 7 bits 2 stop bits (O,7,2) |
| 8 | Even parity, 8 bits 1 stop bit (E,8,1) |
| 9 | Even parity, 8 bits, 2 stop bits (E,8,2) |
| A | Even parity, 7 bits, 1 stop bit (E,7,1) |
| B | Even parity, 7 bits, 2 stop bits (E,7,2) |
| C-F | No Change |

## Host Download Commands

By sending download commands from the Host to the I-O Print Box, you can change all configuration parameters not already covered through the configuration switches.

Most Host download commands are placed in a Host document or on the screen. Regardless of whether the incoming print job is a screen print, a spread sheet or a word-processing document created on the host, the interface will recognize the Host download command.

The command itself will not be printed if it was entered correctly. 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.

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

**Tip:** Save the Host download commands in a separate file. If you need to re-configure the I-O 4430/4431 at a later time, or if you need to configure more than one I-O Print Box, just "print" the file containing the Host download commands.

Take the following steps to enter a host download command.

1. Type the Command Pass-Thru delimiter **&%** (or alternate CPT start delimiter) in the document at the point where the command is to take effect.

2. Type an upper case "Z".

3. Type the command number for the command to be used, as shown in the table. Always use two digits for the command number (i.e. &%Z05,)

4. Type a comma.

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

6. A space or control character (i.e., NL, FF, CR, LF) signals the end of the download command.

7. Multiple commands can be chained together by using a slash (/) or back slash (\) to separate the commands (no spaces allowed). For example, to set the Default Print Quality (Command 22) to NLQ (Value 1), Draft Printing (Command 23) to Fast Draft (Option 1), and the Wrap/Truncate Text selection (Command 26) to Truncate (Option 1), type:

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

The following table shows the Host/PC Download commands for the I-O 4430/4431 and corresponding command numbers in alphabetical order:

| Host/PC Download Command | Command Number |
|---|---|
| 10 CPI String | 86 |
| 15 CPI String | 87 |
| 15 CPI Printing (Proprinter Mode only) | 28 |
| 6 LPI String | 84 |
| 8 LPI String | 85 |
| 11" x 17" / A3 Printing | 32 |
| Alternate CPT Start Delimiter | 01 |
| Alternate CPT End Delimiter | 02 |
| Automatic Print Orientation | 08 |
| Character Set | 17 |
| Command Pass-Thru | 44 |
| Default Print Quality | 22 |
| Draft Printing | 23 |
| Duplex Printing | 33 |
| Host Language | 05 |
| Host Port Initialization | 11 |
| IBM Printer Emulated | 24 |
| IBM Motion Commands | 25 |
| Override Format Commands | 16 |
| Paper Bin Selection | 09 |
| Paper Drawer 1 | 13 |
| Paper Drawer 2 | 14 |
| Paper Drawer 3 | 15 |

| Host/PC Download Command | Command Number |
|---|---|
| Paper Drawer 4 | 30 |
| Paper Drawer 5 | 31 |
| Paper Size | 09 |
| Print Orientation | 07 |
| Print Setup Parameters | 98 |
| Restore Factory Defaults | 98 |
| Restore Previously Saved Configuration | 98 |
| Save All Current Settings | 99 |
| Serial Out Baud Rate (4431 only) | 72 |
| Serial Out Word Length (4431 only) | 73 |
| Serial Out Stop Bits (4431 only) | 74 |
| Serial out Parity (4431 only) | 75 |
| Starting Horizontal Position | 19 |
| Starting Vertical Position | 18 |
| True LPI | 04 |
| Truncate/Wrap | 26 |
| User Defined Fonts | 21 |
| User Defined Strings | 04 |
| Wrap/Truncate | 26 |

## Configuration Options

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

### COMMAND 01: ALTERNATE CPT START DELIMITER

Creates an alternate Command Pass-Thru (CPT) start delimiter. This delimiter is also an alternate Host/PC download delimiter. It may be one or two characters long. The first character may be any printable character other than "&." Only one alternate CPT start delimiter is allowed. The default "&%" will always be recognized as a valid 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/PC 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. 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 Lexmark 4039 printer to start underlining as command 3. The string is represented by the value 3. To use this function, place &%U3 in the document.

### COMMAND 05: HOST LANGUAGE

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

| 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

**HP PCL only.** Determines the print orientation if it 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 the heading “Print Orientation” in the section “Operations – Twinax” for a detailed description regarding print orientation.

**Example:** &%Z07,2 selects landscape

### COMMAND 08: AUTOMATIC PRINT ORIENTATION

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

| VALUE | DESCRIPTION |
|---|---|
| 0 | APO Off |
| *1 | APO On |

**Note:** Refer to page 4-14 for a detailed description regarding APO.

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

### COMMAND 09: PAPER SIZE/BIN SELECTION

Selects the paper size if the printer attached is a laser. If the printer attached is an Epson DFX dot-matrix printer with multiple-bins for different input paper paths, this command will either allow the bin commands to be passed onto the printer, or suppress those commands.

| VALUE | PCL LASER PRINTER | EPSON DFX DOT-MATRIX PRINTERS |
|---|---|---|
| *0 | Paper size specified by host software | Bin commands are sent to the printer |
| 1 | A4 size paper | No bin commands are sent to the printer |
| 2 | Paper size selected through Printer's front panel | |

**Example:** &%Z09,1 selects A4 size paper for a laser printer. &%Z09,1 tells the interface not to send any bin commands to an Epson DFX dot-matrix printer.

### COMMAND 10: TRUE LPI

**HP PCL only.** 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 the software setup for the XPoint Twinax Controller.

### COMMAND 11: HOST PORT INITIALIZATION STRING

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

| 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 Lexmark 4039 laser printer.

### COMMAND 13: PAPER DRAWER 1 COMMAND

**HP PCL only.** Matches the host's Paper Drawer 1 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 1, the printer will feed from the paper source assigned to paper drawer 1. Consult the printer's user's guide for the available paper sources and respective numbers. Refer to page 4-9 of this User's Guide for more information.

| VALUE | DESCRIPTION |
|---|---|
| 01 to 07 | Paper sources available on the printer |
| *01 | Default |

**Example:** &%Z13,05 assigns the optional 500-sheet cassette on an HP LaserJet 4 Plus to the host's paper drawer 1 command.

### COMMAND 14: PAPER DRAWER 2 COMMAND

**HP PCL only.** Matches the host's Paper Drawer 2 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 2, the printer will feed from the paper source assigned to paper drawer 2. Consult the printer's user's guide for the available paper sources and respective numbers. Refer to page 4-9 of this User's Guide for more information.

| VALUE | DESCRIPTION |
|---|---|
| 01 to 07 | Paper sources available on the printer |
| *04 | Default |

**Example:** &%Z14,05 assigns the optional 500-sheet cassette on an HP LaserJet 4 Plus to the host's paper drawer 2 command.

### COMMAND 15: PAPER DRAWER 3 COMMAND

**HP PCL only**. Matches the host's Paper Drawer 3 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 3, the printer will feed from the paper source assigned to paper drawer 3. Consult the printer's user's guide for the available paper sources and respective numbers. Refer to page 4-9 of this User's Guide for more information.

| VALUE | DESCRIPTION |
|---|---|
| 01 to 07 | Paper sources available on the printer. |
| *05 | Default |

**Example:** %Z15,04 assigns the multi-purpose tray on an HP LaserJet 4 Plus to the host's paper drawer 3 command.

### COMMAND 16: OVERRIDE FORMAT COMMANDS

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 printer also uses the font and character set selected.

| VALUE | DESCRIPTION |
|---|---|
| 0 | Roman 8 |
| *1 | CP 850 |
| 2 | CP 437 |
| 3 | CP 858 # |

| | |
|---|---|
| 4 | Latin 1 Euro # |

**Example:** &%Z17,4 selects the Latin 1 character set which includes the Euro symbol.

**Note:** # The Euro symbol is supported in code page 858 for dot-matrix printers, and in the Windows 3.1 Latin 1 character set for laser printers.

### COMMAND 18: STARTING VERTICAL POSITION

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

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

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

### COMMAND 19: STARTING HORIZONTAL POSITION

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

| VALUE | DESCRIPTION |
|---|---|
| -127 to 127 | |
| *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

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

| 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 a Lexmark 4039 printer:

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

### COMMAND 22: DEFAULT PRINT QUALITY

**Non-HP PCL only.** Defines the print quality when the host sends "default print quality" commands.

| VALUE | DESCRIPTION |
|---|---|
| *0 | Draft |
| 1 | NLQ |

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

### COMMAND 23: DRAFT PRINTING

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

| VALUE | DESCRIPTION |
|---|---|
| *0 | Normal draft |
| 1 | Fast draft |

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

### COMMAND 24: IBM PRINTER EMULATION

Selects the IBM printer emulation. The IBM printer emulation is closely related to the selected output protocol (Rotary "C", see page 3-3). The table below summarizes this relationship. When changing the output protocol the interface only loads the default IBM printer emulation if the active IBM emulation is invalid. **To obtain the default IBM printer emulation, you need to restore factory defaults.**

**Example:** Your interface is set to the Generic output protocol and IBM 5256 printer emulation. You now switch to the I-O 8215 output protocol. Since the currently active IBM 5256 printer emulation is valid (see table below), the interface will honor this emulation and not change. Had you selected the HP line printer emulation, the IBM 5256 printer emulation would not be a valid selection. The interface would have switched to the default IBM 5224 printer emulation.

| Output Protocol | Default IBM Printer Emulation | Other Valid Printer Emulations |
|---|---|---|
| Hewlett-Packard PCL[1)] | 3812-1 (SCS) | - |
| Hewlett-Packard PCL (non-PJL)[1)] | 3812-1 (SCS) | - |
| IBM Proprinter | 4214 | 5224, 5225, 5256 |
| IBM PPDS | 4214 | 5224, 5225, 5256 |
| Epson ESC/P2 | 4214 | 5224, 5225, 5256 |
| Epson DFX+ | 4214 | 5224, 5225, 5256 |
| Epson LQ (24-pin) | 4214 | 5224, 5225, 5256 |
| Epson 9-pin (DFX) | 4214 | 5224, 5225, 5256 |

| | | |
|---|---|---|
| Generic | 5256 | 5224, 5225 |
| Hewlett-Packard Line Printer[1)] | 5224 | - |
| I-O 8215[1)] | 5224 | 5225, 5256 |

| VALUE | DESCRIPTION |
|---|---|
| 0 | 5256 Model 3 |
| 1 | 5224 Model 1 |
| 2 | 5225 Model |
| 3 | 4214 Model 2 |

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

**Note:** An AS/400 will auto configure when the Print Box is powered on. Therefore, you should save the new IBM emulation and then cycle the power on the interface to communicate the new emulation to the AS/400.

### COMMAND 25: IBM MOTION COMMAND

**Non-HP PCL only:** Manipulates the IBM motion command.

| VALUE | DESCRIPTION |
|---|---|
| *0 | Use FF (when possible) |
| 1 | Substitute multiple LF for FF |
| 2 | Suppress FF |
| 3 | Suppress CR, LF and FF |

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

**Example:** &%Z25,1 sets the interface to count the lines specified through LPI settings and replace FF with multiple LF

### COMMAND 26: WRAP/TRUNCATE TEXT

**Non-HP PCL only.** Sets the printer to wrap or truncate text lines longer than 8 inches.

| VALUE | DESCRIPTION |
|---|---|
| *0 | Wrap text |
| 1 | Truncate text at 8 inches |

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

### COMMAND 28: 15 CPI PRINTING

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

| VALUE | DESCRIPTION |
|---|---|
| *0 | No, prints 15 CPI as 17.1 CPI |
| 1 | Yes, prints 15 CPI as 15 CPI |

**Note:** IBM Proprinters cannot print 15 CPI. The I-O Print Box has the ability to "artificially" print 15 CPI by printing 17.1 CPI and adjusting the spacing through insertion of a space in graphics mode. Although this option allows users to effectively print 15 CPI (e.g. when using pre-printed forms) it significantly

slows down the printer.

**Example:** &%Z28,1 Sets the printer interface to "artificially" produce 15 CPI printing.

### COMMAND 30: PAPER DRAWER 4 COMMAND

**HP PCL only:** Matches the host's Paper Drawer 4 command 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 source assigned to paper drawer 4. Consult the printer's user's guide for the available paper sources and respective numbers. Refer to page 4-9 of this User's Guide for more information.

| VALUE | DESCRIPTION |
|---|---|
| 01 to 07 | Paper sources available on the printer |
| *01 | Default |

**Example:** &%Z30,05 assigns the optional 500-sheet cassette on an HP LaserJet 4 Plus to the host's paper drawer 4 command.

### COMMAND 31: PAPER DRAWER 5 COMMAND

**HP PCL only:** Matches the host's Paper Drawer 5 command 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 source assigned to paper drawer 5. Consult the printer's user's guide for the available paper sources and respective numbers. Refer to page 4-9 of this User's Guide for more information.

| VALUE | DESCRIPTION |
|---|---|
| 01 to 07 | Paper sources available on the printer |
| *01 | Default |

**Example:** &%Z31,05 assigns the optional 500-sheet cassette on an HP LaserJet 4 Plus to the host's paper drawer 5 command.

### COMMAND 32: 11" x 17" / A3 PRINTING

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

| VALUE | DESCRIPTION |
|---|---|
| *0 | 11 x 17 / A3 selection is OFF |
| 1 | 11 x 17 / A3 selection is ON |

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

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

### COMMAND 33: DUPLEX PRINTING

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

| VALUE | DESCRIPTION |
|---|---|
| *0 | Off |
| 1 | Long-edge duplexing |
| 2 | Short-edge duplexing |

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

### COMMAND 42: EBCDIC HEX DUMP

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

Hex printing starts with the buffer after the start command and stops when the interface is powered off.

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

### COMMAND 43: 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 interface is powered off.

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

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

### COMMAND 44: COMMAND PASS-THRU

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

| VALUE | DESCRIPTION |
|---|---|
| *0 | CPT enabled |
| 1 | CPT disabled |

**Example:** &%Z44,1 Disables Command Pass-Thru

**Note:** Command Z44,1 disables all (i.e., &%Z44,1/Z99,0) subsequent host download commands received by the I-O 8215 emulation. If the user desires to save this setting in permanent memory, Z99,0 must be chained to it. If the user desires to re-enable 8215 host download commands, either restore the factory defaults using the DIP switches, or change the emulation (to Generic, for example) again using the DIP switches, then send the &%Z44,0/Z99,0 command, and finally change back to the 8215

emulation.

