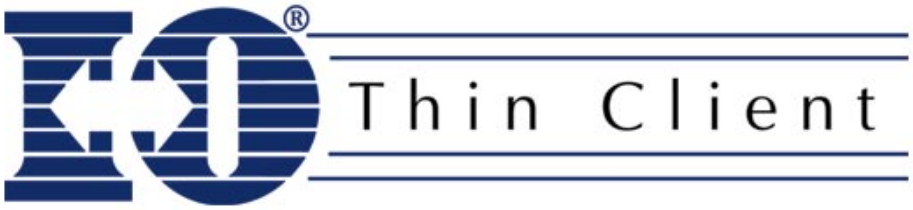

I-O 5250 Printer Emulation User's Guide

V1.11

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Preface

Thank you for purchasing the I-O Thin Client. This guide contains information to setup and use I-O's 5250 Printer Emulation for thin clients.

The guide consists of the following chapters:

- **Introduction**: Provides an overview of the product.
- **Configure the AS/400 for TN5250e**: Provides brief instruction on how to setup the AS/400 – iSeries system for TN5250e printing.
- **Configure the I-O 5250 Printer Connection**: Describes how to create or edit an I-O 5250 Printer Emulation connection.
- **Running the I-O 5250 Printer Session**: Describes how to activate a printer session.
- **Customizing the I-O 5250 Printer Session**: Describes how to adjust the final print job attributes (such as CPI, print quality, page orientation, etc.).
- **SCS Printing Operation**: Provides a detailed overview of laser and dot matrix printers and how they emulate the IBM 3812 and 4214 printers. Includes description of basic and advanced functions added by I-O.
- **Troubleshooting**: Provides solutions to problems that you may encounter while using the product.
- **Manufacturer's Warranty & Repair Policy**: States the warranty and how to obtain service and support.

The following symbols are used in the guide.

Caution: This symbol highlights procedures that, if not correctly performed or adhered to, could damage or corrupt the product or adversely affect the security and functionality of the product. Do not proceed beyond such points until the required conditions are fully understood and achieved.

Note: This symbol denotes useful additional information that is relevant to the procedure or feature being described.

Tip: This symbol denotes a hint, shortcut or alternate method to aid or supplement the procedure being described.

Consistent with our policy of continuous development, the product you received may have features different from to those described in this guide. Please visit our web-site www.iocorp.com for current information.

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Introduction

This chapter provides a brief overview of I-O's 5250 Printer Emulation for thin clients.

Overview

I-O 5250 Printing for Thin Client is a simple to use IBM AS/400 – iSeries host printing emulation. Connection to the IBM host is accomplished over the Ethernet link using TN5250e (a TCP/IP printing protocol created for use with IBM iSeries – AS/400 hosts).

Configuration is required only on the thin client as the IBM host will automatically create a print device, writer and spooler. The IBM host will either create its own name for the printer session, or you may setup a name of your choice. However, the IBM host must be configured to use TCP/IP, TN5250e and set for automatic device configuration.

With TN5250e, the IBM host recognizes only one type of printer device, a 3812 (a laser printer). However, I-O's 5250 Printer Emulation for thin clients contains a 3812 to 4214 conversion capability. This allows not only laser printers, but dot-matrix and thermal printers to be attached to the thin client and appear to the IBM host as a 3812 laser printer.

Print jobs sent from the IBM host are issued in IBM's proprietary EBCDIC character set and use SNA Character String (SCS) command structure. The I-O 5250 Printer Emulation converts EBCDIC to ASCII and the SCS command structure to the printer's command structure (PCL, Epson, and Proprinter). The I-O 5250 Printer Emulation product and be customized to change the host print attributes if needed (CPI, page orientation, etc.)

I-O also has included a number of advanced features in the I-O 5250 Printer Emulation. These include the ability to send printer specific commands as part of the SCS data stream that the IBM host does not know the printer is capable of performing. Other features include I-O's bar code language, graphing language, and even color support.

Standard Features

I-O 5250 Printing Emulation can be configured with the following features:

Printer sessions supported	1
Printer emulations supported	3812
3812 to 4214 SCS command conversion	Yes
Printer control screen	Yes
Command Pass-Thru™	Yes
Computer Output Reduction (COR)	Yes
Auto Print Orientation (APO)	Yes
Printer overrides host control option	Yes
Paper size control	Yes
Orientation	Yes
End of Line control	Yes
EBCDIC to ASCII translation	Yes
Parallel port connection	Yes
Serial port connection	Yes
Customizable Telnet port number	Yes
Host status indicator	Yes
Printer status indicator	Yes

NOTE: CERTAIN DOT-MATRIX PRINTER FUNCTIONS SUCH AS LINE ALIGNMENT ARE NOT AVAILABLE THROUGH IBM'S TN5250E. IF THESE PRINTER FUNCTIONS ARE REQUIRED, IT IS SUGGESTED THAT ONE OF I-O'S LAN PRINT SERVERS BE INSTALLED TO PROVIDE COMPLETE DOT-MATRIX FUNCTIONALITY.

Configure the AS/400 for TN5250e

TN5250e is an extension of the Telnet display and printer protocol used in the IBM AS/400 systems. I-O has customized the TN5250e protocol used in I-O 5250 Printer Emulation modules to include the same laser and dot-matrix printer emulations as are used in all I-O LAN Printer Server products. The host AS/400 sees a TN5250e printer as a 3812 page printer, yet I-O's LAN Print Servers allow you to attach either laser or dot matrix printers.

I-O recommends using TN5250e as the preferred AS/400 LAN printing protocol over the TCP/IP LPR/LPD printing processes. This is because TN5250e is easy to configure, fast in operation, and with I-O's enhanced printer emulations provides nearly the same functionality as an twinax-attached printer for both laser and dot-matrix printers.

To configure your AS/400 to support TN5250e printing, the AS/400 must meet the following requirements:

- Be running OS/400 V3R2 or newer, with the most recent applicable PTF's applied.
- Have the most recent version of Client Access installed on the AS/400.
- Have the most recent version of the Telnet server installed on the AS/400.
- Have the AS/400's auto configuration function turned on.
- Make certain that the AS/400 can create virtual devices and there are a sufficient number of devices available to be created.

  This is done using the AS/400 command:

  CHGSYSVAL SYSVAL(QAUTOVRT) + VALUE(?)

  The "?" is the maximum number of user-created virtual devices that can be created.
- If the OS/400 version is earlier than V4R2, the Telnet server will need to be started using the AS/400 command:

  STRTCPSVR SERVER(*TELNET)

  V4R2 and newer versions will automatically start the Telnet server.

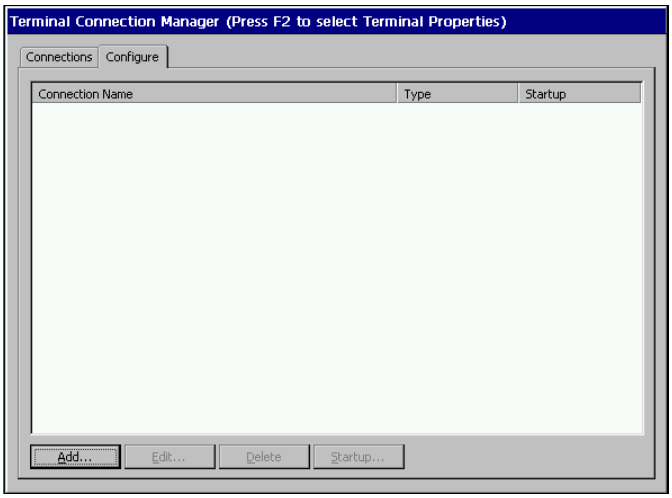
After these requirements are met, the AS/400 (referred herein as IBM host or host) will automatically configure the I-O 5250 Printer session the first time you attempt to make a connection. The IBM host will create a 3812 paper printer device and assign a device name, or use the name you determine when configuring the I-O 5250 Printer session.

Configure the I-O 5250 Printer Connection

This chapter describes the procedure to configure the I-0 5250 Printing Emulation for thin clients.

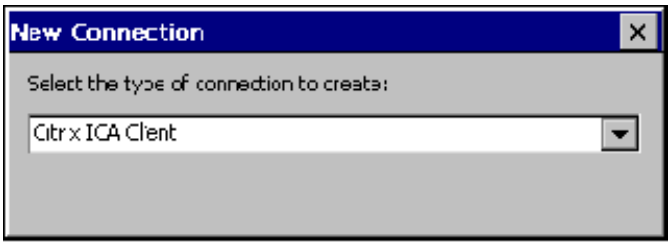
Create the I-O 5250 Printer Connection

1. Select the **Configure** sheet of the **Terminal Connection Manager** window.

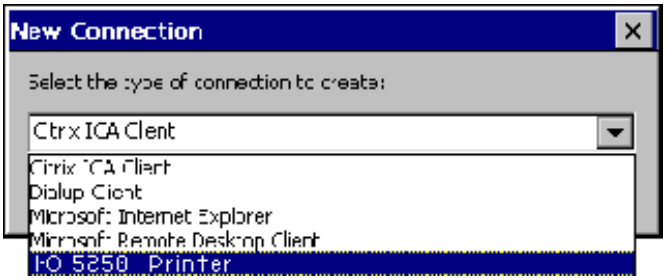


TIP: TO SWITCH TO THE TERMINAL CONNECTION MANAGER FROM AN OPEN SESSION, PRESS CTRL+ALT+END.

2. Click **Add….** The **New Connection** dialog-box is displayed.

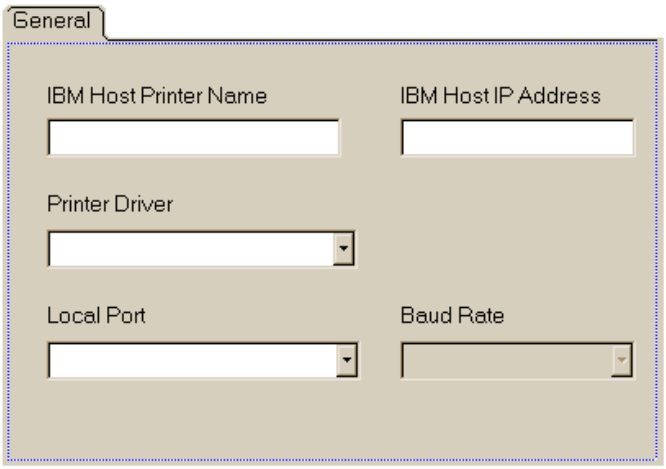


3. Select **I-O 5250 Printer** from the drop-down list and click **OK**.



NOTE: ONLY ONE PRINTER CONNECTION CAN BE CREATED. IF MORE IBM HOST PRINTER CONNECTIONS ARE REQUIRED, INSTALL ONE OF I-O'S LAN PRINT SERVERS.

4. The **I-O 5250 Printer Connection** configuration screen is displayed. On **General** tab, you will enter the basic required information for establishing a TN5250e printer connection with the IBM host.



- **IBM Host Printer Name**: Enter the name that you want the IBM host to use for this printer session (up to 8 characters maximum).

CAUTION: IF YOU LEAVE THIS FIELD BLANK, THE IBM HOST WILL CREATE A 3812 DEVICE BUT WILL GIVE THE PRINTER THE NAME OF QPADEVNNNN WITH NNNN BEING A 4-DIGIT NUMBER. HOWEVER, EACH TIME THE I-O PRINT SERVER CONNECTS TO THE IBM HOST, THE NNNN NUMBER FOR THE PRINTER MAY BE DIFFERENT. THIS MAY CAUSE PROBLEMS WHERE A SPECIFIC PRINTER NAME IS USED IN SPECIFYING THE LOCATION OF PRINTED OUTPUT. *IT IS RECOMMENDED THAT YOU ENTER A PRINTER NAME!*

- **IBM Host IP Address**: Enter the TCP/IP address of the IBM host the I-O 5250 Printer session will be connected to.
- **Printer Driver**: From the drop down box, select the print driver supported by the printer attached to the thin client.

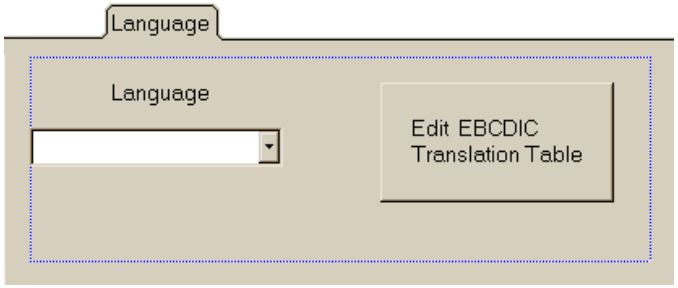
  For example, if you were attaching a HP LaserJet printer, you would select "HP PCL". For Epson, there are several general drivers. Select the one that most closely matches the Epson or Epson compatible dot-matrix printer that is being attached.