### COMMAND 70: OVERWRITE EBCDIC TRANSLATION TABLE

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

| VALUE | DESCRIPTION |
|---|---|
| XX | The EBCDIC character to be changed (in hex) |
| XY | 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 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 72: SERIAL OUT BAUD RATE

**4431 only** Selects the Baud Rate for data sent to the serial-printer. A new setting will not be effective immediately. To activate the new setting cycle power on the interface.

| VALUE | DESCRIPTION |
|---|---|
| 0 | 38,400 baud |
| 1 | 19,200 baud |
| *2 | 9,600 baud |
| 3 | 4,800 baud |
| 4 | 2,400 baud |
| 5 | 1,200 baud |
| 6 | 600 baud |
| 7 | 300 baud |

**Example:** &%Z72,0 sets the receiving baud rate to 38,400

### COMMAND 73: SERIAL OUT WORD LENGTH

**4431 only** Selects the Word Length of data sent to the serial-printer. A new setting will not be effective immediately. To activate the new setting cycle power on the interface.

| VALUE | DESCRIPTION |
|---|---|
| 7 | 7 Bits |
| *8 | 8 Bits |

**Example:** &%Z73,7 sets the word length to 7 bits

### COMMAND 74: SERIAL-OUT STOP BITS

**4431 only** Selects the number of Stop Bits of a data stream received at the serial-in port. A new setting will not be effective immediately. To activate the new setting cycle, power on the interface.

| VALUE | DESCRIPTION |
|---|---|
| *1 | 1 Bit |
| 2 | 2 Bits |

**Example:** &%Z74,2 sets the number of Stop Bits to 2

### COMMAND 75: SERIAL-OUT PARITY

Selects the Parity of a data stream sent to the serial-printer. A new setting will not be effective immediately. To activate the new setting cycle power on the interface.

| VALUE | DESCRIPTION |
|---|---|
| *0 | None |
| 1 | Odd |
| 2 | Even |

**Example:** &%Z75,2 sets the parity to even.

### COMMAND 84: 6 LPI STRING

Used with Generic and 8215 output protocol to define the 6 LPI string. This string represents the printer-specific command to set the printer to 6 LPI. Consult the printer's user's guide for the appropriate ASCII hex value representing the 6 LPI command. Whenever the interface receives a 6 LPI command from the host, it sends the string specified through Host/PC download command 84. If no string is specified, it will send the standard 6 LPI command for the active output protocol.

| VALUE | DESCRIPTION |
|---|---|
| 1(up to 25 hex bytes) | Defines the 6 LPI string |
| 1() | Deletes the 6 LPI string |

**Note:** 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.

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

**Note:** If the active output protocol is generic and no 6 LPI string is specified, the interface will ignore all 6 LPI requests from the host.

### COMMAND 85: 8 LPI STRING

Used with Generic and 8215 output protocol to define the 8 LPI string. See Command 84.

| VALUE | DESCRIPTION |
|---|---|
| 1(up to 25 hex bytes) | Defines the 8 LPI string |
| 1() | Deletes the 8 LPI string |

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

interface's memory.

### COMMAND 86: 10 CPI STRING

Used with Generic and 8215 output protocol to define the 10 CPI string. See Command 84.

| VALUE | DESCRIPTION |
|---|---|
| 1(up to 25 hex bytes) | Defines the 10 CPI string |
| 1() | Deletes the 10 CPI string |

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

### COMMAND 87: 15 CPI STRING

Used with Generic and 8215 output protocol to define the 15 CPI string. See Command 84.

| VALUE | DESCRIPTION |
|---|---|
| 1(up to 25 hex bytes) | Defines the 15 CPI string |
| 1() | Deletes the 15 CPI string |

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

### COMMAND 98: RESTORE DEFAULTS OR PRINT CONFIGURATION

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

| VALUE | DESCRIPTION |
|---|---|
| 0 | Restores the factory defaults |
| 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

**Note:** Most Host download commands sent to the I-O Print Box take effect immediately and stay only in the interface's active memory. To save the changed configuration beyond a power off, Host download command Z99,0 must be sent.

# CONFIGURATION - COAX

## Rotary Setup Switch

The interface can be configured through the Rotary Setup Switch or by sending download commands from the host. The following table shows the functions associated with the various Setup Switch positions. Please note that positions 9, B, C, D and E are "dual function" positions. They are read at initial power up and must be followed by a secondary switch setting to define the desired value. Tables 1 to 5 list these secondary settings.

| Switch No. | Function at power up | Function after power up |
|---|---|---|
| 0 | No Intervention Required | No function |
| 1 | 2 ½ minutes | No function |
| 2 | 5 1/5 minutes | No function |
| 3 | 8 minutes | No function |
| 4 | 10 ½ minutes | No function |
| 5 | 13 1/3 minutes | No function |
| 6 | 16 minutes | No function |
| 7 | Self-test printout | No function |
| 8 | Restore factory defaults and print a self-test | No function |
| 9 | ASCII Code Page selection and coax Buffer size – See table 1for secondary settings. | EBCDIC Hex Dump Mode |
| A | Normal Operation | Normal operation |
| B | Host default language - See Table 2 for secondary settings | ASCII Hex Dump mode |
| C | ASCII printer emulation - See Table 3 for secondary settings | No function |
| D | 4431 Printer Baud Rate – See Table 4 for secondary settings | No function |
| E | 4431 Serial settings – See Table 5 for secondary settings | No function |
| F | No function | No function |

## Secondary Switch Settings

If the Setup Switch is in the 9, B, C,D or E position when the I-O 4430/31 is powered up, a secondary selection is required. After the power-up, the interface's LED will blink in a three (3) flash pattern for approximately 30 seconds. During this time the Setup Switch must be changed to the appropriate secondary setting (see tables below). Simply turn the Setup Switch to the desired secondary setting and wait until the 30 second interval expires. At that time the LED will permanently save the information. The LED will briefly flicker during the saving process and then 3-3 display a rapid one (1) flash pattern indicating that the interface is not in an operating mode. If an invalid selection was made, the LED will not display the rapid flicker nor the one (1) flash pattern.

### Table 1 - Secondary Settings for Position 9

Secondary switch settings of position "9" during the three (3) flash pattern. This selects the Coax buffer size as well as the ASCII code page (character set) used. If both the buffer size and code page need to be changed, the process needs to be done twice.

| Switch Setting | Selected Value |
|---|---|
| 0 | Coax Buffer of 960 bytes |
| 1 | Coax Buffer of 1920 bytes |
| 2 | Coax Buffer of 2560 bytes |
| 3 | Coax Buffer of 3440 bytes |
| 4 | Coax Buffer of 3564 bytes |
| 5 | Code Page 437 |
| 6 | Code Page 850 |
| 7 to F | No Change |

### Table 2 - Secondary Settings for Position B

Secondary switch settings of position "B" during the three (3) flash pattern. This is used to select the Host Default Language.

| Switch Setting | Twinax Language |
|---|---|
| 0 | US/Canada (1) |
| 1 | Coax (2) |
| 2 | Austrian / Germany (3) |
| 3 | Belgium (4) |
| 4 | Brazil (5) |
| 5 | French Canadian (6) |
| 6 | Norway / Denmark (7) |
| 7 | Norway/ Denmark alternate (8) |
| 8 | Finland/Sweden (9) |
| 9 | Finland/Sweden alternate (10) |
| A | French (11) |
| B | No Change |
| C | Austria/Germany alternate (13) |
| D | Multinational (14) |
| E | Italian (15) |
| F | Japan-English (16) |

**Note:** The rotary switch number corresponds with the Host Download number for the command Z08,X where the rotary switch is one number less. The download command number is listed after the language If the Switch is not moved from the position "B", no change is made.

### Table 3 - Secondary Settings for Position C

Secondary switch settings of position "C" during the 3 flash pattern. This is used to select the bar code printer language to be used.

| Switch Setting | Value Selected |
|---|---|
| 0 | IBM PPDS (dot matrix) |
| 1 | Epson ESC/P2 |
| 2 | HP PCL (with PJL commands) |
| 3 | PPDS Laser |
| 4 | Hp PCL (without PJL commands) |
| 5 | IBM Proprinter |
| 6 | Epson LQ |
| 7 | Epson DFX+ (prints 15cpi) |
| 8 | Epson FX (emulates 15cpi) |
| 9 | Generic Printer |
| A-F | No Change |

### Table 4 - Secondary Settings for Position D

Secondary switch settings of position "D" during the 3 flash pattern. This is used to select the Baud rate of the attached printer when using the serial 4431 interface. There is no function for a 4430.

| Switch Setting | Value Selected |
|---|---|
| 0 | 38.4K baud |
| 1 | 19.2K baud |
| 2 | 9600 baud |
| 3 | 4800 baud |
| 4 | 2400 baud |
| 5 | 1200 baud |
| 6 | 600 baud |
| 7 | 300 baud |
| 8-F | No Change |

### Table 5 - Secondary Settings for Position E

Secondary switch settings of position "E" during the 3 flash pattern. This is used to select serial setting to match the attached serial printer for the 4431. The is no function with the 4430.

| Switch Setting | Value Selected |
|---|---|
| 0 | No parity, 8 bits, 1 stop bit (N,8,1) |
| 1 | No parity, 8 bits, 2 stop bits (N,8,2) |
| 2 | No parity, 7 bits, 1 stop bit (N,7,1) |
| 3 | No parity, 7 bits, 2 stop bits (N,7,2) |
| 4 | Odd parity, 8 bits, 1 stop bit (O,8,1) |
| 5 | Odd parity, 8 bits, 2 stop bits (O,8,2) |
| 6 | Odd parity, 7 bits, 1 stop bit (O.7.1) |
| 7 | Odd parity, 7 bits 2 stop bits (O,7,2) |
| 8 | Even parity, 8 bits 1 stop bit (E,8,1) |
| 9 | Even parity, 8 bits, 2 stop bits (E,8,2) |
| A | Even parity, 7 bits, 1 stop bit (E,7,1) |
| B | Even parity, 7 bits, 2 stop bits (E,7,2) |
| C-F | No Change |

## Host Download Commands

By sending download commands from the Host to the I-O Print Box, you can change all configuration parameters not already covered through the rotary configuration switch.

Most Host download commands are placed in a Host document or on the screen. Regardless of whether the incoming print job is a screen print, a spread sheet, or a word processing document created on the host, the interface will recognize the Host download command.

The command itself will not be printed if it was entered correctly. 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.

Most Host download commands sent to the I-O Print Box take effect immediately and stay only in the interface's active memory. To save the changed configuration beyond a power off, Host download command Z99,0 must be sent.

**Tip:** Save the Host/PC download commands in a separate file. If you need to re-configure the I-O Print Box at a later time, or if you need to configure more than one I-O Print Box, just "print" the file containing your Host download commands.

Take the following steps to enter a host download command.

1. Type the Command Pass-Thru delimiter **&%** (or alternate CPT beginning delimiter) in the document at the point where the command is to take effect.

2. Type an upper case "Z" (or the alternate command ID character).

3. Type the command number for the command to be used, as shown in the table.

4. Type a comma.

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

6. A space or control character (i.e., NL, LF, CR, FF) signals the end of the download command.

7. Multiple commands can be chained together by using a slash (/) or back slash (\) to separate the commands (no spaces allowed). For example, to set the Form Length (Command 05) to 64 lines (Value 64), the Buffer Size (Command 01) to 960 characters (Value 1), and the Character Density (Command 03) to 12 CPI (Value 12), type:

&%Z05,64/Z01,1/Z03,12

8. If you want to save these commands, either end the command string with a "/Z99,0" or send another separate command string of "&%Z99,0".

### Host/PC Download Command Overview

The following table shows the Coax Host Download commands and their corresponding command numbers in alphabetical order:

| Host/PC Download Command | Command Number |
|---|---|
| 10 CPI Command String | 86 |
| 12 CPI Command String | 88 |
| 15 CPI Command String | 87 |
| 16.7 CPI Command String | 89 |
| 6 LPI Command String | 84 |
| 8 LPI Command String | 85 |
| Alternate Paper Tray Orientation | 63 |
| Automatic Function at End of Job | 20 |
| Automatic Print Orientation | 61 |
| Character Set | 65 |
| Coax Buffer Size | 01 |
| Command ID Character | 41 |
| CPI | 03 |
| CPT Ending Delimiter | 39 |
| CPT Start Delimiters | 40 |
| CR at MPP + 1 | 15 |
| Custom User Strings | 55 |
| Epson Matrix Font | 09 |
| FF After Time Out | 27 |
| FF At End Of Buffer | 18 |

| Host/PC Download Command | Command Number |
|---|---|
| FF After Local Screen Copy | 13 |
| FF Before Local Screen Copy | 12 |
| Form Length | 05 |
| Host Port Init String | 57 |
| IBM Motion Command | 25 |
| Intervention Required Timeout | 34 |
| Laser Paper Size | 32 |
| Line Spacing | 04 |
| LPI | 02 |
| LU1 Language | 08 |
| Manual Paper Tray Orientation | 64 |
| Max Print Position | 06 |
| NL at MPP + 1 | 16 |
| Override Format Commands | 30 |
| Primary Paper Tray Orientation | 62 |
| Paper Path | 11 |
| Print Active Configuration Setting | 98 |
| Print Quality | 21 |
| Print Case | 07 |
| Print Image | 14 |
| Restore Factory Default | 98 |
| Restore Previously Saved Configuration | 98 |
| Save Config in NV Memory | 99 |

| Host/PC Download Command | Command Number |
|---|---|
| SCS Translate = | 45 |
| Serial Out Baud Rate (4431 only) | 72 |
| Serial Out Parity (4431 only) | 75 |
| Serial Out Stop Bits (4431 only) | 74 |
| Serial Out Word Length (4431 only) | 73 |
| Start/Stop EBCDIC Hex Dump | 42 |
| Start/Stop ASCII Hex Dump | 43 |
| Suppress Empty Forms | 26 |
| Suppress Host | 36 |
| Text After FF | 17 |
| True LPI Spacing (plus models only) | 38 |
| Truncate/Wrap | 31 |
| Valid FF Location | 19 |
| Vertical Channel Select | 37 |

Asterisks (*) identify factory default settings. Invalid commands (such as selecting 2 LPI) are ignored. The last valid setting will be unchanged. Examples in this section apply to configuration through Host/PC download only.

### 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 | 17.7 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 254 | 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

### 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 9: EPSON MATRIX FONT

Selects Epson default font, if supported by the printer.

| VALUE | DESCRIPTION |
|---|---|
| *1 | Draft Print Quality |
| 2 | Roman, NLQ |
| 3 | Sans Serif, NLQ |
| 4 | Courier, NLQ |
| 5 | Prestige, NLQ |
| 6 | Script, NLQ |
| 7 | OCR-B, NLQ |

**Example:** &%Z0,2 Selects near-letter quality (Roman) as the default

### COMMAND 11: PAPER PATH

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

| VALUE | DESCRIPTION |
|---|---|
| 0 | Ignore host PPM commands and select the paper tray on the printer's front panel |
| 1 | Tractor feed or only one paper source used (ignore the host PPM) |
| *2 | Cut sheet feeding from primary bin is default |
| 3 | Cut sheet feeding from alt. bin 1 is default (corresponds to PCL escape value 4) |
| 4 | Envelope feeder default |

| | |
|---|---|
| 5 | Manual sheet feed default |
| 6 | Manual envelope feed default |
| 7 | Epson DFX front bin or tractor |
| 8 | Epson DFX rear bin or tractor |
| 9 | Cut sheet feeding from alt. bin 2 is default (corresponds to PCL escape value 5) |

**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 or 1 is selected.

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 (TEXT AFTER VALID FF NOT AT END OF BUFFER)

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 (TEXT AFTER FF AT END OF 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 FF or LF 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 21: PRINT QUALITY (FastDraft)

Defines default print quality.

| VALUE | DESCRIPTION |
|---|---|
| *0 | The Page Presentation Media (PPM) commands control the quality:<br>DP Quality (01) = FastDraft and<br>DP Text Quality (02) = normal draft |
| 1 | All DP draft output is printed FastDraft |
| 2 | All DP draft output is printer normal draft |
| 3 | Value 0 reversed, 01 = normal and 02 = FastDraft |
| 4 | All output is Near Letter Quality |

**Example:** &%Z21,1 Selects all DP output as FastDraft printing.

### COMMAND 25: IBM MOTION COMMANDS

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 for MPL and send multiple line feeds to the printer in place a 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 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

**HP PCL only.** 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 |
| 3 | Selects 11" x 17" paper |
| 4 | Selects A3 size paper |
| 5 | Printer selected |

**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 this value can also be set by the rotary switch. Leaving the rotary switch in positions 0-6 will override this command.

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

**Example:** &%Z34,036 Sets IR time interval to 3 minutes (36 *5)/60 = 3 minutes

### COMMAND 36: SUPPRESS IBM CONTROL CODES

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 |
| 1 | Suppress all IBM control codes |
| 2 | Suppress LPI, CPI, MPP and MPL control codes |
| 3 | Suppress CPI and MPP control codes |
| 4 | Suppress LPI and MPL control codes |
| 5 | Suppress print quality specified in the PPM command |

**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

**HP PCL only.** Because laser printers have a non-printable border around the edge of single sheet pages, 6 LPI and 8LPI 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 be a hex value. You cannot use 0-9, A-L, P or U. These are reserved.

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

### COMMAND 42: START 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 |

**Notes:** This command enables the user to print 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, start translating 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, or the stop command is received.

| 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 55: CUSTOM USER STRINGS

Command 55 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. They are 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).

### 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. 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.

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)

**HP PCL only.** 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 NOT ACTIVE. Print orientation is controlled by the orientation selections specified in Commands 62, 63, and 64. |
| 1 | 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. |

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

**Example:** &%Z61,1 Enables APO

### COMMAND 62: PRIMARY PAPER TRAY ORIENTATION

**HP PCL only.** 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

**HP PCL only.** 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

**HP PCL only.** 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, letterhead, 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. This selection automatically changes to match the output protocol selected through the interface's configuration switches if HP, PPDS or Proprinter II modes are chosen. The other selections require the user to manually select the appropriate character set.

| VALUE | DESCRIPTION |
|---|---|
| 1 | Roman 8 (default for HP PCL) |
| *2 | Code Page 850 |
| 3 | Code Page 437 |
| 4 | Code Page 858[#] |
| 5 | Latin 1 Euro[#] |

**Notes:** # The Euro symbol is supported in code page 858 for dot-matrix printers, and in the Windows 3.1 Latin 1 character set for laser printers.

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 made.

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:** &%Z65,5 Selects the Latin 1 Euro character set which supports the Euro symbol.

### 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 72: SERIAL-OUT BAUD RATE

Selects the Baud Rate for data sent to the serial-printer. A new setting will not be effective immediately. To activate the new setting, cycle power on the interface.

| VALUE | DESCRIPTION |
|---|---|
| 0 | 38,400 baud |
| 1 | 19,200 baud |
| *2 | 9,600 baud |
| 3 | 4,800 baud |
| 4 | 2,400 baud |
| 5 | 1,200 baud |
| 6 | 600 baud |
| 7 | 300 baud |

**Example:** &%Z76,0 Sets the baud rate to 38,400

### COMMAND 73: SERIAL-OUT WORD LENGTH

Selects the Word Length of data sent to the serial-printer. A new setting will not be effective immediately. To activate the new setting, cycle power on the interface.

| VALUE | DESCRIPTION |
|---|---|
| 7 | 7 Bits |
| *8 | 8 Bits |

**Example:** &%Z73,8 sets the word length to 8 bits

### COMMAND 74: SERIAL-OUT STOP BITS

Selects the number of Stop Bits of the data stream to the serial-printer. A new setting will not be effective immediately. To activate the new setting, cycle power on the interface.

| VALUE | DESCRIPTION |
|---|---|
| *1 | 1 Bit |
| 2 | 2 Bits |

**Example:** &%Z74,2 sets the number of Stop Bits to 2

### COMMAND 75: SERIAL-OUT PARITY

Selects the Parity of a data stream sent to the serial-printer. A new setting will not be effective immediately. To activate the new setting, cycle power on the interface.

| VALUE | DESCRIPTION |
|---|---|
| *0 | None |
| 1 | Odd |
| 2 | Even |

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

### COMMAND 84: 6 LPI STRING

Used when operating the Generic output protocol. Defines the 6 LPI string the interface sends to the printer when the host sends a 6 LPI command.

| VALUE | DESCRIPTION |
|---|---|
| 1(max. 25 bytes of ASCII hex code) | Defines the 6 LPI string |
| 1 () | Defines the 6 LPI string |

**Notes:** This string represents the printer-specific command to set the printer to 6 LPI. Consult your printer's manual for the appropriate hex value representing the 6 LPI command.

**Example:** &%Z85,1(1B 30) Stores the 8 LPI command for an Epson lQ-2500 printer (hex value 1B 30) as the 8 LPI string.

### COMMAND 85: LPI STRING

Used when operating in Generic output protocol. Defines the 8 LPI string the interface sends to the printer when the host sends the 8 LPI command.

| VALUE | DESCRIPTION |
|---|---|
| 1 (max. 25 bytes of ASCII hex code) | Defines the 8 LPI string |
| 1() | Deletes the 8 LPI string |

**Notes:** This string represents the printer-specific command to set the printer to 8 LPI. Consult your printer's manual for the appropriate hex value representing the 8 LPI command.

**Example:** &%Z85,1(1B 30) Stores the 8 LPI command for an Epson LQ-2500 printer (hex value 1B 30) as the 8 LPI string.

### COMMAND 86: 10 CPI STRING

Used when operating in Generic output protocol. Defines the 10 CPI string the interface sends to the printer when the host sends a 10 CPI command.

| VALUE | DESCRIPTION |
|---|---|
| 1(max. 25 bytes of ASCII hex code) | Defines the 10 CPI string |
| 1() | Deletes the 10 CPI string |

**Example:** &%Z86,1(1B 50) Stores the 10 CPI command for an Epson LQ-2500 printer (hex value 1B 50) as the 10 CPI string

### COMMAND 87: 15 CPI STRING

Used when operating in Generic output protocol. Defines the 15 CPI string the interface sends to the printer when the host sends a 15 CPI command.

| VALUE | DESCRIPTION |
|---|---|
| 1 (max. 25 bytes of ASCII hex code) | Defines the 15 CPI string |
| 1 () | Deletes the 15 CPI string |

**Example:** &%Z87,1 (1B 67) Stores the 10 CPI command for an Epson LQ-2500 printer (hex value 1B 67) as the 15 CPI string.

### COMMAND 88: 12 CPI STRING

Used when operating in Generic output protocol. Defines the 12 CPI string the interface sends to the printer when the host sends a 12 CPI command

| VALUE | DESCRIPTION |
|---|---|
| 1(max. 25 bytes of ASCII hex code) | Defines the 12 CPI string |
| 1() | Deletes the 12 CPI string |

**Example:** &%Z88,1(1B 4D) Stores the 12 CPI command for an Epson LQ-2500 printer (hex value 1B 4D) as the 12 CPI string.

### COMMAND 89: 16.7 CPI STRING

Used when operating in Generic output protocol. Defines the 16.7 CPI string the interface sends to the printer when the host sends a 16.7 CPI command.

| VALUE | DESCRIPTION |
|---|---|
| 1(max.25 bytes of ASCII hex code) | Defines the 16.7 CPI string |
| 1() | Deletes the 16.7 CPI string |

**Example:** &%Z89,1(1B 10) Stores the 16.7 CPI command for an Epson LQ-2500 printer (hex value 1B 10) as the 16.7 CPI string.

### 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.

# OPERATION

## Power Up Processing

When the I-O 4430/31 Interface is powered up it does the following:

1. It checks for a proper 9-pin host attachment cable (Twinax or Coax) to auto-detect which mode of operation is desired. If none is found, the interface waits for a proper cable to be attached and the LED displays double blinking.

2. The interface examines the Setup Switch to see if a configuration selection is being requested.

3. The interface then looks for the output printer to be ready before beginning operation (a single blinking of the LED). However, Setup Switch settings can be made without a printer attached

## Parallel Printing

The interface looks for a parallel status of online, no paper out, no faults and not busy before proceeding. The interface is programmed to function in a busy only handshake manner.

## Serial Printing

When printing to a serial printer, verify the Serial Out settings. They are: baud rate, word length, stop bits, and parity. The interface does not offer handshaking settings. However, it honors both hardware and software handshaking. It examines the CTS(DTR pin #20) signal before sending each byte, as well as checking the XON/XOFF status. Note: The serial output port must see CTS(DTR) before it will output data or allow line sync to be established. The I-O 4431 Interface will receive XON and XOFF for software handshaking, as well as DTR/DSR for hardware handshaking.

**Character Set (Code Page)** By default, the interface uses the Code Page 437 character set. You also have the option to select the Code Page 850 character set. Please be aware that Code Page 437 has 41 fewer characters than Code Page 850. The HP PCL also supports the Roman8 character set, which can be selected using a host download command.

## Host Printing

Based on the IBM printer emulation selected, you will have access to all the features inherent to the respective IBM printer the interface is emulating.

In addition to the features of the emulated IBM printer, ASCII printers will often have other exciting capabilities which you can take advantage of using I-O's Command Pass-Thru.

## Laser Printer Operation

The I-O 4430/31 allows you to emulate an ASCII laser printer as an IBM 3812 printer. This feature-rich emulation is automatically active when you select one of the HP PCL output protocols. You can also run an ASCII laser printer under an IBM 5256 emulation. The following section describes how to access the many features of I-O's emulation of the IBM 3812 printer.

Some earlier laser printers such as the HP LaserJet II and some III series printers, do not support the Print Job Language (PJL). If you are operating such a printer, please select the PCL (non-PJL) protocol through the Print Box's Rotary Switch.

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 4430/31emulation 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 |

### Changing Typestyles

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

There are two ways to change typestyles:

- Select a typestyle number within the program or document
- Use Font Change commands in the document

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

The host does not know that a font change has taken place, and may send the original font number to the printer at the beginning of each page. Therefore, the user may have to put a Font Change command at the beginning of each new page. If the pitch is changed, there may be formatting problems since the host is still formatting each line according to the pitch of the original typestyle number. Text Management/38 does not allow more than one font per line of text, so Font Change commands must be used in such cases.

### Font Change Commands

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

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

The Font Change Command occupies space in the program or text, however, the command does not print.

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

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

Quality ¬Q88saves¬Q85 you time and money.

Here's how the print will look:

Quality **saves** you time and money.

The ¬Q85 following saves returns the printing back to the original font.

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

Quality ¬F6199,30saves¬F6199,12 you time and money.

Here's how the print will look:

Quality saves you time and money.

The ¬F6199,12 following "saves" returns the printing back to the original font. The numbers following the comma (¬F6199,30 and ¬F6199,12) set the point size of a proportional font (such as Arial) and the pitch size of a fixed pitch (such as Courier).

To print fonts that are not already supported through your I-O Print Box, refer to the "User-Defined Fonts" section.

### Page Length

The printer prints up to 66 lines at 6 LPI in HP emulation mode (the line spacing will be compressed slightly to fit). The

System/36 only allows 65 lines per page. If there are one or two lines at the top of a new page, more lines per page have been formatted than can print.

### Paper Size

Configure the printer's setup to the paper size used most. 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) |
| 11” x 17” Paper | 11 x 17 in. (279.4 x 431.8 mm) |
| A3 Paper | 11.69 x 16.54 in. (297 x 420 mm) |

If the interface's paper size menu is set to the default "Host selected", it will look for one of the paper sizes mentioned above. If the host sends one of these paper sizes, the interface will instruct the printer to load the respective paper. Otherwise, it will instruct the printer to load the previously used paper size or if the host print job is the first after power up, it will request Letter size paper.

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

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

1. Press **F20** for "Format options."

2. Select **1** for "Document options" then another **1** for "Document format."
   Select **4** for "Page layout/paper options."

3. Scroll to the second screen and enter 8.5 as the paper width and 14 as the paper length. Press ENTER to activate the selection.

4. Press **F12** until the menus have been exited.

5. Print the document.

6. The printer's operator panel displays "Load paper, Tray #, Legal." Install the legal size paper tray into the printer, and the printer will start printing.

7. Press **Continue** on the printer operator panel to print on currently loaded paper and not wait for the size legal tray.

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

1. Select a paper size in the program.

2. Install the correct paper size into the printer.

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

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

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

### Printing on 11" x 17" or A3 Size Paper

Some printers, such as the HP LaserJet 4V printer, allow printing on 11" x 17" and A3 size paper. The I-O 4430/31 automatically recognizes these larger paper sizes. However, at times it might be advantageous to force the printer to print on 11 x 17 inch or A3 size paper, even when the host sends requests for smaller paper sizes (i.e. letter, legal, A4, Executive).

If this is desired, the interface's 11 x 17 (A3) selection should be turned ON through Host/PC download command 32 or through the setup software.

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

## Paper Drawer Selection

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. On the host, these paper sources are called Source Drawer (print file) or Paper Drawer (OfficeVision /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.

The paper drawer feature of the I-O 4430/31 can be accessed through Host/PC download commands 13, 14, 15, 30 and 31 or through the setup software.