  It should be noted that the IBM host will always create a 3812 page printer device whenever TN5250e is used for printing. This is a laser printer. To allow you to attach other printers besides laser printers, I-O's 5250 Printer Emulation module contains a 3812 to 4214conversion module. If you choose to attach a dot-matrix printer to the thin client and select one of the dot-matrix print drivers listed in the drop down box, I-O's 5250 Printer Emulation module will first convert the 3812 SCS commands into 4214 SCS commands. Those 4214 SCS will then be converted into the appropriate ASCII dot-matrix commands. To the IBM host, the attached dot-matrix printer appears as a 3812 page printer.

NOTE: BECAUSE THERE ARE DIFFERENCES IN THE WAY THAT LASER PRINTERS AND DOT-MATRIX PRINTERS FUNCTION, NOT ALL OF THE NATIVE IBM HOST DOT-MATRIX FUNCTIONALITY IS AVAILABLE THROUGH THIS CONVERSION PROCESS DUE TO THE FACT THAT THE IBM HOST IS ONLY SENDING 3812 COMMANDS. SUCH FEATURES AS "LINE ALIGNMENT" USED FOR ALIGNING CHECKS PRIOR TO PRINTING CAN ONLY BE OBTAINED USING A TRUE IBM 4214/5224/5225/5256 DOT-MATRIX EMULATION. FOR SUCH APPLICATIONS, I-O RECOMMENDS THAT YOU USE ONE OF I-O'S LAN PRINT SERVER PRODUCTS TO PROVIDE THE COMPLETE IBM DOT-MATRIX FUNCTIONALITY.

- **Local Port**: Select from the drop down box the physical port that the printer is attached.
- **Baud Rate**: If the COM1 serial port is the physical port the printer is attached, identify here the speed of the port (make this rate the same as that set on the printer). The remainder of the serial characteristics for this port have been set to: 8 data bits, no parity, 1 stop bit. This field is only available when COM1 is selected in the Local Port field.

5. Select the **Language** tab. From the drop down box, select the host language to be used by the IBM host when the command "Use Default Language" is received.

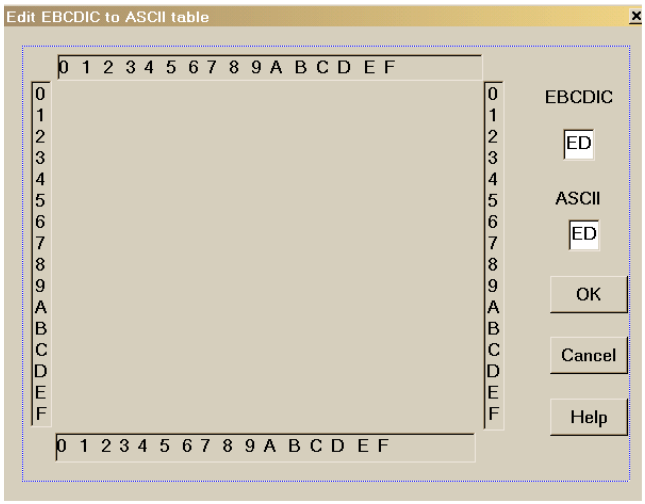


- **Language**: Select the appropriate language from the drop down box.
- **Edit EBCDIC Translation Table**: Use this option to change the translation table that the I-O 5250 Printer Emulation module uses to convert IBM's EBCDIC characters to ASCII characters.

CAUTION: EDITING THIS TABLE SHOULD ONLY BE ATTEMPTED BY ADVANCED USERS.

If a character is printing on your printer with the wrong ASCII value, use the printer's manual to determine the ASCII HEX value of this character and that of the value you want in its place. Then edit the translation table with by changing the incorrect ASCII value to the desired value.

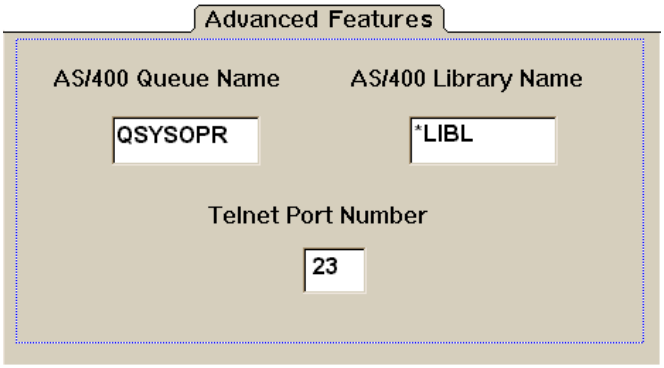
- **EBCDIC**: Enter the hexadecimal EBCDIC value you want to change.
- **ASCII**: Enter the hexadecimal ASCII value for the character you actually want printed.



(Similar to actual screen)

NOTE: I-O USES IBM'S MULTINATIONAL CODE PAGE 500 (WITH MODIFICATIONS FOR THE SELECTED LANGUAGE) FOR THE EBCDIC TABLE AND THEN CONVERTS TO ASCII CODE PAGE 850 AS THE DEFAULT CONVERSION. USING HOST DOWNLOAD COMMAND 17, YOU MAY CHANGE THE ASCII TABLE TO ROMAN 8, LATIN 1 (INCLUDES EURO SYMBOL), CODE PAGE 437, OR CODE PAGE 858 (INCLUDES EURO SYMBOL).

6. Select the **Advanced Features** tab. Enter the values the IBM host uses for the message queue, library and Telnet port number.



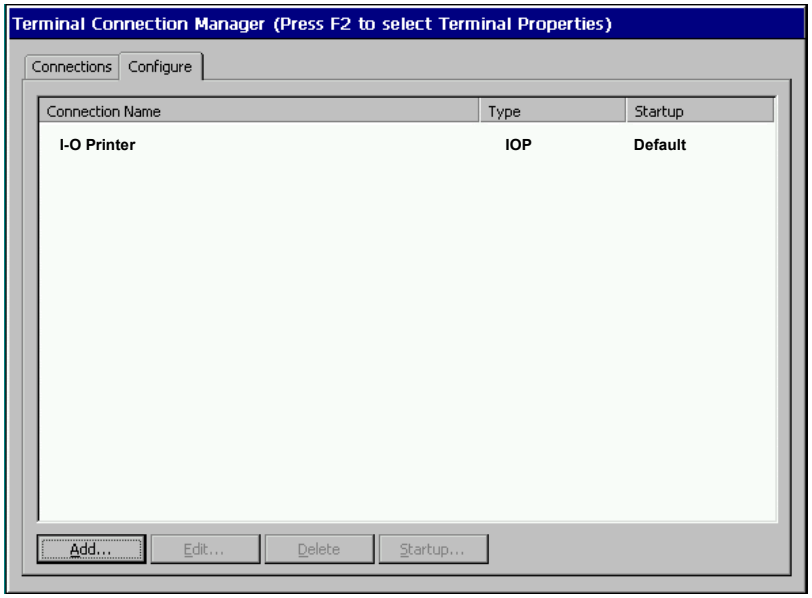
NOTE: YOU NORMALLY DO NOT NEED TO MODIFY THESE VALUES AS THEY ARE THE TN5250E DEFAULTS. REFER TO YOUR SYSTEM ADMINISTRATOR FOR ANY CHANGES HERE.

- **AS/400 Queue Name**: Enter the name of the message queue on the IBM host. The default value is QSYSOPR.
- **AS/400 Library Name**: Enter the name of the library on the IBM host. The default value is *LIBL.
- **Telnet Port Number**: Enter the TCP/IP port for Telnet on the IBM host. The default value is 23. If a firewall is being used, port 23 may be blocked to prevent unwanted access to your network and hosts. In such a case, the port number would be changed to another number. The maximum value is 65535.

7. When you have completed making all configuration entries on the General, Language and Advanced Features screens, click the **OK** on the title bar. Pause a few moments while the thin client saves the changes (if adding a connection, a new entry will appear on the Terminal Connection Manager screen). Then click the **Connections** tab on the Terminal Connection Manager screen.

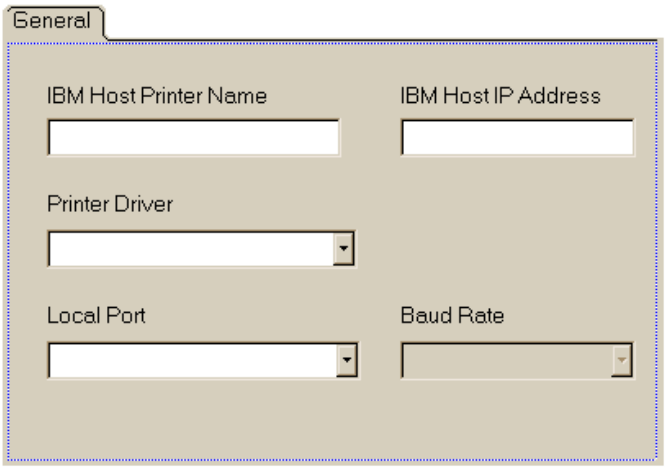
Edit the I-O 5250 Printer Connection

1. Select the **Configure** sheet of the **Terminal Connection Manager** window.



2. Highlight the **I-O 5250 Printer** connection entry, and click the **Edit** button.

3. The **I-O 5250 Printer Connection** configuration screen is displayed. On **General** tab, you will enter the basic required information for establishing a TN5250e printer connection with the IBM host.



- **IBM Host Printer Name**: Enter the name that you want the IBM host to use for this printer session (up to 8 characters maximum).

CAUTION: IF YOU LEAVE THIS FIELD BLANK, THE IBM HOST WILL CREATE A 3812 DEVICE BUT WILL GIVE THE PRINTER THE NAME OF QPADEVNNNN WITH NNNN BEING A 4-DIGIT NUMBER. HOWEVER, EACH TIME THE I-O PRINT SERVER CONNECTS TO THE IBM HOST, THE NNNN NUMBER FOR THE PRINTER MAY BE DIFFERENT. THIS MAY CAUSE PROBLEMS WHERE A SPECIFIC PRINTER NAME IS USED IN SPECIFYING THE LOCATION OF PRINTED OUTPUT. *IT IS RECOMMENDED THAT YOU ENTER A PRINTER NAME!*

- **IBM Host IP Address**: Enter the TCP/IP address of the IBM host the I-O 5250 Printer session will be connected to.

- **Printer Driver**: From the drop down box, select the print driver supported by the printer attached to the thin client.

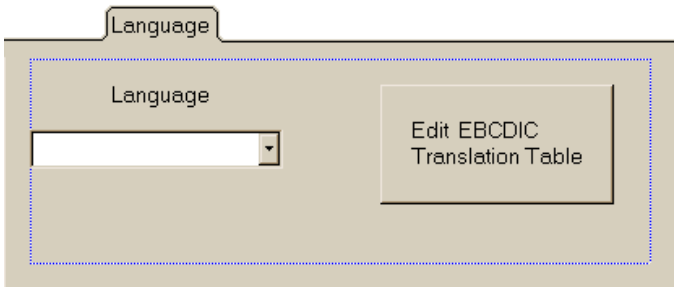
  For example, if you are attaching a HP LaserJet printer, you would select "HP PCL". For Epson, there are several general drivers. Select the one that most closely matches the Epson or Epson compatible dot-matrix printer that is being attached.

  It should be noted that the IBM host will always create a 3812 page printer device whenever TN5250e is used for printing. This is a laser printer. To allow you to attach other printers besides laser printers, I-O's 5250 Printer Emulation module contains a 3812 to 4214 conversion module. If you choose to attach a dot-matrix printer to the thin client and select one of the dot-matrix print drivers listed in the drop down box, I-O's 5250 Printer Emulation module will first convert the 3812 SCS commands into 4214 SCS commands. Those 4214 SCS will then be converted into the appropriate ASCII dot-matrix commands. To the IBM host, the attached dot-matrix printer appears as a 3812 page printer.