To change the physical tray assigned to the theoretical paper drawer (#1, #2, #3, #4, or #5):

1. Select the paper drawer # through host download command 13, 14, 15, 30, or 31, or through the setup software;

2. Select the number representing the physical tray listed in the printer's manual.

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

The following table shows the default values and, as an example, lists the corresponding paper tray used for HP LaserJet 4Si and 4 Plus printers:

| Host/PC Download Command | Paper Drawer Number | Default Value | HP4Si Paper Tray | HP4 Plus Paper Tray |
|---|---|---|---|---|
| Z13 | 1 | 1 | Upper | Cassette |
| Z14 | 2 | 4 | Lower | MP tray |
| Z15 | 3 | 5 | Not Used | 500-sheet Cassette |
| Z30 | 4 | 1 | Upper | Cassette |
| Z31 | 4 | 1 | Upper | Cassette |

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

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

## Paper Output Bin Selection

The I-O Print Box allows you to direct host print jobs to any of the printer's available output bins. The HP LaserJet 5Si, for instance, can be equipped with the optional multi-bin mailbox, which offers 8 additional 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 two digits designating the destination bin. The two digit number corresponds to the printer's PCL command for the particular output bin.

Once an output bin is selected, all host print jobs will be directed to that output bin. To send host print jobs to another output bin, insert a second I-O command. ¬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 | HP LJ 5Si Output Bin |
|---|---|---|---|
| ¬O00 | Automatic Selection | ESC&\|0G | printer's default bin |
| ¬O01 | Selects bin #1 | ESC&\|1G | printer top/face-down bin |
| ¬O02 | Selects bin #2 | ESC&\|2G | printer left-face-up bin; not available when the multi-bin mailbox is installed) |
| ¬O03 | Selects bin #3 | ESC&\|3G | mailbox face up bin #1 |
| ¬O04 | Selects bin #4 | ESC&\|4G | mailbox face down bin #1 |
| ¬O05 | Selects bin #5 | ESC&\|5G | mailbox face down bin #2 |
| ¬O06 | Selects bin #6 | ESC&\|7G | mailbox face down bin #4 |
| ¬O07 | Selects #7 | ESC&\|7G | mailbox face down bin #4 |
| ¬O08 | Selects bin #8 | ESC&\|8G | mailbox face down bin #5 |
| ¬O09 | Selects bin #9 | ESC&\|9G | mailbox face down bin #6 |
| ¬O10 | Selects bin #10 | ESC&\|10G | mailbox face down bin #7 |
| ¬O11 | Selects bin #11 | ESC&\|11G | mailbox face down bin #8 |
| ¬O12 to 99 | Selects bin #12 to 99 | not yet assigned | |

## Print Orientation

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

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

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

3. Print Orientation setting on printer interface.

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

### Page Rotation (Diagram Block 1)

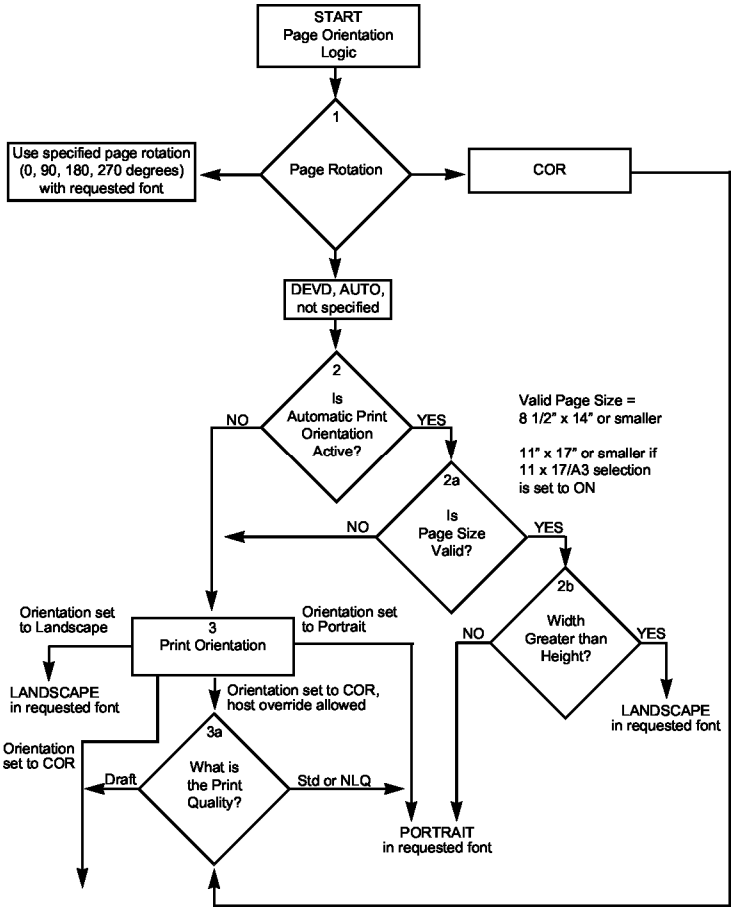
Degrees of page rotation can be specified through the print file of a data processing document or in the document format menu of a word processing document. See "Changing Page Rotation Settings" below for a description on how to access the print file and the document format menu. The available settings 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.




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

### Automatic Print Orientation (Diagram Block 2)

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

### Print Orientation Settings (Diagram Block 3)

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 I-O Print Box's 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 Print Box 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.

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 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 following table 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 in this chapter.

| | | 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)<br><br>**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<br><br>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

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

1. Select line **1** as the first typing line.

2. Specify **Envelope** size in the program.

3. Select **Feed Envelope** in the program. Then choose the font desired.

4. Set the left margin to **1.**

5. Type the return address, starting at line 1, column 1.

6. Type the mailing address. The appropriate space for the address will vary with the envelope size. For a Commercial 10 envelope, the address starts at about line 10, column 55.

7. Print the envelope.

The following envelope sizes are supported by the I-O Print Box:

| | |
|---|---|
| Monarch | 3 7/8" x 7 ½" |
| Commercial 10 | 4 1/8" x 9 ½" |
| International DL | 110 mm x 220 mm |
| International D5 | 162 mm x 229 mm |

## Document/Envelope Printing

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

1. Set the format for the letter and enter the letter file. On the first typing line, press CMD20 for **Format options.**

2. Select **1** for **Document options,** then another 1 for **Document format.** Select **3** for **Typestyle/color.**

3. Select the font ID Number for the letter, such as No. 11, 86, etc., then press ENTER.

4. From the Document Format screen, select option **4** for **Page layout/ paper options.** Scroll to the second screen of these options and select a paper size of 8.5 (width) x 11 (length) inches and paper source 1. If the letter is more than one page, select paper source of 1 for the following pages. Press ENTER to return to the **Document format** screen, then CMD 12 to return to the **Document options** screen.

5. Now set up the Alternate Format for the envelope. Select **2** for **Alternate format,** then **3** for **Typestyle/color.** Select the font ID for the envelope and press ENTER to return to the Alternate Format screen.

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

7. Select option **1** for **Margins and Tabs** and make the left margin 1. Press ENTER and CMD3 until you are back in the document.

8. Type in the letter. When done, add in a page end by pressing ALT P.

9. Now load in the Alternate Format for the envelope. To do this, press the C**MD5** key, **Goto,** and type in **rf** for **Resetting Format.** Press ENTER. Select option 4 on the Alternate Format screen, **Begin Alternate Format.** Press ENTER.

10. You will now be back in the document, with the Alternate Format. If these instructions have been followed, the cursor will be on the first typing line of 1, with the left margin of 1. Type in the envelope address, and send the file to print. The letter will print out first, followed by the envelope.

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

## Duplex Printing

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

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

For most documents, select duplex printing through the host's print options menu (OfficeVision/400) or through the printer file (OS/400 V2 R3).

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

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

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

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

0 = Simplex
1 = Duplex
2 = Duplex (tumble) printing

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.

On some duplex printing, if the last page is single sided, the last page may remain in the printer. The form feed light remains on. When the next print job is sent, this page will be ejected. To manually eject the last page, take the printer

off-line by pressing the ONLINE button, then press the FORM FEED button to eject the last page. Put the printer back on-line by pressing the ONLINE button once more.

## Other Printer Commands

The table below is a summary list of special commands that the laser printer emulation will obey if they are imbedded in a user's document.

| Command | Function |
|---|---|
| ¬E | Sends an ASCII ESC command to the printer |
| ¬TY | Enables true 6 LPI printing |
| ¬TN | Disables true 6 LPI printing |
| ¬I | Ignores all host formatting commands |
| ¬S | Stops ignoring host formatting commands |

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

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

The printer will slightly compress line spacing to fit 66 lines onto the page. This may be undesirable (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 electronic forms software, these files are recognized by the host as text files, which causes the host to format the files with unwanted carriage returns and line feeds. Placing the ¬I at the end of a line and ¬S at the front of the next line causes the interface to remove the host carriage return and line feed commands and send only the data to the printer.

I-O's laser printer emulation is compatible with the many popular electronic forms software applications. If the Print Box replaces XPoint's Twinax Controller, set the interface's True LPI menu to "XPoint Controller."

## I-O 8215 Emulation

I-O has received many requests to maintain support from customers who have applications written that will print properly using the venerable I-O 8215 interface. The 4430/4431 can be configured to operate exactly as an I-O 8215 would, using the exact same EBCDIC to ASCII translation tables (no language settings, nor user changes) and the exact same command processing.

Using the Rotary Switch setting “C” followed by “3”, or by Host download command, you can set the 4430/4431 to function in this manner. Since the 8215 had no permanent memory, and very few switch settings, only those that apply are noted in the Configuration Section.

## Matrix/Specialty Printer Operation

### IBM Matrix Printer Emulations

The I-O Print Box offers the following IBM matrix printer emulations:

IBM 4214 Model 2
IBM 5224 Model 1
IBM 5225 Model 1
IBM 5256 Model 3

These IBM matrix printer emulations can be selected through Host/PC download command 24 or through the setup software. The I-O Print Box allows access to all the capabilities of the emulated IBM printer. The IBM 4214 printer offers 5,10,12,15, 16.7, and 20 CPI; 3,4,6, and 8 LPI; and print qualities of draft, fast draft, or NLQ.

The IBM 5224 and 5225 printers offer 10 and 15 CPI; 6 and 8 LPI; and only a draft print quality. The IBM 5256 printer only offers 10 CPI printing.

These printer emulations are often used when connecting a specialty printer, such as a barcode printer to an IBM host.

The I-O 4430/31 offers the following print drivers (output protocol) for matrix and specialty printers:

IBM PPDS
IBM Proprinter 4201/4202
Epson DFX+ (prints 15 cpi)
Epson FX (emulates 15 cpi)
Epson LQ
Epson ESC/P2
Generic
I-O 8215

### Character Set

By default, the interface uses the Code Page 850 character set. You also have the option to select the Roman 8, Code Page 437, Code Page 858, or Latin 1 Euro character set.

Please be aware that Code Page 437 has 41 fewer characters than Code Page 850. Although the I-O Print Box artificially produces these missing characters, at times the "reproduction" may not satisfy your quality requirements.

### Print Quality

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

If the printer has the capability, the I-O 4430/31 allows you to further specify if Draft printing should be Fast Draft or Normal Draft (Host/PC download command 23). Request for Draft printing can come directly from the host or from the interface (host sends Default print quality and interface's 4214 Default Print Quality is set to Draft). If the printer only offers one draft printing mode, the setting of the Draft Printing option is ignored.

Another way to modify the print quality is to set the printer to a certain value through its front panel. By activating the Override Format Commands option of the interface through host download command 16 the printer's front panel settings are "locked in" and remain valid until the Override Format Command is disabled.

### Pitch Control

The interface's 4214 emulation permits the printer to print 5, 10, 12, 15, 17.1 and 20 CPI (pitch). The pitch can vary,

depending on the CPI selected in the host document or the printer's front panel.

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

### Graphics Printing

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

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

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

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

### Truncate/Wrap

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

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

### True 15 CPI

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

When using the Epson 9-pin printer driver, this is done automatically. Since the Epson DFX 5000+ is able to print 15 CPI, make sure to select the Epson DFX+ driver when operating the DFX 5000+ printer or newer Epson FX printers. Verify the use of 15 CPI printing using ESC g in the printer’s user’s guide.

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

### Generic Mode

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

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

For example, assume the printer protocol the printer requires is not available on the I-O Print Box. To change the printer to 10 CPI, the printer's user's manual provides the hexadecimal value of 1B 50.

Use the Host/PC download command 86 to assign the value 1B 50 to the 10 CPI string (type &%Z86,1(1B 50)). From now on, when the interface receives a request for 10 CPI from the host, it will send the value 1B 50 to the printer and thereby set it to 10 CPI.

If nothing is assigned to the CPI or LPI string, the interface will send nothing to the printer, i.e. it will ignore the CPI or LPI command from the host.

The interface stores commands for the following CPI and LPI values:

| | |
|---|---|
| 6 LPI | Host/PC download command 84 |
| 8 LPI | Host/PC download command 85 |
| 10 CPI | Host/PC download command 86 |
| 15 CPI | Host/PC download command 87 |

## Command Pass-Thru™

The Command Pass-Thru feature allows access to all of the built-in features of the printer, even if these features aren't normally available through the host software. Command Pass-Thru lets you place printer-specific command sequences into the data sent to the printer. The 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 (ASCII).

3. Place **&%** (or the alternate CPT start delimiter ), in the document at the point where the feature is to take effect. This signals the start of the print feature.

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

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

For example:

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

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

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

to print on the printer as:

This is an underlined word.

Only characters from 01 to FF are recognized (alphabetic characters must be in upper case). Errors in the Command Pass-Thru sequence will cause the I-O Print Box to ignore the command and printing will resume at the point the error occurred.

Command Pass-Thru may invalidate horizontal spacing.

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

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

### User Defined Strings

To avoid keying-in frequently used printer commands (which would appear in the document as hex values embedded 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 Lexmark 4039 printer, then simply enter &%U1 in the document at the point where shadow printing is to begin.

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

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

## User Defined Fonts (HP PCL only)

The I-O 4430/31 supports a variety of fonts. For a list of the supported fonts, refer to Appendices A and B. In addition, the User Defined Fonts feature allows assignment of new or existing font IDs to different printer resident fonts or fonts from an optional font cartridge. Up to 10 new pairs of font IDs and fonts can be created.

The following example assumed an HP 4Si is connected to the I-O Print Box and the default font is specified as font 11. The font ID 11 represents the font Courier 10 CPI. If you want to change the default font but maintain the font ID 11, simply assign a new font to font ID 11 (e.g. Courier bold 10 CPI). This is done by sending the Host/PC download command &%Z21,0,11 (<(12U,s0p10h12v0s3b4099T) to the printer. Font ID 11 has not been redefined as Courier Bold 10 CPI. Consult the printer's user's guide for the information needed to write the string.

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

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

# OPERATION - COAX

## Host Printing

Based on the IBM printer emulation selected, you will have access to all the features inherent to the respective IBM printer the interface is emulating.

In addition to the features of the emulated IBM printer, ASCII printers will often have other exciting capabilities which you can take advantage of using I-O's Command Pass-Thru.