NOTE: BECAUSE THERE ARE DIFFERENCES IN THE WAY THAT LASER PRINTERS AND DOT-MATRIX PRINTERS FUNCTION, NOT ALL OF THE NATIVE IBM HOST DOT-MATRIX FUNCTIONALITY IS AVAILABLE THROUGH THIS CONVERSION PROCESS DUE TO THE FACT THAT THE IBM HOST IS ONLY SENDING 3812 COMMANDS. SUCH FEATURES AS "LINE ALIGNMENT" USED FOR ALIGNING CHECKS PRIOR TO PRINTING CAN ONLY BE OBTAINED USING A TRUE IBM 4214/5224/5225/5256 DOT-MATRIX EMULATION. FOR SUCH APPLICATIONS, I-O RECOMMENDS THAT YOU USE ONE OF I-O'S LAN PRINT SERVER PRODUCTS TO PROVIDE THE COMPLETE IBM DOT-MATRIX FUNCTIONALITY.

- **Local Port**: Select from the drop down box the physical port that the printer is attached.
- **Baud Rate**: If the COM1 serial port is the physical port the printer is attached, identify here the speed of the port (make this rate the same as that set on the printer). The remainder of the serial characteristics for this port have been set to: 8 data bits, no parity, 1 stop bit. This field is only available when COM1 is selected in the Local Port field.

4. Select the **Language** tab. From the drop down box, select the host language to be used by the IBM host when the command "Use Default Language" is received.

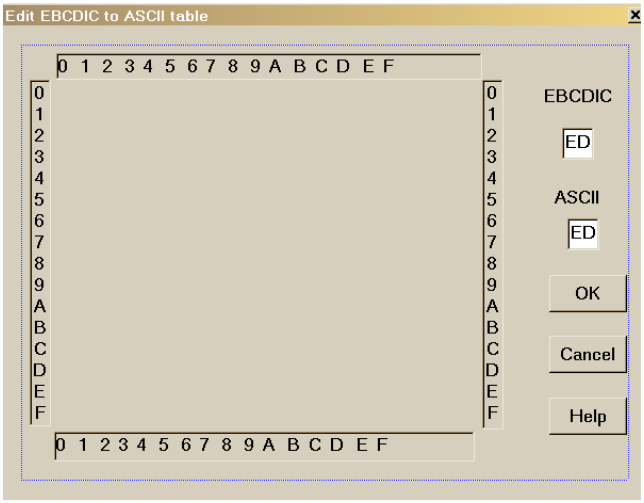


- **Language**: Select the appropriate language from the drop down box.
- **Edit EBCDIC Translation Table**: Use this option to change the translation table that the I-O 5250 Printer Emulation module uses to convert IBM's EBCDIC characters to ASCII characters.

CAUTION: EDITING THIS TABLE SHOULD ONLY BE ATTEMPTED BY ADVANCED USERS.

If a character is printing on your printer with the wrong ASCII value, use the printer's manual to determine the ASCII HEX value of this character and that of the value you want in its place. Then edit the translation table with by changing the incorrect ASCII value to the desired value.

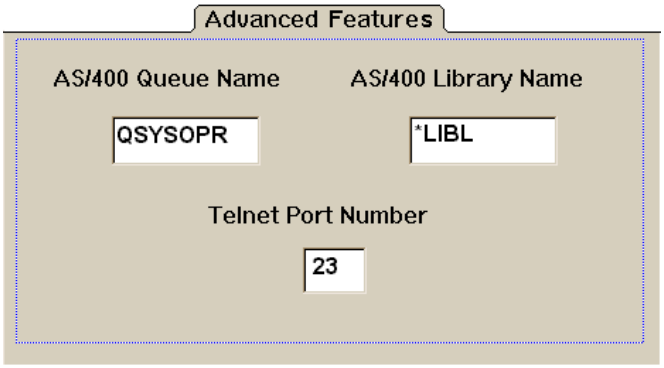
- **EBCDIC**: Enter the hexadecimal EBCDIC value you want to change.
- **ASCII**: Enter the hexadecimal ASCII value for the character you actually want printed.



(Similar to actual screen)

NOTE: I-O USES IBM'S MULTINATIONAL CODE PAGE 500 (WITH MODIFICATIONS FOR THE SELECTED LANGUAGE) FOR THE EBCDIC TABLE AND THEN CONVERTS TO ASCII CODE PAGE 850 AS THE DEFAULT CONVERSION. USING HOST DOWNLOAD COMMAND 17, YOU MAY CHANGE THE ASCII TABLE TO ROMAN 8, LATIN 1 (INCLUDES EURO SYMBOL), CODE PAGE 437, OR CODE PAGE 858 (INCLUDES EURO SYMBOL).

5. Select the **Advanced Features** tab. Enter the values the IBM host uses for the message queue, library and Telnet port number.



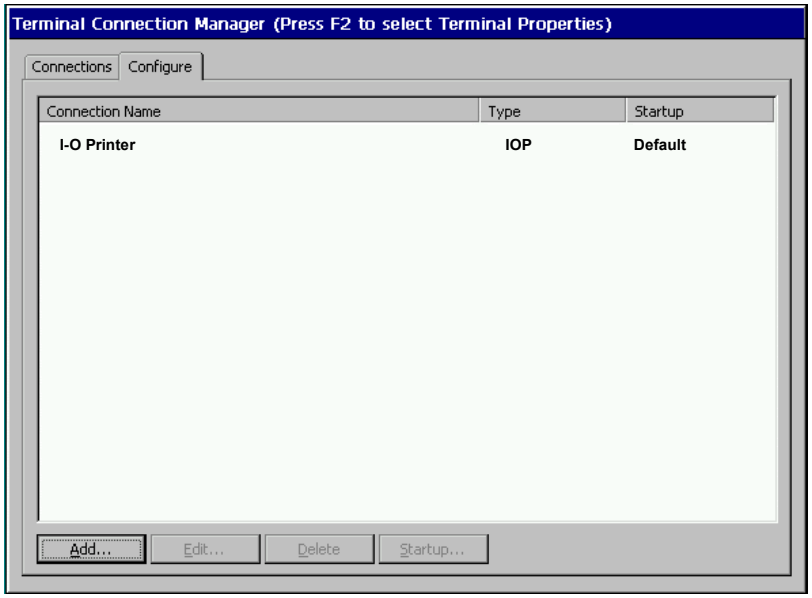
NOTE: YOU NORMALLY DO NOT NEED TO MODIFY THESE VALUES AS THEY ARE THE TN5250E DEFAULTS. REFER TO YOUR SYSTEM ADMINISTRATOR FOR ANY CHANGES HERE.

- **AS/400 Queue Name**: Enter the name of the message queue on the IBM host. The default value is QSYSOPR.
- **AS/400 Library Name**: Enter the name of the library on the IBM host. The default value is *LIBL.
- **Telnet Port Number**: Enter the TCP/IP port for Telnet on the IBM host. The default value is 23. If a firewall is being used, port 23 may be blocked to prevent unwanted access to your network and hosts. In such a case, the port number would be changed to another number. The maximum value is 65535.

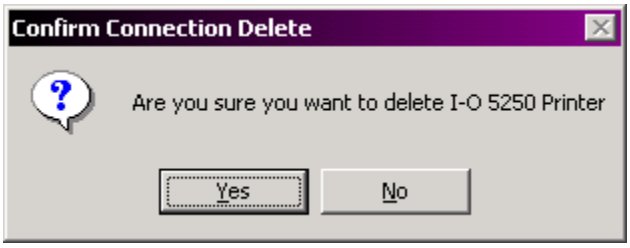
6. When you have completed making all configuration entries on the General, Language and Advanced Features screens, click the **OK** on the title bar. Pause a few moments while the thin client saves the changes (if adding a connection, a new entry will appear on the Terminal Connection Manager screen). Then click the **Connections** tab on the Terminal Connection Manager screen.

Delete the I-O 5250 Printer Connection

1. Select the **Configure** sheet of the **Terminal Connection Manager** window.



2. Highlight the **I-O 5250 Printer** connection entry, and click the **Delete** button.
3. Click **Yes** to confirm the removal of the connection.



Running the I-O 5250 Printer Session

This chapter describes running the I-0 5250 Printer Emulation for thin clients.

When you start an I-O 5250 Printer connection, a Control Panel is displayed. This screen shows the status of the IBM host connection and printer attached to the thin client. Printer control functions like ejecting a page, printing a configuration report, canceling a printer job are executed using control buttons.

Other Control Panel options affecting the printer and print job are described in the Customizing the I-O 5250 Printer Session chapter.

Start the I-O 5250 Printer Session

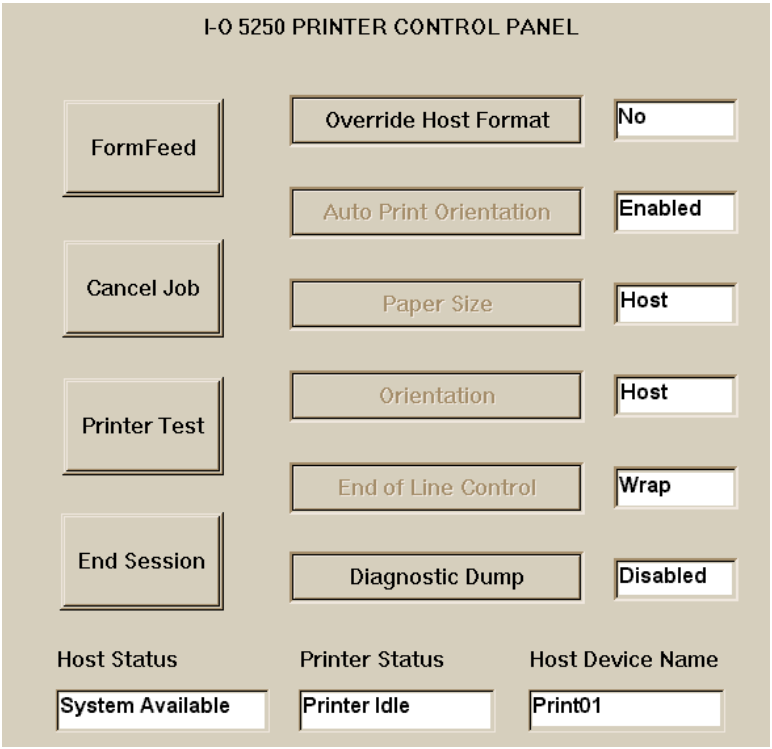
PRIOR TO STARTING A PRINTER SESSION, MAKE SURE THE PRINTER IS ATTACHED TO THE APPROPRIATE LPT1 OR COM1 PORT, IS POWERED ON, AND YOU HAVE COMPLETED THE CONFIGURATION OF THE I-O 5250 PRINTER CONNECTION (SEE THE CONFIGURE THE I-O 5250 PRINTER CONNECTION CHAPTER).

To start an I-O 5250 Printer session, follow these steps:

1. Click on the Connections Tab
2. Click on the entry that represents the I-O 5250 Printer Connection you previously created.
3. Click on the Connect button.

TIP: TO QUICKLY ACTIVATE A CONNECTION, YOU MAY DOUBLE-CLICK ON THE I-O 5250 PRINTER CONNECTION ENTRY IN LIEU OF STEPS 2 AND 3 ABOVE.

4. The following I-O 5250 Printer Control Panel will appear:



- **Host Status**: This field will initially display the message "Waiting for System". After a few seconds, the Host Status field will display "System Available" indicating that the IBM host printer connection is active. (Be patient, it may take a few seconds for the IBM host to complete the connection).

- **Printer Status**: This field will display "Printer Idle" indicating that the attached printer is ready.
- **Host Device Name**: This field will display the name of this printer connection as it appears on the IBM host.

Once the Host Status field displays "System Available", the I-O 5250 Printer connection is now ready to accept printer jobs from the IBM host. On the IBM host, SCS print jobs are sent to this printer connection by directing the print job to the printer device that has been defined with the Host Device Name as shown above. All normal IBM host printer control functions are available from the host (spooling, restarting, range printing, error status messaging, etc.)

It may be necessary or the user may desire to change the configuration of one or all print jobs. This can be done in two ways: 1) use the Control Panel options, or 2) using I-O's Host Download Commands. These are described in detail in the Customizing the I-O 5250 Printer Session chapter.

NOTE: TO SWITCH BACK TO THE CONNECTION MANAGER SCREEN, PRESS CTRL+ALT+END. TO ROTATE THROUGH ACTIVE CONNECTIONS, PRESS CTRL+ALT+DOWNARROW.

Test the Printer Attached to the Thin Client

To verify the printer attached to the thin client is communicating properly with the I-O 5250 Printer Connection, click on the Printer Test button. A two page configuration report will then be printed. (See Appendix C for an example configuration report.)