### Laser Printing

#### Selecting Fonts

A printer-resident font or a font from an optional font cartridge can be selected 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. P for portrait and L for landscape printing. The font ID number selects the font to be used for printing. The font ID should be five digits in length. Refer to Appendix A for a list of fonts and the font IDs available for the printer.

For example:

&%L00086 selects a 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 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. Command 61 must be set to "0" (APO Inactive), Commands 62-64 must be set to "3" (User Defined).

## 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).

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

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 1), the Print Box notes the format of the print image and calculates the required print dimensions. The following illustration 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.

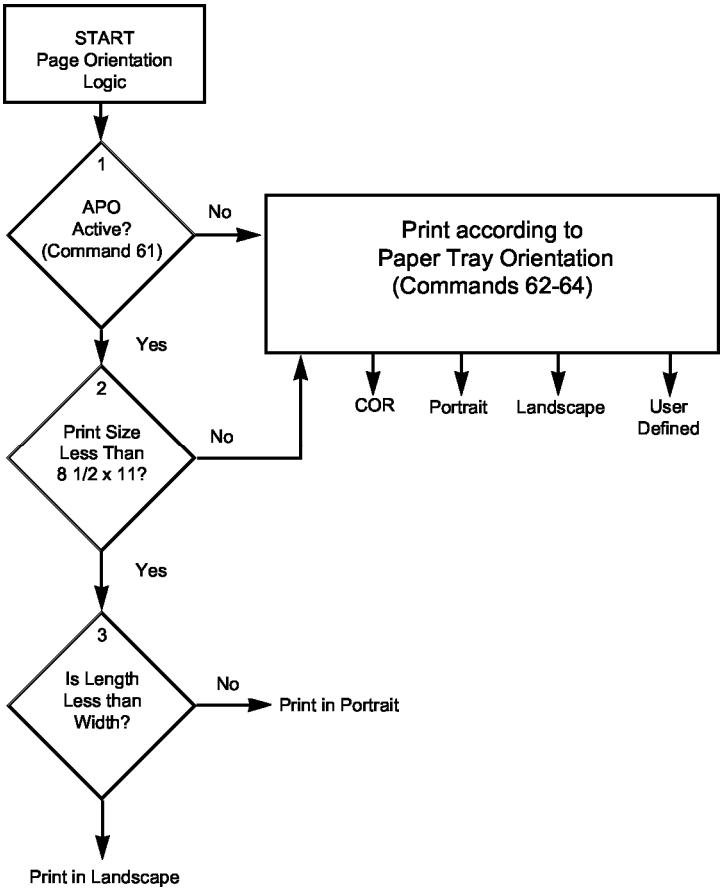
The APO feature also uses the calculated print width and length to determine the print orientation when the dimensions are less than 8 1/2" x 11". When the width is greater than the length and APO is active, the document prints in landscape, even if the font is specified as portrait.

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

1. If APO is not active (command 61, value 0), the interface uses the paper source selections (commands 62-64) 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)
No
Print according to
Paper Tray Orientation
(Commands 62-64)
COR
Portrait
Landscape
User
Defined
Yes
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.

| Paper Size | PMPP at | | | | PMPL at | | | |
|---|---|---|---|---|---|---|---|---|
| | **10 CPI** | **12 CPI** | **15 CPI** | **17.1 CPI** | **6 LPI** | **8 LPI** | **True 6 LPI** | **True 8 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 |

## Generic Mode

The Generic output protocol should be used when the other output protocols of the I-O 4430/31 are inappropriate. This could be the case with printers such as certain barcode label printers or embossers, but also with printers from Okidata, Mannesmann-Tally, etc. Refer to the printer's user's guide to find out if the printer operates with one of the output protocols of the I-O Print Box.

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

For example, the printer protocol a printer requires is not available on the I-O 4430/31. To change the printer to 10 CPI, the printer's user's guide provides the hexadecimal value of 1B 50. Use the Host/PC download command 88 to assign the value 1B 50 to the 10 CPI string (type &%Z88,1(1B 50)). From now on, when the interface receives a request for 10 CPI from the host, it will send the value 1B 50 to the printer and thereby set it to 10 CPI.

If nothing is assigned to the CPI or LPI string, the interface will send nothing to the printer, i.e. it will ignore the CPI or LPI command from the host.

The interface stores commands for the following CPI and LPI values:

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

## 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 an escape command to the printer to control the printing. For example, **¬E(s3B** would begin bold printing (see your printer's manual for a list of the printer 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.

## 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.

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.

**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 3-28 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 Print Box offers a configurable option to emulate the IBM 3287 or to pass the data without translation. Refer to command 45, SCS TRN translate, for more detailed information.

# ADVANCED FEATURES

There are several advanced features in the I-O 4430/31 for accessing special functions of the printers, which are not normally available on the IBM system printers. These features include:

- Color Printing
- Bar Code Printing
- I-O Graphics Language™

Each of these features is described below..

## Color Printing

The I-O 4430/31 allows printing of color on **PCL5C - compatible printers** such as the HP Color LaserJet, DeskJet 1200C, or 1600C 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. The I-O color commands are:

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

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

This prints ¬C02red¬C00 in red.

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

You can also create one or more additional colors using the User-Defined String feature.

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

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

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

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

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

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

2. To define and print a color send the following string to the printer: &%Z04,1(1B 2A 76 30 61 30 62 30 63 31 69 31 53).

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

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

**Example:**

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

   &%Z04,0(1B 2A 76 36 57 00 00 08 08 08) [This string sets up the color palette.]
   &%Z04,3(1B 2A 76 32 35 35 61 30 62 30 63 31 69 31 53) [This command defines and prints the color red. Notice that the defined color consists of red (255) only. Green and blue components have been given the value 0 (hex 30).]

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

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

   **Note:** The ¬C08 in the above example returns the print color back to black.

## Printing Bar Codes

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

The following applies to printing bar codes on laser printers as well as on dot matrix printers, unless specified otherwise. Using the I-O bar code feature, the following bar codes can be easily printed:

| 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).

**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) |

**Module width in mm (inches) - Epson or IBM Dot-Matrix**

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

| | | | |
|---|---|---|---|
| UPC A | 1.8<br>(.07) | 3.6<br>(.14) | 5.5<br>(.21) |

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

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 barcode

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

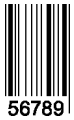
| | |
|---|---|
| Maximum number of data characters: | 30 |
| Valid numeric characters: | 0-9 |
| Valid alphanumeric characters: | N/A |
| Valid other characters: | N/A |

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




### 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


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 |
| 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 |
| **Symbol Character Value** | **Code A** | **Data Character Code B** | **Code C** |
| 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 |
| 59 | [ | [ | 59 |
| 60 | \ | \ | 60 |

| | | | |
|---|---|---|---|
| 61 | ] | ] | 61 |
| 62 | ^ | ^ | 62 |
| 63 | _ | _ | 63 |
| 64 | NUL | ` | 64 |
| 65 | SOH | a | 65 |
| 66 | STX | b | 66 |
| 67 | ETX | c | 67 |
| 68 | EOT | d | 68 |
| 69 | ENQ | e | 69 |
| 70 | ACK | f | 70 |
| 71 | BEL | g | 71 |
| 72 | BS | h | 72 |
| 73 | HT | i | 73 |
| 74 | LF | j | 74 |
| 75 | VT | k | 75 |
| 76 | FF | l | 76 |
| 77 | CR | m | 77 |
| 78 | So | n | 78 |
| 79 | 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 |

| **Symbol Character Value** | **Code A** | **Data Character Code B** | **Code C** |
|---|---|---|---|
| ~1 | US | DEL | 95 |
| ~2 | FNC3 | FNC3 | 96 |
| ~3 | FNC2 | FNC2 | 97 |
| ~4 | SHIFT | SHIFT | 98 |
| ~5 | CODE C | CODE C | 99 |
| ~6 | CODE B | FNC4 | CODE B |
| ~7 | FNC4 | CODE A | CODE A |
| ~8 | FNC1 | FNC1 | FNC1 |

## I-O Graphics Language™

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

### 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 pro gram as a comment | N/A | any printable character |
| % shading | percentage of shading | percentage | 0-100, integers |
| # of seg-ments | 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, inte gers |
| 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 inte gers |
| 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 inte gers |
| 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 |

## 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.

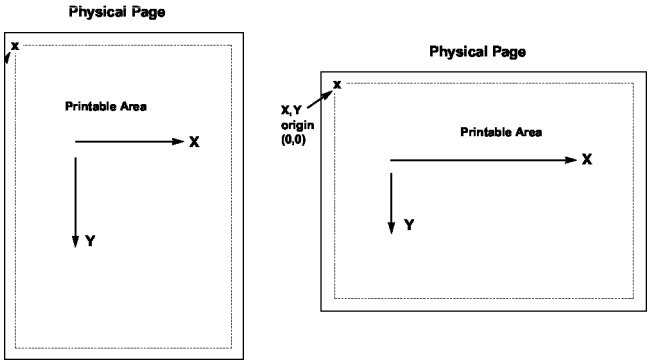



**Figure 1**

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)

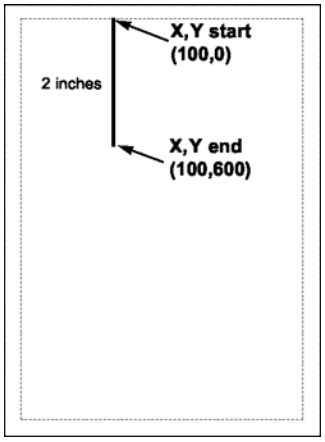



**Figure 2**

***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)

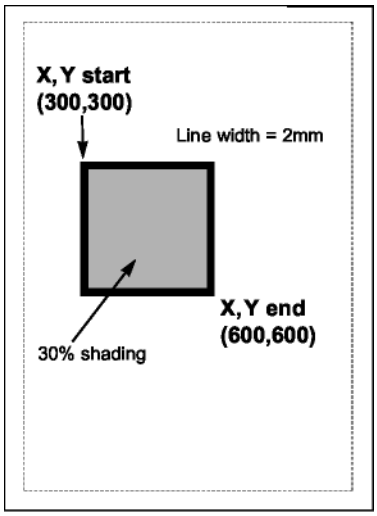



**Figure 3**

***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)

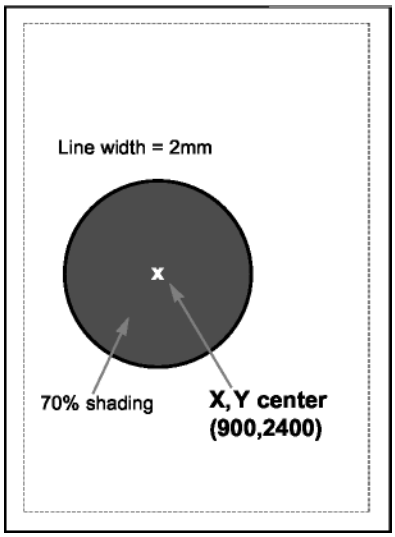



**Figure 4**

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

***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)

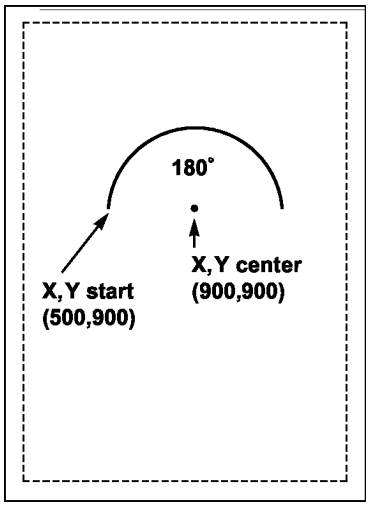



**Figure 5**

***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).

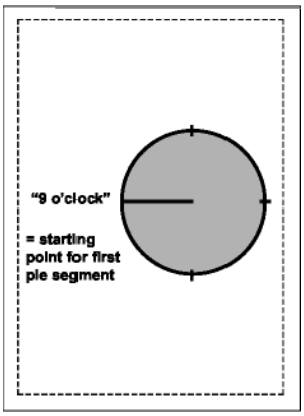



**Figure 6a**

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).

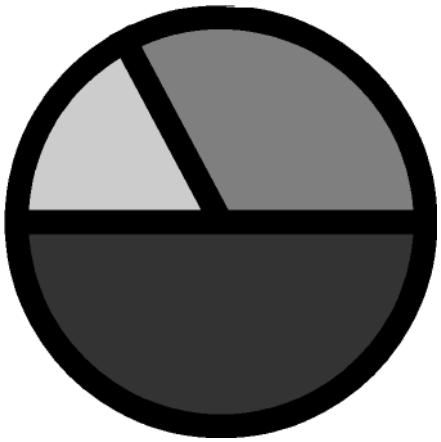


**Figure 6b**

***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).

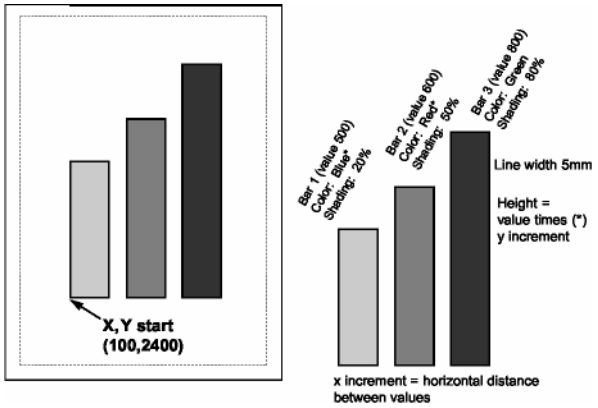



**Figure 7**

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).

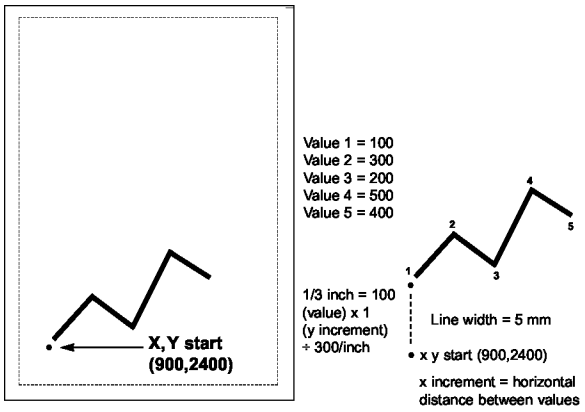



**Figure 8**

**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).

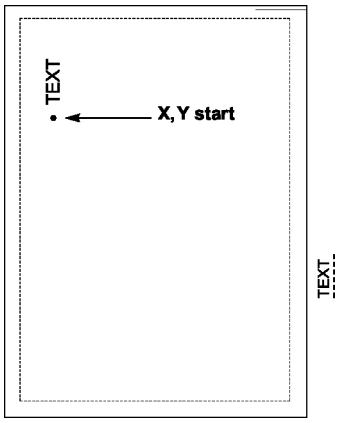



**Figure 9**

***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.

## 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.

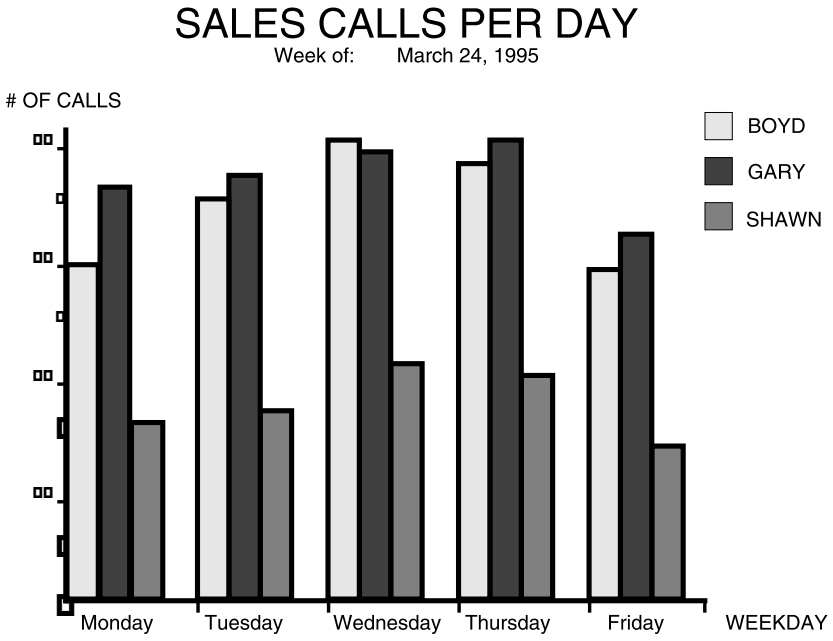



**Figure 10**

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.

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).

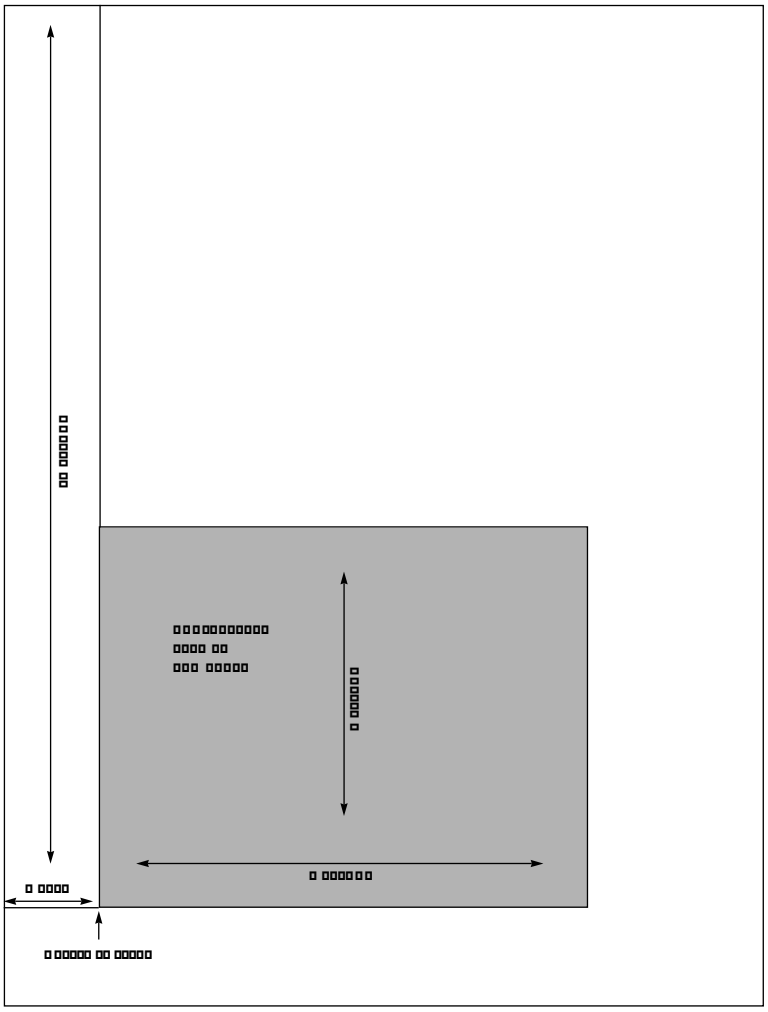


**Figure 11**

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

### 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

### 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.

# PROBLEM RESOLUTION

This chapter provides instructions for performing diagnostic tests on the I-O 4430/31. 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 Technical Support.

Before calling, verify that the I-O 4430/31 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
- Model number of the printer
- Description of the problem
- Results of diagnostic tests
- Type of host system or controller
- Description of cabling system

You may also need to print an EBCDIC or ASCII hex dump by enabling the Hex Dump option through the interface's rotary switch. This causes all printing to be in hexadecimal EBCDIC code, just as it's received from the host or ASCII code sent to the printer, to help in tracing problems.

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

## Interface Self-Test

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

Follow the steps below to start the self-test by setting the Rotary Switch:

1. Verify that the interface is connected properly to the printer.

2. Power off the printer and the interface.

3. Select position “7” on the interface’s Rotary Switch, power on the printer and the interface. A self-test should print.

4. Return the Rotary Switch to position “A” (or the correct twinax address and power on the printer and interface.

The self-test can also be started through host download command 98. Follow the steps below to start the self-test from your terminal.

1. Verify that the printer is connected properly to the interface and in "Ready" mode.

2. Type "&%Z98,1" 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 host download command). The self-test will print out in a few seconds.

Sample printouts are shown below. The selections shown in the samples are factory defaults. The numbers at the left margin are command numbers used to change this setting using host download commands.

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

33TWINAX INTERFACE
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SOFTWARE VERSION 2.01 Twinax Level 1.00

RAM OK
ROM OK

| | |
|---|---|
| Address ..... : | 0 |
| Output Printer Protocol ..... : | HP-PCL 3812 |
| | |
| #01 - Alt. CPT Start Delimiters ..... : | &% - 50 6C |
| #02 - Alt. CPT End Delimiters ..... : | &% - 50 6C |
| #03 - Host Port Timeout ..... : | 08 - seconds |
| #05 - Host Language ..... : | 01 – U.S./Canada |
| #07 - Print Orientation ..... : | 0 – COR/Host override allowed |
| #08 - Auto Print Orientation ..... : | 1 - On |
| #09 - Paper Size ..... : | 0 – Host Selected |
| #10 - True LPI ..... : | 0 – Compress LPI |
| #13 - Paper Drawer 1 ..... : | 1 – Tray Command 1 |
| #14 - Paper Drawer 2 ..... : | 4 – Tray Command 4 |
| #15 - Paper Drawer 3 ..... : | 5 – Tray Command 5 |
| #16 - Override Format Commands ..... : | 0 – No Overrides |
| #17 - Character Set ..... : | 1 – HP Roman 8 |
| #18 - Starting Vertical Position ..... : | 00 |
| #19 - Starting Horizontal Position ..... : | 00 |
| #30 - Paper Drawer 4 ..... : | Tray Command 01 |
| #31 - Paper Drawer 5 ..... : | Tray Command 01 |
| #32 - 11 X 17 (A3) ..... : | 0 - Off |
| #33 - Duplexing ..... : | 0 – Off |

#11 - Host Port Initialization:

#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 | 5E | 7B | 7D | 5C | 30 | &-øØ°µ^{}\0 |
| 1: | 20 | 82 | 2F | 90 | 61 | 6A | 7E | 9C | 41 | 4A | 20 | 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: | BD | 21 | DD | 3A | AE | A6 | AD | 5B | F0 | D5 | FD | FC | ¢!\|:«ª¡[-ı²³ |
| B: | 2E | 24 | 2C | 23 | AF | A7 | A8 | 5D | 93 | 96 | E2 | EA | .$,#»°¿]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 | E7 | 92 | E8 | EF | A2 | A3 | E0 | E9 | +;>=þÆÞ´óúÓÚ |
| F: | 7C | AA | 3F | 22 | F1 | CF | A9 | F2 | E4 | 98 | E5 | 20 | \|¬?"±¤®_õÿÕ |

COAX INTERFACE
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Software Version 2.01

Rom Ok
Ram Ok

| | | |
|---|---|---|
| Coax Printer Protoco | : | HP PCL |
| #01 - Buffer Size (Characters) | : | 1 960 |
| #02 - Lines Density (LPI) | : | 6 |
| #03 - Characters Density (CPI) | : | 10 |
| #04 - Line Spacing | : | 1 Single (6 or 8 LPI) |
| #05 - Form Length (MPL) | : | 066 |
| #06 - Maximum Print Position (MPP) | : | 080 |
| #07 - Print Case | : | 1 Dual |
| #08 - LU1 Language | : | 01 English (US) |
| #09 - Laser Font Number | : | 00011 |
| #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 |
| #21 - Print Quality (Fast Draft) | : | 0 DP = Fast Draft, Text = Draft |
| #25 - IBM Motion Command | : | 0 Use FF |
| #26 - Suppress Empty Forms | : | 0 No |
| #27 - Form Feed After Time Out | : | 0 No |
| #30 - Override of Formatting Cmds | : | 0 Disabled |
| #32 - Paper Size | : | 0 Letter (8.5 x 11") |
| #34 - Interv Required (IR) Timeout | : | 120 times 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) |
| #45 - SCS TRN Translate | : | 1 3287 emulation emulat, SCS code 35 |
| #61 - Auto Print Orientation | : | 1 Active |
| #62 - Primary Tray Orientation | : | 0 COR |
| #63 - Alternate Tray Orientation | : | 0 COR |
| #64 - Manual Feed Orientation | : | 0 COR |
| #65 - Character Set Selection | : | 1 Roman 8 |
| #57 - Host Port Init String: | | |
| HP: | | |

#55 - Custom User Strings:
U0:
U1:
U2:
U3:
U4:
U5:

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 | D6 | D2 | B3 | F3 | 5E | 7B | 7D | 5C | 30 | &-øØ°µ^{}\0 |
| 1 | 20 | C5 | 2F | DC | 61 | 6A | 7E | BB | 41 | 4A | 20 | 31 | é/Éaj~£AJ 1 |
| 2 | C0 | C1 | A2 | A4 | 62 | 6B | 73 | BC | 42 | 4B | 53 | 32 | âêÂÊbks¥BKS2 |
| 3 | CC | CD | D8 | A5 | 63 | 6C | 74 | F2 | 43 | 4C | 54 | 33 | äëÄËclt·CLT3 |
| 4 | C8 | C9 | A1 | A3 | 64 | 6D | 75 | BE | 44 | 4D | 55 | 34 | àèÀÈdmufDMU4 |
| 5 | C4 | D5 | E0 | E5 | 65 | 6E | 76 | BD | 45 | 4E | 56 | 35 | áíÁÍenv§ENV5 |
| 6 | E2 | D1 | E1 | A6 | 66 | 6F | 77 | F4 | 46 | 4F | 57 | 36 | ãîÃÎfow¶FOW6 |
| 7 | D4 | DD | D0 | A7 | 67 | 70 | 78 | F7 | 47 | 50 | 58 | 37 | åïÅÏgpx¼GPX7 |
| 8 | B5 | D9 | B4 | E6 | 68 | 71 | 79 | F8 | 48 | 51 | 59 | 38 | çìÇÌhqy½HQY8 |
| 9 | B7 | DE | B6 | A9 | 69 | 72 | 7A | F5 | 49 | 52 | 5A | 39 | ñßÑ`irz¾IRZ9 |
| A | BF | 21 | 7C | 3A | FB | F9 | B8 | 5B | 2D | 31 | 32 | 33 | ¢!\|:«ª¡[-123 |
| B | 2E | 24 | 2C | 23 | FD | FA | B9 | 5D | C2 | C3 | DF | AE | .$,#»°¿]ôûÔÛ |
| C | 3C | 2A | 25 | 40 | E4 | D7 | E3 | B0 | CE | CF | DA | DB | <*%@ðæÐ öüÖÜ |
| D | 28 | 29 | 5F | 27 | B2 | 20 | B1 | AB | CA | CB | E8 | AD | ()_'ý Ý"òùÒÙ |
| E | 2B | 3B | 3E | 3D | F0 | D3 | F1 | 27 | C6 | C7 | E7 | ED | +;>=ÞÆþ'óúÓÚ |
| F | 7C | 5E | 3F | 22 | FE | BA | 20 | 5F | EA | EF | E9 | 20 | \|^?"±¤ _õÿÕ |

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 | C8 | CC | A1 | D8 | 61 | 71 | 41 | 51 | 0&àäÀÃaqAQ |
| 1 | 00 | 3D | 31 | 2D | C9 | CD | A3 | A5 | 62 | 72 | 42 | 52 | =1-èëÈËbrBR |
| 2 | 00 | 27 | 32 | 2E | D9 | DD | E6 | A7 | 63 | 73 | 43 | 53 | '2.ìïÌÏcsCS |
| 3 | 00 | 22 | 33 | 2C | CA | CE | E8 | DA | 64 | 74 | 44 | 54 | "3,öõÖÕdtDT |
| 4 | 00 | 2F | 34 | 3A | CB | CF | AD | DB | 65 | 75 | 45 | 55 | /4:ùüÙÜeuEU |
| 5 | 00 | 5C | 35 | 2B | E2 | C0 | E1 | A2 | 66 | 76 | 46 | 56 | \5+ãâÃÂfvFV |
| 6 | 00 | 7C | 36 | 5E | EA | C1 | E9 | A4 | 67 | 77 | 47 | 57 | \|6^õêÕÊgwGW |
| 7 | 00 | 7C | 37 | B0 | EF | D1 | 59 | A6 | 68 | 78 | 48 | 58 | \|7°ÿîYÎhxHX |
| 8 | 3E | 3F | 38 | B3 | C8 | C2 | 41 | DF | 69 | 79 | 49 | 59 | >?8³ÀâAßiyIY |
| 9 | 3C | 21 | 39 | 00 | C9 | C3 | 45 | AE | 6A | 7A | 4A | 5A | <!9 èûEÛjzJZ |
| A | 5B | 24 | DE | 5E | C5 | C4 | 45 | E0 | 6B | D7 | 4B | D3 | [$ß^éáEÁkæKÆ |
| B | 5D | BF | BD | 7E | D9 | C5 | 49 | DC | 6C | D6 | 4C | D2 | ]¢§~ìéIÉløLØ |
| C | 29 | BB | 23 | AB | CA | D5 | 4F | E5 | 6D | D4 | 4D | D0 | )£#¨òíOÍmåMÅ |
| D | 28 | BC | 40 | 60 | CB | C6 | 55 | E7 | 6E | B5 | 4E | B4 | (¥@'ùóUÓnçNÇ |
| E | 7D | F2 | 25 | A9 | CF | C7 | 59 | ED | 6F | 3B | 4F | 3B | }·%`úúYÚo;O; |
| F | 7B | BA | 5F | 00 | B5 | B7 | 43 | B6 | 70 | 2A | 50 | 2A | {¤_ çñCÑp*P* |

## EBCDIC Hex Dump

The interface can be set up to print the buffer in hexadecimal EBCDIC 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 in twinax, that character is printed below the hex data —at the right in coax.