NOTE: ON THE CONFIGURATION REPORT, THE SYMBOL SET VALUES AND CONFIGURATION PARAMETERS WILL DIFFER FROM THE REPORT THAT YOU WILL RECEIVE. THIS IS INCLUDED HERE ONLY AS AN EXAMPLE OF THE TYPE OF CONFIGURATION REPORT YOU WILL RECEIVE.)

Eject a Page from the Printer

Sometimes data to be printed is sent to a laser printer, but the printer does not eject the page. Pressing the FormFeed button will cause the printer to eject the page.

The FormFeed button may also be used to advance the paper to the top of the next page for a dot-matrix printer.

Cancel the Print Job

To cancel the current job that is printing, press the Cancel Job button

End the I-O 5250 Printer Session

To end the I-O 5250 Printer session, click the End Session. If you have made any changes to the control panel options, a message screen will ask if you want to save the changes.

If any configuration changes have been made using either the Control Panel options or through sending Host Download commands from the IBM host, a message screen will be presented when the End Session button has been pressed.

- **Yes**: Select Yes if you want the changes to be saved so they will be there when you restart the printer connection.
- **No**: Select No to discard the changes.

TIP: REFER TO THE CUSTOMIZING THE I-O 5250 PRINTER SESSION CHAPTER FOR A DETAIL DESCRIPTION OF THE USE OF HOST DOWNLOAD COMMANDS.

Control Panel Options

These options can be changed at any time and as many times as desired during a 5250 printer session. When you end the I-O 5250 Printer session, a message screen will ask if you want to save the changes. When you restart the printer connection, the previously saved options will be active.

See the Customizing the I-O 5250 Printer Session chapter for a description of both the Control Panel options and the Host Download commands.

SIMILAR COMMANDS ARE ALSO AVAILABLE AS HOST DOWNLOAD COMMANDS THAT ARE SENT FROM THE IBM HOST TO THIS I-O 5250 PRINTER EMULATION SESSION.

Customizing the I-O 5250 Printer Session

This chapter describes how to customize the I-O 5250 Printer Emulation for thin clients.

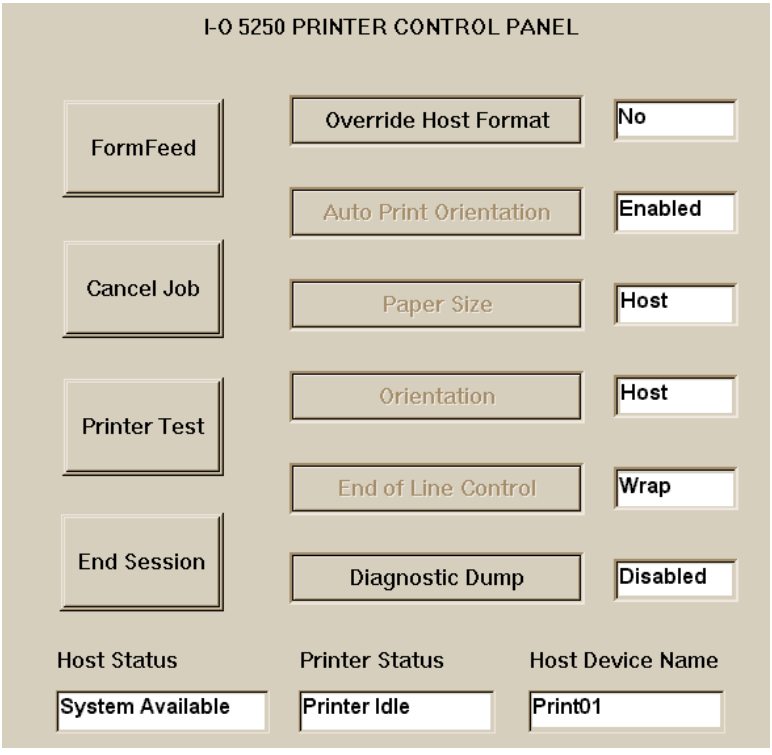
I-O's 5250 Printer Emulation can be configured to change the way IBM host print jobs are actually printed. Options include the ability to allow the printer's front panel to set the final print quality (draft or near-letter quality), the characters per inch used, etc.

Customization can be done in two different ways:

- Using the I-O 5250 Print Emulation's Control Panel
- Using the more robust and feature-rich Host Download Commands

Control Panel Options

These options can be changed at any time and as many times as desired during a 5250 printer session. When you end the I-O 5250 Printer session, a message screen will ask if you want to save the changed. When you restart the printer connection, the previously saved options will be active.



TIP: SIMILAR COMMANDS ARE ALSO AVAILABLE AS HOST DOWNLOAD COMMANDS THAT ARE SENT FROM THE IBM HOST TO THE I-O 5250 PRINTER EMULATION SESSION.

Override Host Format

This option allows the user to select whether to override the format commands that are coming from the host by using the printer's front panel controls.

- **No**: Do not override IBM host format commands
- **All**: Printer's settings will override all IBM host format commands

- **NLQ**: Printer's print quality setting will override only the IBM host NLQ commands
- **CPI**: Printer's characters per inch setting will override only the IBM host CPI commands

Auto Print Orientation

This option allows the user to select whether the I-O 5250 Printer Emulation will automatically rotate the page from portrait to landscape.

- **Enabled**: Allows the I-O 5250 Printer Emulation to determine the page orientation. When a print job is received from the host that is wider than high and will fit on an 8 ½" x 14" or smaller page, the I-O 5250 Printer Emulation's Automatic Print Orientation (APO) function will rotate the page from portrait and print the job in the font requested by the host.
- **Disabled**: Does not allow the I-O 5250 Printer Emulation to determine the page orientation. Orientation may be set using the Orientation option.

For a more detailed description of Automatic Print Orientation (APO), refer to the Laser Printer Operation – Print Orientation section of the SCS Printing Operation chapter.

NOTE: THIS OPTION IS ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER.

Paper Size

This option allows the user to determine how paper sizes are selected.

- **Host**: The I-O 5250 Printer Emulation will automatically look for and recognize the following paper sizes:
  - Letter Paper 8.5x11 in. (215.9 x 279.4mm)
  - A4 Paper 8.27 x 11.69 in. (210x297mm)
  - Legal Paper 8.5 x 14 in. (215.9 x 355.6mm)
  - Executive Paper 7.25 x 10.5 in. (184.2 x 266.7mm)

  If the host sends one of these paper sizes, the I-O 5250 Printer Emulation will request the attached laser 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.
- **A4**: The I-O 5250 Printer Emulation will always instruct the laser printer to load A4 size paper.
- **No Size**: The I-O 5250 Printer Emulation will not send any paper requests and the paper size selected through the printer's front panel will be used.

NOTE: THIS OPTION IS ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER.

Orientation

This option allows the user to determine whether the paper will be printed in portrait or landscape orientation.

- **Host**: The host will determine the orientation. However, a host Print Quality selection of Standard or NLQ will cause the host to select portrait orientation and print the job in the requested font.
- **Portrait**: The I-O 5250 Printer Emulation will force the page to portrait orientation.
- **Landscape**: The I-O 5250 Printer Emulation will force the page to landscape orientation.

- **COR**: The I-O 5250 Printer Emulation will rotate the page to landscape and compress the font as needed to fit a complete page 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

For a more detailed description of Automatic Print Orientation (APO), refer to the Laser Printer Operation – Print Orientation section of the SCS Printing Operation chapter.

NOTE: THIS OPTION IS ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER.

End of Line Control

This option allows the user to select whether to wrap a line that is too long to fit on the page onto the next line.

- **Wrap**: This selection will cause a line that is too long to fit on the page to wrap to the following line.
- **Truncate**: This selection will cause all text beyond 8" to be cut off.

NOTE: THIS OPTIONS IS ONLY AVAILABLE WHEN PRINTING TO DOT-MATRIX PRINTERS.

Diagnostic Dump

This option allows the user to print a hexadecimal representation of the TN5250e data stream being received from the host. The print out is used by the technical support group to assist the user in trouble shooting a specific print job that is not printing correctly.

- **EBCDIC**: Sends all host data directly to the printer in EBCDIC hexadecimal format until this selection is disabled.
- **ASCII**: Sends all host data directly to the printer in ASCII hexadecimal format until this selection is disabled.
- **Disabled**: Stops sending the host data to the printer in hexadecimal format. Normal printing resumes.

This option may be turned on and off at any time, even in the middle of a print job allowing the user to print only the section of the document that is in question in hexadecimal format.

CAUTION: PRINTING IN HEXADECIMAL FORMAT REQUIRES A GREAT DEAL OF PAPER. MAKE CERTAIN THAT YOUR PRINTER HAS AN ADEQUATE SUPPLY OF PAPER PRIOR TO TAKING THIS OPTION.

Saving Options

If any configuration changes have been made using either the Control Panel options or through sending Host Download commands from the IBM host, a message screen will be presented when the End Session button has been pressed. Saving these configuration changes will allow them to be active when next running the I-O 5250 Printer session.

- **Yes**: Select Yes if you want the changes (as well as Host Download commands) to be saved so they will be there when you restart the printer connection.
- **No**: Select No to discard the changes.

Refer to the Host Download Command 99 in the Host Download section of the Customizing the I-O 5250 Printer Session chapter for a detail description of the use of Host Download Commands.

CAUTION: IF HOST DOWNLOAD COMMANDS HAVE BEEN USED, AND IT IS YOUR DESIRE TO HAVE THOSE COMMANDS SAVED SO THEY WILL BE ACTIVE WHEN NEXT RUNING THE I-O 5250 PRINTER SESSION, SELECT YES.

Host Download Commands

Host Download commands are basically strings of text that are sent from the IBM host to the I-O 5250 Printer Emulation module that will configure the print job. All configuration parameters pertaining to the IBM printer emulation can be modified using Host Download commands.

Host Download commands are placed in an IBM host document, report, program or on the screen. The document or screen print is then sent to the print device assigned to the I-O 5250 Printer Emulation and its attached printer. As part of the TN5250e data stream processing, the I-O 5250 Printer Emulation module monitors the data stream and filters out Host Download commands. These commands will not print, but will be used to configure the I-O 5250 Printer Emulation module.

Host Download commands sent to the I-O 5250 Printer Emulation module take effect immediately and stay only in the I-O Thin Client's active memory. To save the changed configuration beyond the end of the printer session, Host Download command Z99,0 must be sent and the Save Options selection must be taken when the session is ended on the thin client.

CAUTION: HOST DOWNLOAD COMMAND Z99,0 SETS A FLAG THAT CAUSES THE SAVE OPTIONS DIALOG BOX TO APPEAR AT THE END OF A PRINTER SESSION. ANSWERING YES ON THE SAVE OPTIONS SCREEN IS REQUIRED IF YOU WANT THESE HOST DOWNLOAD COMMANDS SAVED FOR FUTURE SESSIONS.

Issuing a Host Download Command.

The following steps describe how to enter a Host Download Command.

1. Type the Command Pass-Thru (CPT) delimiter &% (or the alternate CPT start delimiter) in the document, program, report or on the screen 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 below. Always use two digits for the command number (i.e. &%Z05,1).
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 I-O 5250 Printer Emulation module 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 Host Download command.
7. Multiple commands can be chained together by using a slash (/) or backslash (\) to separate the commands (no spaces are allowed).

   For example, to set the Default Print Quality (Command 22) to NLQ (Value 1), Draft Printing (Command 23) to Fast Draft (Value 1), and the Wrap/Truncate Text selection (Command 26) to Truncate (Value 1), type:

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

NOTE: INVALID COMMANDS ARE IGNORED AND ARE PRINTED. THE LAST VALID SETTING WILL BE UNCHANGED.

Description of Host Download Commands

The following table shows the available configuration options in alphabetical order. Following the table is the detailed explanation of each Host Download Command in numeric order.

Configuration Parameter	*Command Number*
15 CPI Printing	28
Dot-Matrix Print Quality	22
ASCII Dump	43
Automatic Page Orientation	08
Character Set	17
CPT End Delimiters	02
CPT Start Delimiters	01
Dot-Matrix Draft Printing	23
Duplexing	33
EBCDIC Dump	42
Horizontal Margin	19
Host Initialization	11
Host Language	05
IBM Drawer 1	13
IBM Drawer 2	14
IBM Drawer 3	15
IBM Drawer 4	30
IBM Drawer 5	31
IBM Motion	25
Lines Per Inch	10
Orientation	07
Override Host Formatting	16
Paper Size	09
Truncate / Wrap	26
Save Current Settings	99
User Defined Fonts	21
User Defined Strings	04
Vertical Margin	18

NOTE: IN THE DESCRIPTION OF EACH HOST DOWNLOAD COMMAND, ASTERISKS (*) IDENTIFY FACTORY DEFAULT SETTINGS.