Start the buffer hex dump from the interface's Rotary Switch as follows:

1. Make sure the 4430/4431 host cable is attached.
2. Verify that the interface is connected properly to the printer.
3. Power on the printer and interface, and wait for the printer to go to "READY" mode.
4. Before sending the print job, put the Rotary Switch in position “9.”
5. Send the print job from the host. The job will print in a "Buffer Dump" format showing all host hex codes.

6. After printing is complete, return the Rotary Switch to position "A" or the valid twinax address for normal operation.

To start the EBCDIC Hex Dump through Host Download:

1. Verify that the printer is connected properly to the interface.

2. Type "&%Z42,1" on the screen, or insert this string in the print job before the problem section.

3. Send the host download command to the printer (press the Print Screen Button or print the document/file that contains the host download command).

4. Send the host data in question to the printer.

5. To stop the EBCDIC hex dump, power off the interface. (In coax, you can type "&%Z42,2" on the screen, then print it.)

6. Send the host download command to the printer (press the Print Screen Button or print the document/file that contains the host download command).

## ASCII Hex Dump

The interface can be set up to print the ASCII data that it would send to the printer hexadecimal dump. This can be useful for a technician to diagnose problems with the interface or the printer.

The ASCII hex data is printed in a block and if the hex data represents a printable character in twinax/coax, that character is printed at the right.

Start the buffer hex dump from the interface's Rotary Switch as follows:

1. Make sure the 4430/4431 host cable is attached.

2. Verify that the interface is connected properly to the printer.

3. Power on the printer and interface, and wait for the printer to go to "READY" mode.

4. Before sending the print job, put the Rotary Switch in position “B.”

5. Send the print job from the host. The job will print in an "ASCII Hex Dump" format showing all host hex codes.

6. After printing is complete, return the Rotary Switch to position "A" or the valid twinax address for normal operation.

To start the ASCII Hex Dump through Host Download:

2. Verify that the printer is connected properly to the interface.

2. Type "&%Z43,1" on the screen, or insert this string in the print job before the problem section.

3. Send the host download command to the printer (press the Print Screen Button or print the document/file that contains the host download command).

4. Send the host data in question to the printer.

5. To stop the ASCII hex dump, restore the rotary switch to its normal position (“A”), or you can type "&%Z42,2" on the screen, then print it.

6. Send the host download command to the printer (press the Print Screen Button or print the document/file that contains the host download command).

## Self-Diagnostics (Twinax Only)

The interface can be set up to perform a complete analysis of its functions. The interface transmits data to itself and then analyzes how that data is processed. In Twinax, if an error is detected, an error message is printed on the printer.

Follow the steps below to perform interface self-diagnostics.

1. Power off the interface and the printer.

2. Disconnect the host cables from the 4430/4431, but leave the Twinax adapter cable attached.

3. Verify that the interface is connected properly to the printer and that the interface is powered off.

4. Select Rotary Switch position "F”.

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

TEST SEQUENCE COMPLETE

Because a laser printer will only print full pages, it will store these and other messages in the printer buffer until enough messages are accumulated to fill up on page (this may take 3-4 minutes). Many printers will allow you to print the buffer before the page is complete by pressing a button on the printer’s front panel.

6. Power off the printer and interface and reset the Rotary Switch to the valid twinax address to end the self-diagnostics program.

Any error messages are printed between the "TEST SEQUENCE COMPLETE" messages. Call I-O Technical Support if error messages are printed.

## LED Flash Patterns

This listing describes what the different flashing patterns of the LED are indicating:

1. Single flash pattern - The printer is not ready and the interface is waiting for the printer.

2. Single  Rapid flashing pattern - After a rotary switch selection, the LED rapidly flashes to indicate that power should be cycled before proceeding.

3. Double flash pattern – At power-up if a proper Twinax or Caox adapter cable is not detected, indicating that an adapter cable needs to be attached.

4. Triple flash pattern - A rotary switch selection has been made that requires a secondary setting. There will be a 30 second delay to make the secondary selection.

5. Flickering - The interface is saving a configuration to the Non-volatile memory. This could be a restore factory defaults, a host download selection, or a rotary switch selection.

6. The LED is on - Line sync has been established with the Host.

**Normal Operation at Power Up:**

| | |
|---|---|
| Single flash<br>Off | Initial power up signal |
| Single flash pattern<br>Off | Waiting for printer to come on-line |
| On solid | The printer is on-line and the line connection is good |

**Problem with Box at Power Up:**

| | |
|---|---|
| Double flash pattern | Please attach the adapter cable |
| On solid | Problem with the interface |

**Normal Set Up Operation:**

| | |
|---|---|
| Single flash<br>Off | Initial power up signal |
| Triple flash pattern<br>Off | User has 30 seconds to change the rotary switch setting |
| Flickering | Settings are being saved to NV RAM Off |
| Rapid flashing pattern | Setting saved, indicates need to cycle power - user to change rotary switch to twinax address or coax normal operation mode “A” before powering up. |

### Restoring Factory Defaults

The factory default configuration can be restored by either sending Host Download Command 98 or using the Rotary Switch.

To restore the factory defaults using Host Download, follow these steps:

1. Verify that the interface is properly connected to both the host and the printer, and that both the printer and interface are powered on.

2. Type “&%Z98,0” on the screen.

3. Press the Print Screen Button, or print the document/file that contains the Host Download Command. The LED will flash rapidly for about 5 seconds and then print an interface self-test.

4. Power off and then back on the printer and the interface.

5. Power off the printer and the interface and reset the Rotary Switch to position “A” or the valid twinax address.

6. Power on both the printer and the interface.

To restore factory deafults using the rotary switch, follow these steps:

1. Remove power from the 4430/4431.

2. Please the Rotary switch in position #8

3. Apply power to the 4430/4431 and observe the LED “flicker”

4. When the LED end the flicker, remove power and restore the rotary switch to the normal desired position.

## Problem Resolution Guide

The following pages contain a general guide to resolve common problems that may occur. Please refer to this guide before contacting your I-O Technical Support representative.

| Problem or Message | Probably Cause | Action |
|---|---|---|
| "Printer not ready" message at host | Printer not in a ready status | Make sure printer is on line, has paper, etc. |
| Host line sync LED not on | 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 printer at the proper address. |
| | Host is not operating | Check Host system. |
| | Damaged or improper cabling | Check host cabling for damage or improper connection. |
| | Twinax cable improperly terminated | Make sure the prior device is not terminated (some PC emulator cards may terminate mid-line). |
| | Wrong Rotary Switch setting. | Change the Rotary Switch to the correct setting. |
| Host Line Sync LED comes on then goes off | Address conflict with another twinax device on the cable | Make sure no other devices on this cable have the same address. |
| | Damaged or improper host cables | Check host cabling for damage or improper connection. |
| Host LED on, but no print output | Print fault, such as paper out, paper jam, etc. | Make sure the printer has paper, is clear of jams, etc. |
| | Serial Printing problems | Check the Serial printing settings between the printer and interface. |
| | Interface not properly installed, or parallel port not accepting data | Check for solid connec-tions and that the parallel port of the printer is active |
| Printer loses host communication (drops off line) | Improper or damaged cabling | Check host cabling for improper connections or damage. |

| Problem or Message | Probable Cause | Action |
|---|---|---|
| Right margin is cut off | Page width in word processing program is not set wide enough | Reposition right margin setting. |
| | Page widge 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 the document length doesn't exceed the maximum number of lines. |
| | Page orientation was changed | The printer may eject a blank page when the page orientation (portrait or landscape) is changed. |
| Form length is incorrect | Form length incorrect in software | Change form length. |
| | Incorrect configuration at the host | Make sure the host configuration matches the printer's. |
| Printer won't change fonts | Incorrect typestyle number | Make sure the font ID used is valid. Invalid font Ids are ignored by the printer |
| | Wrong font cartridge loaded | Load the cartridge with the font that corresponds to the font ID. |
| | Font cartridge damaged or not seated into the printer properly | If possible try a known good cartridge to determine if cartridge is faulty. Make sure the cartridge is loaded properly. |
| Printer does not print landscape in requested font (**twinx only**) | Did not select a rotation in the word processing program | Select 90° or 270° rotation in the program. |
| | Did not select a rotation in the data processing OCL statement | Add a 90° or 270° orientation instruction to the OCL statement. |

| Problem or Message | Probable Cause | Action |
|---|---|---|
| | APO feature is ON and page size is 8 ½" x 14" or less and width is less than height | Turn APO off or increase page size so it is larger than 8 ½" x 14" or change width and height so width is greater than height. Refer to Print Orientation Command. |
| | APO feature is OFF and orientation is set to COR; COR, host override; or portrait | Set I-O Print Box orientation to landscape. |
| Printer does not print portrait in requested font (**twinax only**) | Selected the wrong rotation in the word processing program | Select 0° to 180° rotation in OCL statement. |
| | Selected the wrong rotation in the data processing OCL statement | Select 0° to 180° rotation in OCL statement. |
| | APO feature is ON and page size is 8 ½" x 14" or less and width is greater than height | Turn APO off or increase page size so it is larger than 8 ½" x 14" or change width and height so width is less than height. Refer to Print Orientation Command. |
| | APO feature is OFF and orientation is set to COR; COR, host override allowed; or landscape | Set I-O Print Box orientation to portrait. |
| Printer does not print COR (**twinax only**) | APO feature is ON and page size is 8 ½" x 14" or less | Turn APO off or increase page size so it is larger than 8 ½" x 14" |
| | APO feature is OFF and orientation is set to COR, host override allowed | Set orientation to COR or change host settings (Refer to Orientation Command). |
| | Rotation in data processing printer file is set to COR and host print quality in printer file is STD or NLQ | Select "DRAFT" print quality in printer file. |
| DisplayWrite/36 or OfficeVision/400 document prints incorrectly (**twinax only**) | There might be an error in using DisplayWrite/36 or OfficeVision/400 | Choose "yes" to printer error log on page 3 of the Print Option Screen. |

| Problem or Message | Probable Cause | Action |
|---|---|---|
| Printer does not print landscape in requested font (**coax only**) | APO feature is ON and page size is 8 ½" x 11" or less; and width is less than height | Turn off APO or increase page size so it is larger than 8 ½" x 11" or change width and height so width is greater than height. |
| | APO feature is OFF and orientation is set to COR, portrait, or user-defined (with font orientation portrait) | Set paper tray orientation to landscape or set font orientation to landscape. |
| Printer does not print landscape in requested font (**coax only**) | APO feature is ON and page size is 8 ½" x 11" or less; and width is less than height | Turn off APO or increase page size so it is larger than 8 ½" x 11" or change width and height so width is greater than height. Refer to the COR and APO commands. |
| | APO feature is OFF and orientation is set to COR, landscape, or user-defined (with font orientation landscape) | Set paper tray orientation to landscape or set font orientation to portrait. |
| Printer does not print COR (**coax only**) | APO feature is ON and page size is 8 ½" x 11" or less | Turn off APO or increase paper size so it is larger than 8 ½" x 11". |
| | APO feature is OFF and orientation is set to portrait, landscape, or user-defined | Set orientation to "COR". |

# APPENDIX A

## Font (FGID) Reference for PCL Compatible Printers

The following tables list standard resident fonts and cartridges that are available, along with the font ID number used to select the font.

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 |

| Typeface | Symbol | Orient | Pitch | Point | Type-style No. |
|---|---|---|---|---|---|
| Univers 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 | 4874 |
| | L1/R8/850 | P/L | Prop. | 30 | 4877 |
| ITC Zapf Dingbat | 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 |
| **General Font Assignments** | | | | | |
| Times | L1/R8/850 | P | Prop. | 8 | 157 |
| Times | L1/R8/850 | P | Prop. | 10 | 158 |
| Times Bold | L1/R8/850 | P | Prop. | 10 | 159 |
| Times Italic | L1/R8/850 | P | Prop. | 10 | 155 |
| Helvetica Bold | L1/R8/850 | P | Prop. | 14.4 | 34126 |
| Courier Bold | L1/R8/850 | P/L | 10 | 12 | 46 |
| Courier Italic | L1/R8/850 | P/L | 10 | 12 | 18 |
| Prestige | L1/R8/850 | P/L | 12 | 10 | 86 |
| Prestige Bold | L1/R8/850 | P/L | 12 | 10 | 111 |
| Prestige Italic | L1/R8/850 | P/L | 12 | 10 | 112 |

| Typeface | Symbol | Orient. | Pitch | Point | Type-style No. |
|---|---|---|---|---|---|
| **General Font Assignments** | | | | | |
| Letter Gothic | L1/R8/850 | P/L | 12 | 12 | 87 |
| Letter Gothic Bold | L1/R8/850 | P/L | 12 | 12 | 110 |
| Letter Gothic Italic | L1/R8/850 | P/L | 12 | 10 | 112 |
| Helvetica | ASCII | P | Prop. | 6 | 181 |
| Helvetica | ASCII | P | Prop. | 8 | 183 |
| Helvetica Bold | ASCII | P | Prop. | 8 | 182 |
| Helvetica Bold | ASCII | P | Prop. | 10 | 185 |
| Helvetica Bold | ASCII | P | Prop. | 12 | 188 |
| Helvetica Bold | ASCII | P | Prop. | 14 | 190 |
| Tax Line Draw | LinDrw-7 | P | 10 | 12 | 34 |
| Letter Gothic | L1/R8/850 | P | 10 | 14.4 | 40 |
| Letter Gothic | L1/R8/850 | P | 17.1 | 9.4 | 255 |
| OCR-A 10N | OCR-A | P | 10 | 12 | 19 |
| OCR-B 10N | OCR-B | P | 10 | 12 | 3 |
| Code 3-9 4.6N | 3 of 9 | P | 4.6 | 12 | 240 |
| Code 3-9 9.3N | 3 of 9 | P | 9.3 | 12 | 61 |
| EAN/UPC Bold Bar Code | UPC | P | Prop. | 12 | 171 |
| EAN/UPC Bar Code | UPC | P | Prop. | 12 | 170 |
| **ProCollection Cartridge** | | | | | |
| Line Printer | ASCII | P/L | 17.1 | 8.5 | 253 |
| Courier Bold | ASCII | P/L | 10 | 12 | 45 |
| Courier Italic | ASCII | P/L | 10 | 12 | 17 |
| Courier | ASCII | P/L | 12 | 10 | 85 |
| Courier Bold | ASCII | P/L | 12 | 10 | 108 |

| Typeface | Symbol | Orient. | Pitch | Point | Type-style No. |
|---|---|---|---|---|---|
| **ProCollection Cartridge (cont.)** | | | | | |
| Courier Italic | ASCII | P/L | 12 | 10 | 92 |
| Courier | Legal | P | 10 | 12 | 51 |
| Couier 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 |
| Times Roman | ASCII | P | Prop. | 10 | 164 |

| Typeface | Symbol | Orient | Pitch | Point | Type style No. |
|---|---|---|---|---|---|
| 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 |
| **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 |
| **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 |
| Helv Bold | L1/R8 | P | Prop. | 14 | 34125 |

| Typeface | Symbol | Orient | Pitch | Point | Type style 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 |
| **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 | 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 |
| **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 |
| **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 |

| Typeface | Symbol | Orient | Pitch | Point | Type style No. |
|---|---|---|---|---|---|
| Tax Line Draw | Taxlin Drw | P/L | 10 | 12 | 30 |
| **Bar Codes & More Cartridge** | | | | | |
| Letter Gothic | L1/R8 | P/L | 15 | 9.5 | 230 |
| Letter Gothic | L1/R8 | P/L | 112 | 12 | 87 |
| Letter Gothic | L1/R8 | 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 |
| **Text Equations Cartridge** | | | | | |
| Prestige Elite | L1/R8 | P | 15 | 7 | 221 |
| Prestige Elite | L1/R8 | P | 17.1 | 7 | 256 |
| Prestige Elite | L1/R8 | P | 12 | 10 | 86 |
| Prestige Elite bold | L1/R8 | P | 12 | 10 | 111 |
| Prestige Elite italic | L1/R8 | P | 12 | 10 | 112 |
| CG Times | L1/R8 | P | Prop. | 8 | 157 |
| CG Times | L1/R8 | P | Prop. | 10 | 158 |
| CG Times bold | L1/R8 | P | Prop. | 10 | 159 |
| CG Times italic | L1/R8 | P | Prop. | 10 | 155 |
| **Global Text Cartridge** | | | | | |
| CG Century Schoolbook | L1/R8/850 | P/L | Prop. | 8 | 16950 |
| CG Century Schoolbook | L1/R8/850 | P/L | Prop. | 10 | 16951 |
| CG Century Schlbk Bold | L1/R8/850 | P/L | Prop. | 10 | 16971 |
| CG Century Schlbk Italic | L1/R8/850 | 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 |

# APPENDIX B

## Resident Scalable Font Numbers

The following is a list of the resident scalable fonts and font numbers for current PCL compatible printers. Refer to "Font Change Commands" to implement resident scalable font changes.

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

| 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 |

| 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 |

# APPENDIX C

## Character Sets

An EBCDIC to ASCII translation table is printed at the bottom of the interface self-test printout as shown in the *Problem Resolution* Chapter. This table illustrates how EBCDIC characters (from the IBM host) are converted to the ASCII characters in Code Page 850, Code Page 858, Roman 8, Code Page 437 and Latin 1 Euro 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 the chart to the right.

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

Characters in the following ASCII tables can be obtained by embedding the ASCII hex value for that character in a host document in the following manner:

&%<hex pair> <additional hex pairs>&%

where &% are the Command Pass-Thru Delimiters <hex pair> is the ASCII hex value for the desired character <additional hex pairs> are the ASCII values for additional characters. Each hex pair can be separated with a space to aid in readability. However, there must not be a space between the Command Pass-Thru delimiters and the first hex pair. Spaces between hex values of a hex pair are also not allowed.

Example: To print ASCII character ö using the Code Page 850 character set, first locate the corresponding ASCII hex value. It is 94. Then embed the ASCII hex value together with the Command Pass-Thru delimiters in your host document:

J&%94&%rg

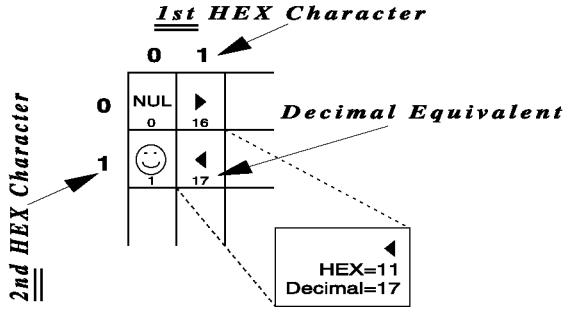
will print as Jörg, a common first name in Germany.

The selection between the two available character sets decides which is used when a font supports both. Refer to the printer's user's guide for illustrations and information on character sets.

Note that some ASCII printers use slightly modified tables. You should consult your printer's User Guide for more information on printable and nonprintable characters.

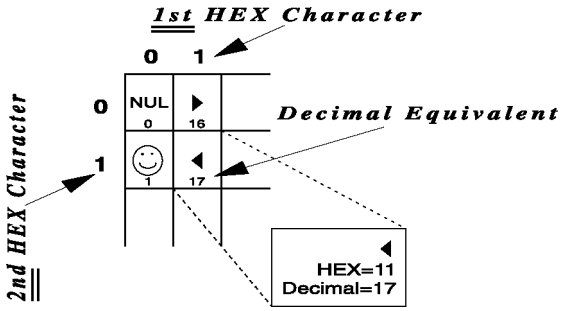
## Code Page 850 Symbol Set

| | 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 | Đ 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 | º 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

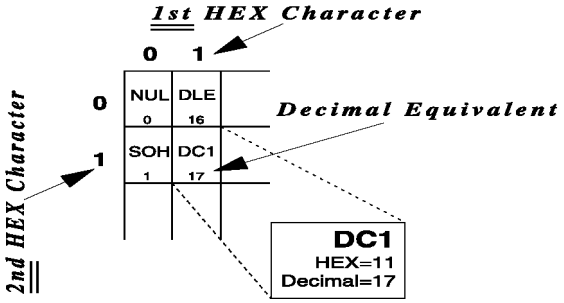
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | NUL 0 | ▶ 16 | 32 | 0 48 | @ 64 | P 80 | ` 96 | p 112 | Ç 128 | É 144 | á 160 | ▒ 176 | └ 192 | ð 208 | Ó 224 | - 240 |
| 1 | ☺ 1 | ◀ 17 | ! 33 | 1 49 | A 65 | 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 |



## Roman-8 Symbol Set

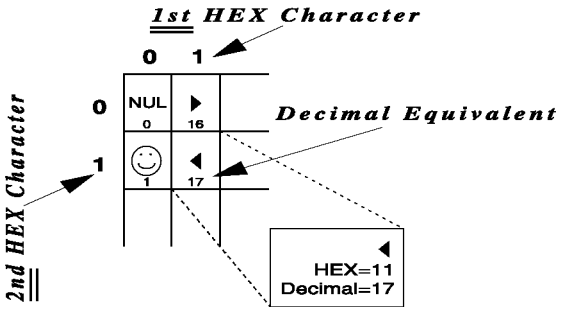
Includes US ASCII (dec. 1-127) and Roman Extension Symbol Sets

| | 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 | D 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 437 Symbol Set

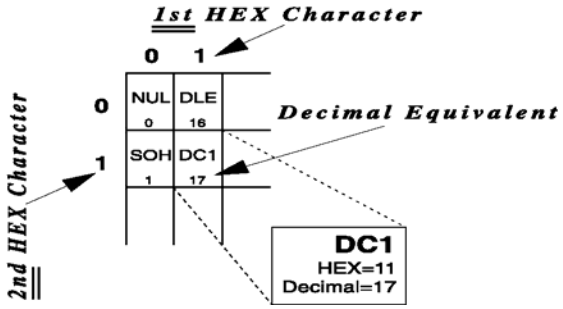
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | NUL 0 | ▶ 16 | 32 | 0 48 | @ 64 | P 80 | ` 96 | p 112 | Ç 128 | É 144 | á 160 | ▒ 176 | └ 192 | ╨ 208 | α 224 | ≡ 240 |
| 1 | ☺ 1 | ◀ 17 | ! 33 | 1 49 | A 65 | Q 81 | a 97 | q 113 | ü 129 | æ 145 | í 161 | ▓ 177 | ┴ 193 | ╤ 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 | ╥ 210 | Γ 226 | ≥ 242 |
| 3 | ♥ 3 | ‼ 19 | # 35 | 3 51 | C 67 | S 83 | c 99 | s 115 | â 131 | ô 147 | ú 163 | │ 179 | ├ 195 | ╙ 211 | π 227 | ≤ 243 |
| 4 | ♦ 4 | ¶ 20 | $ 36 | 4 52 | D 68 | T 84 | d 100 | t 116 | ä 132 | ö 148 | ñ 164 | ┤ 180 | ─ 196 | ╘ 212 | Σ 228 | ⌠ 244 |
| 5 | ♣ 5 | § 21 | % 37 | 5 53 | E 69 | U 85 | e 101 | u 117 | à 133 | ò 149 | Ñ 165 | ╡ 181 | ┼ 197 | ╒ 213 | σ 229 | ⌡ 245 |
| 6 | ♠ 6 | ▬ 22 | & 38 | 6 54 | F 70 | V 86 | f 102 | v 118 | å 134 | û 150 | ª 166 | ╢ 182 | ╞ 198 | ╓ 214 | µ 230 | ÷ 246 |
| 7 | • 7 | ↨ 23 | ' 39 | 7 55 | G 71 | W 87 | g 103 | w 119 | ç 135 | ù 151 | º 167 | ╖ 183 | ╟ 199 | ╫ 215 | τ 231 | ≈ 247 |
| 8 | ◘ 8 | ↑ 24 | ( 40 | 8 56 | H 72 | X 88 | h 104 | x 120 | ê 136 | ÿ 152 | ¿ 168 | ╕ 184 | ╚ 200 | ╪ 216 | Φ 232 | ° 248 |
| 9 | ○ 9 | ↓ 25 | ) 41 | 9 57 | I 73 | Y 89 | i 105 | y 121 | ë 137 | Ö 153 | ⌐ 169 | ╣ 185 | ╔ 201 | ┘ 217 | θ 233 | · 249 |
| A | ◙ 10 | → 26 | * 42 | : 58 | J 74 | Z 90 | j 106 | z 122 | è 138 | Ü 154 | ¬ 170 | ║ 186 | ╩ 202 | ┌ 218 | Ω 234 | · 250 |
| B | ♂ 11 | ← 27 | + 43 | ; 59 | K 75 | [ 91 | k 107 | { 123 | ï 139 | ¢ 155 | ½ 171 | ╗ 187 | ╦ 203 | █ 219 | δ 235 | √ 251 |
| C | ♀ 12 | ∟ 28 | , 44 | < 60 | L 76 | \ 92 | l 108 | \| 124 | î 140 | £ 156 | ¼ 172 | ╝ 188 | ╠ 204 | ▄ 220 | ∞ 236 | n 252 |
| D | ♪ 13 | ↔ 29 | - 45 | = 61 | M 77 | ] 93 | m 109 | } 125 | ì 141 | ¥ 157 | ¡ 173 | ╜ 189 | ═ 205 | ▌ 221 | ø 237 | 2 253 |
| E | ♫ 14 | ▲ 30 | . 46 | > 62 | N 78 | ^ 94 | n 110 | ~ 126 | Ä 142 | Pt 158 | « 174 | ╛ 190 | ╬ 206 | ▐ 222 | ϵ 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 | D 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 | ƒ 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 |



# APPENDIX D

## Parallel Connector

The I-O 4430 uses a standard 36 pin Centronics connector which allows the interface to plug directly into the large 36 pin printer parallel port (this is refered to as an IEEE-1284-C connector).

The following describes the internal connectors on the interface and the pin assignment on the Centronics connector.

| Pin | Signal Description | Pin | Signal Description |
|---|---|---|---|
| 1 | out, STB˜ | 19 | Logic Ground |
| 2 | out, D0 | 20 | Logic Ground |
| 3 | out, D1 | 21 | Logic Ground |
| 4 | out, D2 | 22 | Logic Ground |
| 5 | out, D3 | 23 | Logic Ground |
| 6 | out, D4 | 24 | Logic Ground |
| 7 | out, D5 | 25 | Logic Ground |
| 8 | out, D6 | 26 | Logic Ground |
| 9 | out, D7 | 27 | Logic Ground |
| 10 | in, ACK` | 28 | Logic Ground |
| 11 | in, BUSY | 29 | Logic Ground |
| 12 | in, PE | 30 | Logic Ground |
| 13 | in, SEL | 31 | out, INIT˜ |
| 14 | out, Auto Feed˜ | 32 | in, FLT˜ |
| 15 | nc | 33 | Logic Ground |
| 16 | Logic Ground | 34 | nc |
| 17 | Chassis Ground | 35 | nc |
| 18 | VCC+5volts** | 36 | out*, Selctin˜ |

(Notes:

* Selctin˜ signal is not actively driven. Selctin˜ is grounded thru a resister

** If +5V of 80ma is available on Pin #18, no external power supply is needed

The external power supply accepts 110 to 240 volts AC and outputs 5 volts DC, 3000 MA. It has a center grounded connector.

## Serial Connector

The 25-pin serial connector on the 4431 is designed to connect directly to most common serial printers. Your printer may have a different connector, such as a 9-pin connector, so the pin-out may be different. This will require you to obtain an adapter to attach the 4431 to you printer. The pinout for the 4431 is as follows:

| Pin number | Signal Name | Signal Direction |
|---|---|---|
| 1 | Chassis Ground | |
| 2 | Receive Data | In to 4431 |
| 3 | Transmit Data | Out from 4431 |
| 5 | Request to send | Out from 4431** |
| 6 | Ready | Out from 4431 |
| 7 | Signal ground | |
| 14 | Power | Optional 4431 +5v* |
| 20 | DTR | In to 4431 |

* to use the optional +5volt pin to power the interface from the printer, an internal jumper "J3" must be shorted.

** Pin number 5 is the actual signal that the 4431 uses to control data from the printer, the other output signal "Ready" pin 6 is always active when power in applied to the 4431.

# 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.

# 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.

**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.

# 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 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.

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[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.

# 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.

**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.

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

## 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).

This product also complies with the European Union Restriction of Hazardous Substances (RoHS) Directive (2002/95/EC) which restricts the use of lead (Pb), mercury, cadmium, hexavalent chromium and two brominecontaining flame retardants: PBB (polybrominated biphenyls) and PBDE (polybrominated diphenyl ethers) in electrical and electronic products.

**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.