Command No. 01: CPT Start Delimiter

Replaces the default Command Pass-Thru™ (CPT) start delimiter "&%". This delimiter is also the Host Download delimiter. It may be one or two characters long. The first character may be any printable character.

Value	*Description*
&%	Default CPT delimiter
New characters	New CPT start delimiter
Two spaces	Deletes CPT start delimiter

Example: &%Z01,#@

This creates the CPT start delimiter of #@.

Command No. 02: CPT End Delimiter

Replaces the default delimiter and creates an alternate CPT end delimiter "&%" as in Command 01. This delimiter cannot be used as a Host Download delimiter.

Value	*Description*
&%	Default CPT delimiter
New characters	New CPT end delimiter
Two spaces	Deletes the CPT end delimiter

Command No. 04: User-Defined Strings

Creates up to ten user-defined strings to send to the printer. This feature should be used to avoid re-keying of frequently used printer commands (which appear as hex values imbedded in Command Pass-Thru delimiters). When using Host Download commands, 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 memory under the selected value number (0 to 9). To activate the command, place an &%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)

This creates a user-defined string for a PCL Laser printer to start underlining. The string is represented by the value 3. To use this function, place &%U3 in the document.

Command No. 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

This selects the multinational character set.

Command No. 07: Print Orientation

Determines the print orientation if it is not already determined through the host's selection or I-O's 5250 Printer Emulation's Automatic Page Orientation (APO) feature (Command No. 08).

Value	*Description*
*0	COR, host overrides using its Print Quality setting
1	Portrait
2	Landscape
3	COR

Example: &%Z07,2

This selects landscape.

For a more detailed description of Automatic Print Orientation (APO), refer to the Laser Printer Operation – Print Orientation section of the SCS Printing Operation chapter.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

TIP: THIS FUNCTION MAY ALSO BE RUN FROM THE I-O 5250 PRINTER EMULATION CONTROL PANEL.

Command No. 08: Automatic Print Orientation

Selects or deselects Automatic Print Orientation (APO).

Value	*Description*
0	APO Off
*1	APO On

Example: &%Z08,1

This turns the Automatic Print Orientation on.

For a more detailed description of Automatic Print Orientation (APO), refer to the Laser Printer Operation – Print Orientation section of the SCS Printing Operation chapter.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

TIP: THIS FUNCTION MAY ALSO BE RUN FROM THE I-O 5250 PRINTER EMULATION CONTROL PANEL.

Reference 09: Paper Size / Bin Selection

Selects paper size settings if the printer attached is a laser or selects which input tray will be used on an Epson DFX dot-matrix printer.

With the default "Paper size specified", the I-O 5250 Printer Emulation Module will automatically look for and recognize the paper sizes mentioned below:

Letter Paper	8.5x11 in. (215.9 x 279.4mm)
A4 Paper	8.27 x 11.69 in. (210x297mm)
Legal Paper	8.5 x 14 in. (215.9 x 355.6mm)
Executive Paper	7.25 x 10.5 in. (184.2 x 266.7mm)

If the host sends one of these paper sizes, the I-O 5250 Printer Emulation module will request that the attached printer 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 "A4 size paper" selected, the I-O 5250 Printer Emulation module will always instruct the printer to load A4 size paper.

If the "Paper size selected through printer's front panel" option is chosen, the I-O 5250 Printer Emulation module will not send any paper requests and the paper size selected through the printer's front panel will be used.

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	*Laser Printers*	*Epson DFX Dot-Matrix Printers*
*0	Paper size specified	Bin commands sent to the printer by the host
1	A4 size paper	No bin commands are sent to the printer
2	Paper size selected through printer's front panel	

Example: &%Z09,1

This Host Download command selects A4 size paper

TIP: THIS FUNCTION MAY ALSO BE RUN FROM THE I-O 5250 PRINTER EMULATION CONTROL PANEL.

Command No. 10: LPI

Selects compressed or true LPI (lines per inch) printing. By default LPI is compressed allowing 66 lines to be printed onto a letter sized paper when 6 LPI is requested by the host. If you are using an electronic forms package or print on pre-printed forms, you should select true LPI.

Value	*Description*
*0	Compressed LPI
1	True LPI
2	XPoint Twinax Controller Compatible Mode

Example: &%Z10,1

This Host Download command selects true LPI printing.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 11: Host Initialization String

Stores a string of up to 25 ASCII hex pairs that is sent to the printer at the beginning of each printed page. This allows you to further modify the printer configuration (e.g. select a different font for all host printing).

Value	*Description*
0 (hex codes)	Stores the hex command as a part initialization string

Example: &%Z11,0(1B 26 6C 38 44)

This Host Download command sets LPI to 8 on a PCL laser printer.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 13: IBM Drawer 1

Assigns the host's Paper Drawer 1 command to a physical paper source on the printer. On the host, the available paper sources are called Source Drawer (in the printer file) or Paper Drawer (in OfficeVision). On the printer, the actual paper sources are usually called input trays or bins.

Since input tray selections have been implemented differently from printer to printer, the I-O 5250 Printer Emulation module uses the unique numeric value found in the printer's PCL escape code for the particular input tray. For example, the 500 sheet Cassette of an HP LaserJet 4 Plus printer can be selected through the PCL escape code: ESC&l5H. By assigning the numeric value 5 to the IBM Drawer 1 command, the I-O 5250 Printer Emulation module would cause paper to be drawn from the 500 sheet Cassette whenever the AS/400 sends the Drawer 1 request. Refer to your printer's User's Guide for information on the PCL codes.

Value	*Description*
01 to 254	Numeric identifier for paper trays available on the printer
*01	Default

Example: &%Z13,5

This Host Download command assigns the host's Paper Drawer 1 command to pull paper from the printer's input bin associated with the PCL command ESC&l5H. On a HP LaserJet 4Plus, this would be the 500 sheet Cassette.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 14: IBM Drawer 2

Matches the host's IBM 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.

Value	*Description*
01 to 254	Paper sources available on the printer
*04	Default

Example: &%Z14,05

This Host Download command assigns the optional 500-sheet cassette on a HP LaserJet 4 Plus to the host's paper drawer 2 command.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 15: IBM Drawer 3

Matches the host's IBM 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.

Value	*Description*
01 to 254	Paper sources available on the printer
*05	Default

Example: %Z15,04

This Host Download command assigns the multi-purpose tray on a HP LaserJet 4 Plus to the host's paper drawer 3 command.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 16: Override Host Format

Allows 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

This Host Download command enables the front panel to override all IBM format commands

TIP: THIS FUNCTION MAY ALSO BE RUN FROM THE I-O 5250 PRINTER EMULATION CONTROL PANEL.

Command No. 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 EBCDIX to ASCII translations. Consult the printer's user's guide to verify that the printer also uses the font and character set selected.

Value	*PCL Laser Printers*	*Dot-Matrix Printers*
0	Roman 8	Roman 8
*1	CP 850	CP 850
2	Latin 1 Euro#	CP 437
3	(not available)	CP 858#

Example: &%Z17,2

Selects the Latin 1 character set that includes the Euro symbol.

NOTE: #THE EURO SYMBOL IS SUPPORTED IN CODE PAGE 858 FOR DOT-MATRIX PRINTERS, AND IN THE LATIN 1 EURO CHARACTER SET FOR LASER PRINTERS.

Command No. 18: Vertical Margin

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

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 19: Horizontal Margin

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

Value	*Description*
-127 to 127	Adjustment of horizontal position in 1/60 of an inch
*0	Default
Example:	&%Z19,12
	Moves printing on the page 1/5 inch right or 2 characters at 10 CPI

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 21: Font Strings

Assigns a font ID to a font. The first number (0-9) is one of 10 available strings, the second number (0-65535) is the host font number. The characters shown in parentheses are sent to the printer when the host font number is received. Refer to the printer's user's guide or the documentation accompanying the font cartridge /SIMM/DIMM/Soft font 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 Host Download command selects the third font string to be font #12345 and selects for a HP LaserJet or Lexmark Laser printer: (<(12U = code page 850 <(s0p = fixed spacing 12h = 12 pitch 10v = 10 point 1s = italic 3b = bold 6T) = letter gothic

NOTE: THIS COMMAND ONLY APPLIES WHEN OPERATING IN IBM 3812 EMULATION MODE.

NOTE: FONT IDS ASSIGNED THROUGH THIS FONT STRING FEATURE CANNOT BE USED WITH THE ¬F FONT CHANGE COMMAND. SEE THE ADVANCED FEATURES IN THE SCS PRINTING OPERATION CHAPTER.

Command No. 22: Dot-Matrix Print Quality

Defines the print quality when the host sends a command to use the "default" print quality. The I-O 5250 Printer Emulation module offers the selections Draft and NLQ. If the attached dot-matrix printer has the capability, Draft printing can be further defined. Refer to Command No. 23: Dot-Matrix Draft Printing, for more information.

Another way to modify the print quality is to set the printer to a certain value through its front panel. Refer to Command No. 16: Override Host Format for more information.

Value	*Description*
*0	DRAFT is default print quality
1	NLQ is default print quality

Example: &%Z22,1

This command selects NLQ as the default print quality.

NOTE: THE COMMAND ONLY APPLIES WHEN PRINTING TO A DOT-MATRIX PRINTER.

Command No. 23: Dot-Matrix Draft Printing

Selects the draft printing mode when a draft print command comes from the host or from the I-O 5250 Printer Emulation module. If the attached printer only supports one draft printing mode, this selection is ignored.

Value	*Description*
*0	Normal draft
1	Fast draft

Example: &%Z23,1

This Host Download command sets the printer to print fast draft

NOTE: THE COMMAND ONLY APPLIES WHEN PRINTING TO A DOT-MATRIX PRINTER.

Command No. 25: IBM Motion

This command 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

Example: &%Z25,1

This command causes the I-O 5250 Printer Emulation module to count the lines specified through LPI settings and replace FF with multiple LF commands.

NOTE: THE COMMAND ONLY APPLIES WHEN PRINTING TO A DOT-MATRIX PRINTER.

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Command No. 26: Truncate / Wrap

Selects whether the printer should wrap or truncate text lines longer than 8 inches. For printing on normal or wide paper (14 7/8"), select WRAP. This allows printing to the full extend of the width of the paper. The printer wraps printing beyond the margin to the next line (if the printer is configured for that paper size).

When using narrow paper (8.5"), you may select TRUNCATE. This ignores any printing beyond 8". Documents must be formatted to fit the narrower paper, since the text beyond the 8" margin will truncate (i.e. not print).

Value	*Description*
*0	Wrap text
1	Truncate text at 8 inches

Example: &%Z26,1

This Host Download command will cause all text beyond 8 inches to truncate (i.e. not print).

NOTE: ONLY AVAILABLE WHEN PRINTING TO A DOT-MATRIX PRINTER.

TIP: THIS FUNCTION MAY ALSO BE RUN FROM THE I-O 5250 PRINTER EMULATION CONTROL PANEL.

Command No. 28: 15 CPI Printing

Determines how host commands for 15 CPI printing should be executed.

The I-O 5250 Printer Emulation module 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.

Value	*Description*
*0	No, prints 15 CPI as 17.1 CPI
1	Yes, prints 15 CPI as 15 CPI

Example: &%Z28,1

This Host Download command sets the I-O 5250 Printer Emulation module to "artificially" produce 15 CPI printing.

NOTE: IF THE ATTAHCED PRINTER CAN SUPPORT 15 CPI PRINTING, IT IS SUGGESTED THAT THE EPSON DFX PRINT DRIVER BE SELECTED, AND DO NOT USE THIS COMMAND.

NOTE: IBM PROPRINTERS CANNOT PRINT 15 CPI. THEREFORE, ONLY USE THIS COMMAND WHEN THE ATTACHED PRINTER IS EMULATING AN IBM PROPRINTER AND THE IBM PROPRINTER PRINT DRIVER HAS BEEN SELECTED IN THE I-O 5250 PRINTER EMULATION CONFIGURATION.

Command No. 30: IBM Drawer 4

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.

Value	*Description*
01 to 254	Paper sources available on the printer
*01	Default

Example: &%Z30,05

This Host Download command assigns the optional 500-sheet cassette on a HP LaserJet 4 Plus to the host's paper drawer 4 command.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 31: IBM Drawer 5

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.

Value	*Description*
01 to 254	Paper sources available on the printer
*01	Default

Example: &%Z31,05

This Host Download command assigns the optional 500-sheet cassette on a HP LaserJet 4 Plus to the host's paper drawer 5 command.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 33: Duplex Printing

Sets the I-O 5250 Printer Emulation module duplexing mode.

Value	*Description*
*0	Off
1	Duplexing
2	Duplexing-Tumble

Example: &%Z33,2

This Host Download command instructs the I-O 5250 Printer Emulation module to duplex and tumble all host print jobs.

NOTE: ONLY AVAILABLE WHEN PRINTING TO A LASER PRINTER USING THE HP PCL PRINT DRIVER.

Command No. 42: EBCDIC Hex Dump

After receiving a start command the I-O 5250 Printer Emulation module, beginning with the next buffer received, all host data is directly sent to the printer in EBCDIC hexadecimal format until the print session is ended. Embedding this command in the data stream enables the user to print only the section of the document that is in question in EBCDIC hex dump format.

Value	*Description*
1	Start EBCDIC hex dump

Example: &%Z42,1

This Host Download command starts hex dump printing.

TIP: THIS FUNCTION MAY ALSO BE RUN FROM THE I-O 5250 PRINTER EMULATION CONTROL PANEL.

Command No. 43: ASCII Hex Dump

After receiving a start command the I-O 5250 Printer Emulation module, starting with the next buffer received, translates all host data from EBCDIC into ASCII and then prints the ASCII data in hexadecimal form. The ASCII hex dump prints until the printer session is ended or Host Download command Z43,0 is received by the I-O 5250 Printer Emulation module.

Value	*Description*
*0	Stop ASCII Hex Dump
1	Start ASCII Hex Dump

Example: &%Z43,1

This Host Download command starts ASCII hex dump printing.

TIP: THIS FUNCTION MAY ALSO BE RUN FROM THE I-O 5250 PRINTER EMULATION CONTROL PANEL.

Command No. 84: 6 LPI String

This command is used with the Generic Printer Driver 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 I-O 5250 Printer Emulation module receives a 6 LPI command from the host, it sends the printer the string specified through in this configuration option. See also Command 85.

Value	*Description*
1(up to 25 hex bytes)	Defines the 6 LPI string#
1()	Deletes the 6 LPI string

Example: &%Z84,1(1B 32)

This command assigns the 6 LPI command for an Epson LQ-2500 printer (hex value 1B 32) in memory.

NOTE: ONLY AVAILABLE WHEN USE THE GENERIC PRINT DRIVER.

NOTE: #ONLY CHARACTERS FROM 01 TO FF ARE RECOGNIZED (ALPHABETIC CHARACTERS MUST BE IN UPPER CASE). ERRORS IN THE HEX STRING WILL CAUSE THE I-O 5250 PRINTER EMULATION MODULE TO IGNORE THE COMMAND AND PRINTING WILL RESUME AT THE POINT THE ERROR OCCURRED.

NOTE: IF A 6 LPI STRING IS SPECIFIED USING THIS COMMAND, THE I-O 5250 PRINTER EMULATION MODULE WILL IGNORE ALL 6 LPI REQUESTS FROM THE HOST.

Command No. 85: 8 LPI String

This command is used when the Generic printer driver is selected to define the 8 LPI string. See also Command No. 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)

This command stores the 8 LPI command for an Epson LQ-2500 printer (hex value 1B 30) in memory.

NOTE: ONLY AVAILABLE WHEN USE THE GENERIC PRINT DRIVER.

NOTE: #ONLY CHARACTERS FROM 01 TO FF ARE RECOGNIZED (ALPHABETIC CHARACTERS MUST BE IN UPPER CASE). ERRORS IN THE HEX STRING WILL CAUSE THE I-O 5250 PRINTER EMULATION MODULE TO IGNORE THE COMMAND AND PRINTING WILL RESUME AT THE POINT THE ERROR OCCURRED.

Command No. 86: 10 CPI String

This command is used with the Generic printer driver to define the 10 CPI string. See Command No. 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)

This Host Download command stores the 10 CPI command for an Epson LQ-2500 printer (hex value 1B 50) in memory.

NOTE: ONLY AVAILABLE WHEN USE THE GENERIC PRINT DRIVER.

NOTE: #ONLY CHARACTERS FROM 01 TO FF ARE RECOGNIZED (ALPHABETIC CHARACTERS MUST BE IN UPPER CASE). ERRORS IN THE HEX STRING WILL CAUSE THE I-O 5250 PRINTER EMULATION MODULE TO IGNORE THE COMMAND AND PRINTING WILL RESUME AT THE POINT THE ERROR OCCURRED.

Command No. 87: 15 CPI String

This command is used when the Generic printer driver and IBM is selected to define the 15 CPI string. See Command No. 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)

This Host Download command assigns the 15 CPI command for an Epson LQ-2500 printer (hex value 1B 67) in memory.

NOTE: ONLY AVAILABLE WHEN USE THE GENERIC PRINT DRIVER.

NOTE: #ONLY CHARACTERS FROM 01 TO FF ARE RECOGNIZED (ALPHABETIC CHARACTERS MUST BE IN UPPER CASE). ERRORS IN THE HEX STRING WILL CAUSE THE I-O 5250 PRINTER EMULATION MODULE TO IGNORE THE COMMAND AND PRINTING WILL RESUME AT THE POINT THE ERROR OCCURRED.

Command No. 88: 12 CPI String

This command is used when the Generic printer driver is selected to define the 12 CPI string. See Command No. 84.

Value	*Description*
1(up to 25 hex bytes)	Defines the 12 CPI string#
1()	Deletes the 12 CPI string

Example: &%Z88,1(1B 4D)

This Host Download command assigns the 12 CPI command for an Epson LQ-2500 printer (hex value 1B 4D) in memory.

NOTE: ONLY AVAILABLE WHEN USE THE GENERIC PRINT DRIVER.

NOTE: #ONLY CHARACTERS FROM 01 TO FF ARE RECOGNIZED (ALPHABETIC CHARACTERS MUST BE IN UPPER CASE). ERRORS IN THE HEX STRING WILL CAUSE THE I-O 5250 PRINTER EMULATION MODULE TO IGNORE THE COMMAND AND PRINTING WILL RESUME AT THE POINT THE ERROR OCCURRED.

Command No. 89: 17.1 CPI String

This command is used when the Generic printer driver is selected to define the 17.1 CPI string. See Command No. 84.

Value	*Description*
1(up to 25 hex bytes)	Defines the 17.1 CPI string#
1()	Deletes the 17.1 CPI string

Example: &%Z89,1(1B 0F)

This Host Download command assigns the 17.1 CPI command for an Epson LQ-2500 printer (hex value 1B 0F) in memory.

NOTE: ONLY AVAILABLE WHEN USE THE GENERIC PRINT DRIVER.

NOTE: #ONLY CHARACTERS FROM 01 TO FF ARE RECOGNIZED (ALPHABETIC CHARACTERS MUST BE IN UPPER CASE). ERRORS IN THE HEX STRING WILL CAUSE THE I-O 5250 PRINTER EMULATION MODULE TO IGNORE THE COMMAND AND PRINTING WILL RESUME AT THE POINT THE ERROR OCCURRED.

Command No. 98: Restore Defaults

This command will restore the factory default configuration selections returning all Host Download Commands to the settings identified herein with the asterisks(*).

Value	*Description*
0	Restores the factory default selections
1	Prints out the active configuration selections

Example: &%Z98,1

Prints out the active setup selections for review

Command No. 99: Save Current Settings

This command sets a flag for the I-O 5250 Printer Emulation Control Panel causing a Save Options prompt to appear when ending the printer session. Responding with a "Yes" on the message screen will permanently save all current settings specified through Host Download Commands (as well as those changes made on the Control Panel).

Value	*Description*
0	Sets a flag to activate the Control Panel save configuration message

Example: &%Z99,0

This command sets the flag causing the Save Options prompt to appear when the End Session button is pressed in the Control Panel.

CAUTION: MAKE SURE TO RESPOND WITH YES TO THE SAVE OPTIONS PROMPT WHEN YOU PRESS THE END SESSION BUTTON ON THE I-O 5250 PRINTER EMULATION CONTROL PANEL IF YOU WANT THE HOST DOWNLOAD COMMAND CHANGES TO BE SAVED.

SCS Printing Operation

This chapter describes in more detail the SCS printer operation. Also described are advanced printing features that are designed into the I-O 5250 Printer Emulation for thin clients.

I-O's 5250 Printer Emulation is designed to allow one printer to be attached to the I-O Thin Client. The printer may be a laser or dot-matrix printer with connection being either parallel or serial. Connection to the IBM host is done over Ethernet using the TCP/IP printing protocol of TN5250e.

On the IBM host side, TN5250e is a self-configuring protocol that creates an IBM 3812-1 page printer device description and writer. Since a 3812-1 pager printer is a laser printer, this would limit the type of printer that could be attached to only laser printers. To over come this limitation, I-O's 5250 Printer Emulation contains a laser to dot-matrix conversion function. 3812 SCS laser commands are converted into 4214 SCS dot-matrix commands. Then the EBCDIC data stream is converted into ASCII and the SCS commands are converted into Epson, or IBM Proprinter commands. This allows you to attach either a laser printer or a dot-matrix printer to the I-O Thin Client.

Laser Printer Operation

The I-O 5250 Printer Emulation module allows you to operate any PCL laser printer just as you would an IBM 3812 printer. The following section describes how to access the many features of I-O's 5250 Printer Emulation of the IBM 3812 printer.

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

The I-O 5250 Printer Emulation 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.

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 IBM 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.

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 5250 Printer Emulation module, refer to the Host Download Command No. 21 Font Strings.

Paper Output Bin Selection

The I-O 5250 Printer Emulation module 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 "caret" (^) 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 printer server 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:

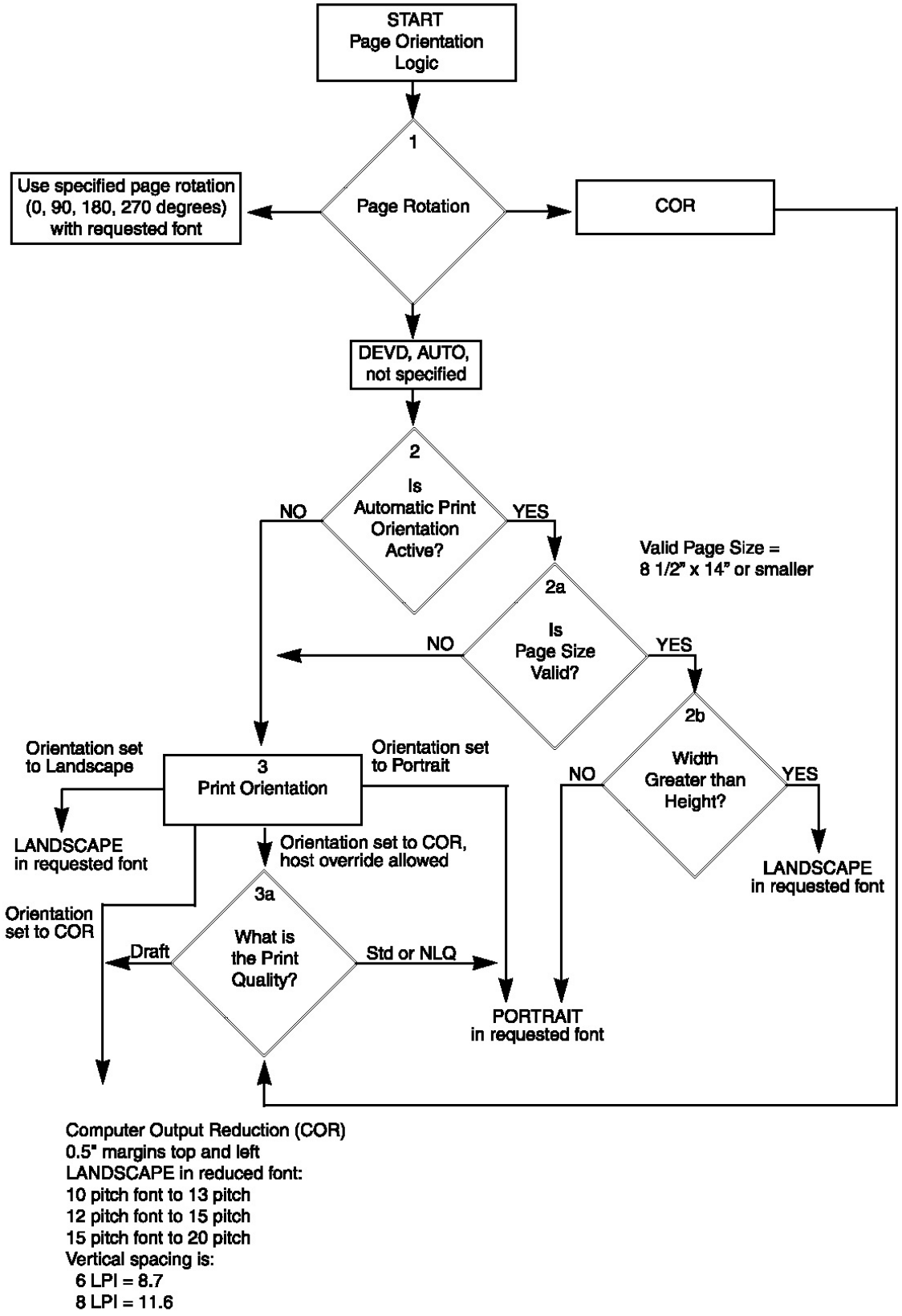
Command	Description	PCL Command
¬O00	Automatic Selection	ESC%I0G
¬O01	Selects output bin #1	ESC%I1G
¬O02	Selects output bin #2	ESC%I2G
¬O03	Selects output bin #3	ESC%I3G
¬O04	Selects output bin #4	ESC%I4G
¬O05	Selects output bin #5	ESC%I5G
¬O06 to 99	Selects output bin #6 to 99	(Not yet assigned)

Print Orientation

When operating the I-O 5250 Printer Emulation module in IBM 3812-1 emulation mode, the print orientation of the host document or report is determined by a variety of factors. These factors, in order of their impact on the final print orientation, are:

1. Page Rotation specified in the printer 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 I-O 5250 Printer Emulation module.
3. Print Orientation setting on I-O 5250 Printer Emulation module.

Refer to the following COR Flowchart diagram as you read the description of the page rotation, automatic print orientation, and print orientation settings that illustrate the print orientation logic.



COR Flowchart

Page Rotation (Block 1)

Degrees of page rotation can be specified through the printer 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 printer file and the document format menu. The available settings are 0, 90, 180, 270 degrees and AUTO (AS/400 only). The printer file also offers DEVD and COR (AS/400 only).

- With 0, 90, 180, and 270 degrees you can specify the desired rotation directly from the host.
- 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.
- 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 I-O 5250 Printer Emulation Control Panel or Host Download Comand.

Automatic Print Orientation (Block 2)

If no page rotation was specified on the host, the I-O 5250 Printer Emulation module'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.

- With the APO feature ON, the I-O 5250 Printer Emulation module first checks the dimensions of the host print job. If the print job is larger than 8.5 x 14 inches the I-O 5250 Printer Emulation module 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 I-O 5250 Printer Emulation module (BLOCK 3).
- If the dimensions of the print job are 8.5 x 14 inches or smaller, the I-O 5250 Printer Emulation module 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 (Block 3)

The I-O 5250 Printer Emulation module's print orientation settings determine the orientation of the host document/report AFTER the host's page rotation setting ***and*** the I-O 5250 Printer Emulation module'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 5250 Printer Emulation module has two methods of handling COR.

- The first COR option is not a true IBM 3812 emulation, but has been 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).

- The second COR option is a true 3812-1 emulation. With certain page rotation settings on the host, the IBM 3812-1 printer allows the user to manipulate the final print orientation through the print quality setting. Note though, that this "override" only applies if the I-O 5250 Printer Emulation module'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 (printer file	*NLQ, *STD
AS/400	*AUTO (OfficeVision/400)	NLQ, Text
S/36	Not Specified	Text – Yes
S38	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) per 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.

		I-O 5250 Printer Emulation Setting for:	
Result	**Host Setting**	**APO**	**Orientation**
Data Processing: Print reports with a width of 80 columns or less (at 10 CPI) in portrait *and* print reports with a width of 132 (at 10 CPI) or 198 (at 15 CPI) columns in landscape with reduced font (COR) **Word Processing:** Print documents of up to 8.5 x 14" in portrait, 14 x 8.5" in landscape, and anything larger in landscape with reduced font (COR)	Degree of Page Rotation = *AUTO **Rotate Paper = 1 (Automatic)**	ON	COR

Print all reports/documents in landscape with reduced font (COR)	Degree of Page Rotation = *AUTO Rotate Paper = 1 (Automatic)	OFF	COR
Print all reports/documents in landscape with requested font	Degree of Page Rotation = *AUTO Rotate Paper = 1 (Automatic)	OFF	Landscape
Print all reports/documents in portrait with requested font	Degree of Page Rotation = *AUTO Rotate Paper = 1 (Automatic)	OFF	Portrait

Changing Page Rotation Settings

Before changing page rotation settings, first verify the current settings. In Office Vision/400, 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 printer file must be changed. This should be done by a MIS staff member, since a changed printer file most likely affects many printers. The page rotation setting can be changed temporarily by overriding the printer file. The printer file must be changed or overridden before the host creates the print job. An overridden printer file applies only to print jobs created on the host session that was active when the printer file was overridden.

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

- To change the printer file:
    1. Type **CHGPRTF** on the command line of the host, and press Enter.
    2. Type in the name of the printer file to be changed.
    3. Press **F10 to display** additional parameters.
    4. Press Page Down (three or four screens depending on OS/400 version) and locate "Degree of page rotation ....." option.
    5. Move the cursor to the beginning of the dashed line and enter the desired selection.
    6. Press ENTER to activate the selection and exit the printer file menu.
- To override the printer file:
    1. Type **OVRPRTF** on the command line of the host, and press Enter.
    2. Type the name of the printer file to be changed.
    3. Press Page Down (three or four screens depending on OS/400 version) and locate "Degree of page rotation ....." option.
    4. Move the cursor to the beginning of dashed line and enter the desired selection.
    5. Press ENTER to activate the selection and exit the printer file menu.

Envelope Printing

To print envelopes, set the I-O 5250 Printer Emulation module to landscape orientation (Host Download command Reference No. 7) or activate the Auto Print Orientation feature (Host Download command Reference No. 8). 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 I-O 5250 Printer Emulation module supports the following envelope sizes:

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

OfficeVision/400 Envelope Printing

A letter and an envelope can be printed from 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 **CMD5** key, Go to, 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
11. 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 I-O 5250 Printer Emulation module to duplexing mode.

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 prior to any text(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 I-O 5250 Printer Emulation module can also be set to duplexing mode through the I-O 5250 Printer Emulation Control Panel or Host Download command 33. The options are:

0 = Simplex

1 = Duplex

2 = Duplex(tumble) printing

Using Host Download Command, type &%Z33,1 or &%Z33,2 into the document or on the screen and print the document or the screen to set the I-O 5250 Printer Emulation module 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, and 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	Disable 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. For example, ¬E(s3B would begin bold printing on an HP LaserJet printer.

The I-O 5250 Printer Emulation module 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 printer 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 I-O 5250 Printer Emulation module 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 many popular electronic forms software applications.

Matrix Printer Operation

IBM Matrix Printer Emulations

When printing to a dot-matrix printer, the I-O 5250 Printer Emulation module first converts 3812 SCS commands to 4214 SCS commands. These 4214 SCS commands are then converted into one of the following ASCII printer commands:

- IBM PPDS (matrix)
- IBM Proprinter
- Epson ESC/P2
- Epson DFX 8500/5000+ (no15 CPI capabilities)
- Epson FX/DFX
- Epson LQ
- Generic

Graphics Printing

The I-O 5250 Printer Emulation module will print the same Advanced Printer Functions (APF) and Business Graphics Utility (BGU) graphics as the IBM 4214 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 AS/400 host. This is the method of graphic printing that IBM used before IPDS was developed.

The I-O 5250 Printer Emulation module implements the LAC command by taking the dot pattern received from the AS/400 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 printers.

Generic Mode

The Generic printer driver should be used when the other printer drivers of the I-O 5250 Printer Emulation module 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 5250 Printer Emulation module's print drivers.

In Generic mode, the I-O 5250 Printer Emulation module 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 to 87).

For example, assume the printer protocol the printer requires is not available on the I-O 5250 Printer Emulation module. To change the printer to 10 CPI, the printer's user's manual provides the hexadecimal value of 1B 50. Use the Host Download command 86 to assign the value 1B 50 to the 10 CPI string (type &%Z86,1(1B 50)). From now on, when the I-O 5250 Printer Emulation module 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 I-O 5250 Printer Emulation module will send nothing to the printer, i.e. it will ignore the CPI or LPI command from the host.

The I-O 5250 Printer Emulation module stores commands for the following CPI and LPI values:

- 6 LPI Host Download Command No. 84
- 8 LPI Host Download Command No. 85

- 10 CPI Host Download Command No. 86
- 15 CPI Host Download Command No. 87

Advanced Features

Command Pass-Thru™

I-O's 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 I-O 5250 Printer Emulation module 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 desired 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.
4. Enter the 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.
5. 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 a 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.

This will print on the printer as:

This is an underlined word.

NOTE: ONLY CHARACTERS FROM 01 TO FF ARE RECOGNIZED (ALPHABETIC CHARACTERS MUST BE IN UPPER CASE).

NOTE: ERRORS IN THE COMMAND PASS-THRU SEQUENCE WILL CAUSE THE I-O 5250 PRINTER EMULATION MODULE TO IGNORE THE COMMAND AND PRINTING WILL RESUME AT THE POINT THE ERROR OCCURRED.

NOTE: COMMAND PASS-THRU MAY INVALIDATE HORIZONTAL SPACING.

Although the command is displayed on the screen the, I-O 5250 Printer Emulation module 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 5250 Printer Emulation module 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.

Printing Bar Codes Using I-O's Bar Code Feature

When generating bar codes on an IBM AS/400 using the I-O bar code feature, the I-O 5250 Printer Emulation module 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 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
8	UPCA with number system characters

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

¬B<type>,<height>,<width>,<hr>,<chkd>,<ast>,<data>¬B

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

- **¬B** Identifies the strings as a bar code command string. ¬B must be placed at the beginning and at the end of the string.
- **<type>** Specifies the bar code type according to the table shown above.
- **<height>** Specifies the height of the bar code. Height is expressed in multiples of 2.5 mm (approximately 1/10 inch). The height of the bar code can range from 1 (2.5 mm) to 9 (22.5 mm) inclusive.

  Height values are ignored if a POSTNET bar code is being printed, since POSTNET uses one standard height. However, a valid value (1-9) must be entered for the height parameter to ensure the bar code command string is complete.
- **<width>** Specifies the width of a bar code module. A module is defined as a specific combination of bars and spaces used to represent a human readable character. By changing the width parameter, you can determine the width of the module and the thickness of the bars and spaces.

  Width parameters can range from 1 to 9.

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

  For example, using Code 3 of 9, you want to bar code the word "PRINTERS." Assume the I-O 5250 Printer Emulation module also generates a check digit and the start/stop characters. Setting the width parameter to 2 will yield a total bar code length of approximately 4 cm or about 1.5 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.

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 (2.9)	8.4 (3.3)	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 18	1.8 (.07)	3.6 (.14)	5.5 (.21)
UPC A	1.8 (.07)	3.6 (.14)	5.5 (.21)

NOTE: BE AWARE THAT THE TABLE GIVES ROUNDED VALUES ONLY.

- **<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.

  9 = Do not print human readables and do not line feed.

- **<chkd>** Indicates whether the I-O 5250 Printer Emulation module automatically calculates and causes a check digit to be printed. The following bar codes require a check digit, therefore, the I-O 5250 Printer Emulation module 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 I-O 5250 Printer Emulation module automatically generates the start/stop characters 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 5250 Printer Emulation module 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 I-O 5250 Printer Emulation module will print "Invalid Data" in the place of the bar code.

Notes on using the I-O Barcode Feature

The following points should be kept in mind when using the I-O Barcode Feature:

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 I-O 5250 Printer Emulation module 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 I-O 5250 Printer Emulation module 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 I-O 5250 Printer Emulation module 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 + number system character which is placed in the 1st position of the data character parameter
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:	¬B6,3,1,1,1,0,0123456¬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 I-O 5250 PRINTER EMULATION MODULE 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 I-O 5250 PRINTER EMULATION MODULE PRINTS THE BAR CODE EXACTLY AS IT IS INPUT.

Code 128

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

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.

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

The following is an explanation of the above data string:

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
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	8
69	ENQ	e	69
70	ACK	f	70
71	BEL	g	71
72	BS	h	72
73	HT	i	73
74	LF	j	74
75	VT	k	75
76	FF	l	76
77	CR	m	77
78	So	n	78
79	S	o	79
80	DLE	p	80
81	DC1	q	81
82	DC2	r	82
83	DC3	s	83
84	DC4	t	84
85	NAK	u	85
86	SYN	v	86
87	ETB	w	87
88	CAN	x	88
89	EM	y	89
90	SUB	z	90
91	ESC	{	91
92	FS	|	92
93	GS	}	93
~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	

I-O Graphics Language™

I-O's Graphics Language™ (IOGL) is a language that allows that user to enhance printed output from their IBM host with such graphics elements as pie charts, line charts, rotated text, circles, boxes, lines, etc. In order to use IOGL, the attached ASCII printer must be a PCL5 compatible laser or inkjet printer.

IOGL is independent of other I-O features, such as internally generated bar codes or font change commands. This means that if an I-O font change command is followed by an IOGL command to rotate text, the text would print in the specified font. IOGL is also independent of regular text data. This allows text data to be overlaid by a graphical element, such as a shaded box.

I-O Graphics Language Overview™

The following table is a listing of the IOGL command strings.

Graphical Elements	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 end>;<y end>;<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>;<value2>;…
Run (Line) Chart	¬GR<line width>;<x start>;<y start>;<x increment>;<y increment>; <# of entries>;<value 1>;<value2>;…
Text Rotation	¬GT<x start>;<y start>;<angle of rotation>;<'text'>
Comments	¬GX<'text'>

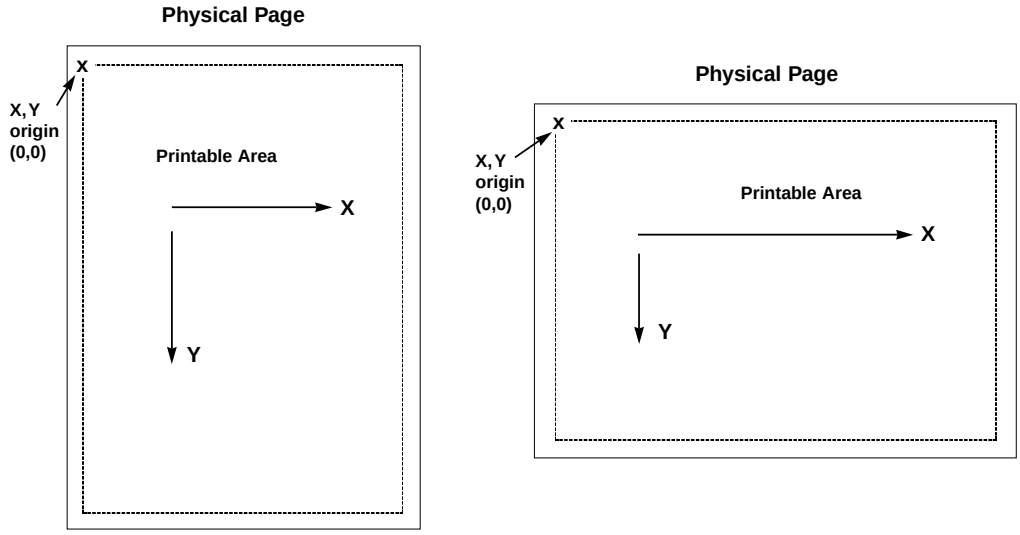
The following table is a listing of the command parameters used in the IOGL strings.

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

- 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.



- 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 I-O 5250 Printer Emulation module 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

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

  A;1;1;600

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

- Do not enter numeric values with commas (i.e. 50,000). The I-O 5250 Printer Emulation module 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).

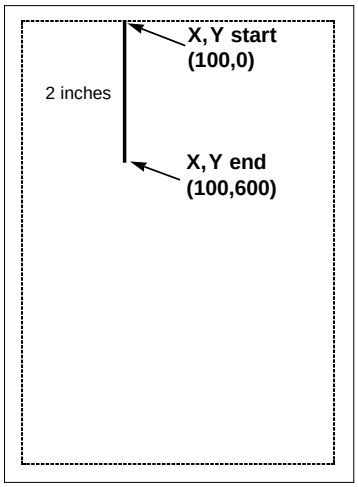
  International users should also be aware that a decimal value used to specify line width (in mm) such as "1,5" (i.e. 1 1/2) is also interpreted as two separate values (i.e. value 1 = 1, value 2 = 5). To enter a valid decimal line width use the period "." (i.e. 1.5 mm).

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.

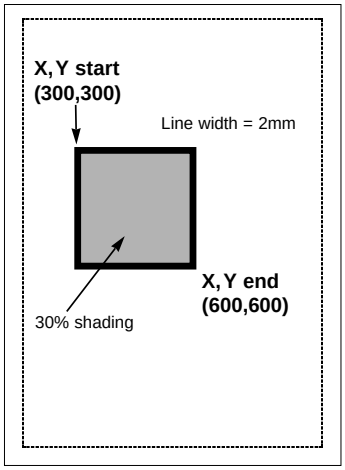
  For example: ¬GL2;100;0;100;600 draws a 2 mm wide, vertical (<x start> = <x end>) line of 2 inches in length (<y-end> - <y-start> = 600/300" = 2")



- **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.

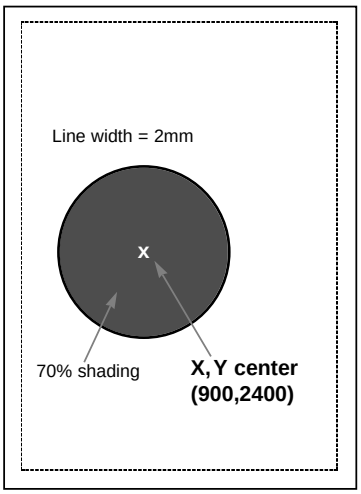
  For example: ¬GB2;300;300;600;600;30 draws a box with 2 mm wide border and 30% shading



- **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)

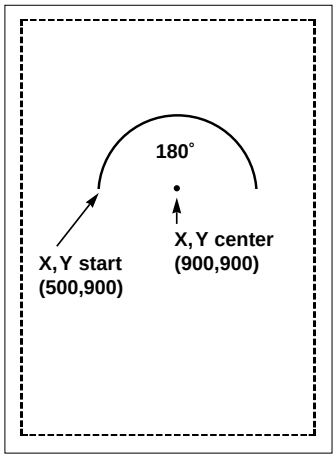


NOTE: TO AVOID CUTTING OFF PART OF THE CIRCLE, MAKE SURE THAT THE RADIUS AND THE X,Y CENTER VALUES ARE SUCH THAT THE COMPLETE CIRCLE WILL FIT INTO THE PRINTABLE AREA OF THE PAGE.

- **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).



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

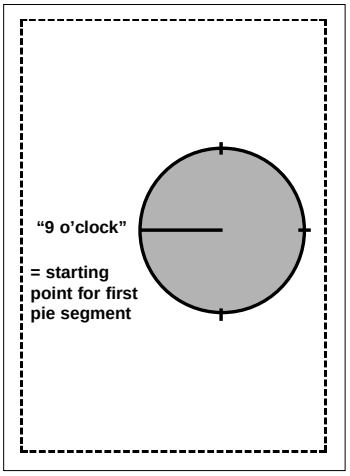
  Defines the color and shading of the pie chart and bar chart segments. The first value entered in the pie and bar chart commands will be printed in color 1 with shading 1. The second value entered in the pie and bar chart commands will be printed in color 2 with shading 2.

  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>;....

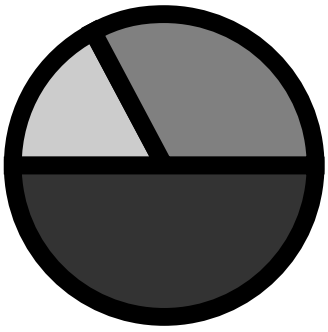
  Draws a pie chart around the xy center with the specified radius (in n/300 inches), number of segments (maximum of 9), and segment values. Segment values are entered as numeric and converted to percentages. Segment values can range from 0 to 100.

  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



  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.

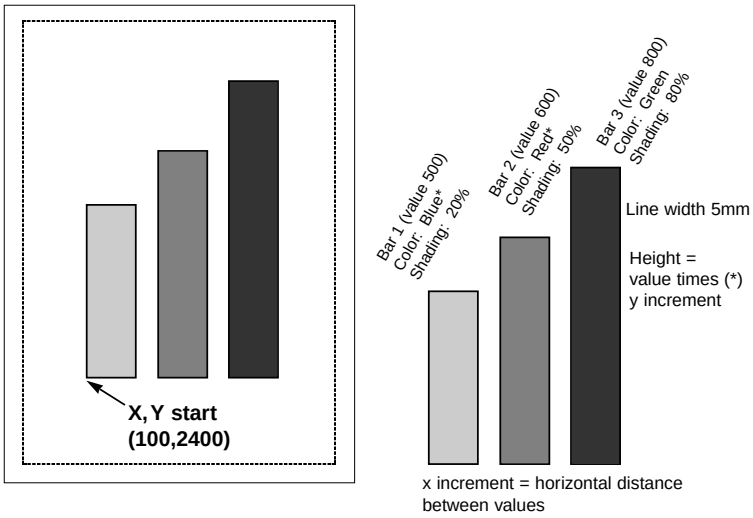
  The first segment (value 10) will be 1/6 of the complete circle (10/(10+20+30)=10/60=1/6), the second segment (value 20) will be 2/6 of the complete circle (20/60), and the third segment will be 3/6 of the complete circle



- **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 and ¬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



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.

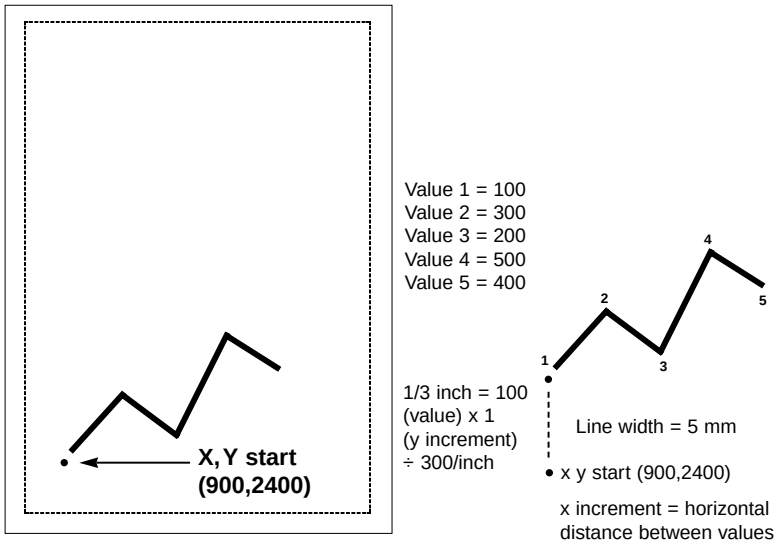
Bar 1 will be 1 2/3 inches (500 x 1/300 inch) high, bar 2 will be two inches high (600 x 1/300 inch), and bar 3 will be 2 2/3 inches high (800 x 1/300 inch).

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

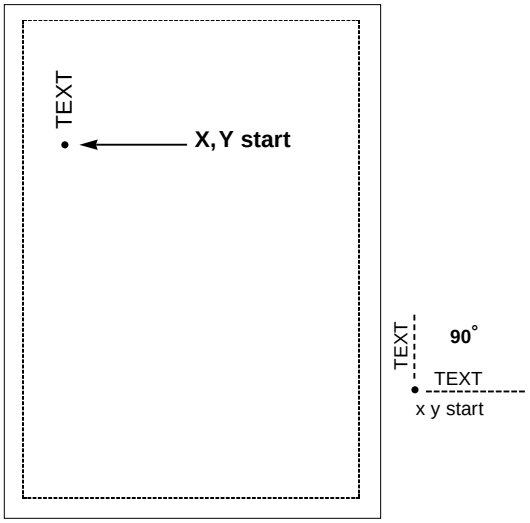


NOTE: THE Y-INCREMENT DETERMINES THE SCALING. ONLY INTEGERS (I.E. 1, 2, 3, 4, ETC.) ARE VALID. IF YOU ARE CHARTING SALES FIGURES IN THOUSANDS OF DOLLARS, THE Y-INCREMENT SHOULD BE SMALL (FOR EXAMPLE, 1). IF YOU ARE CHARTING THE NUMBER OF CUSTOMER COMPLAINTS PER PERIOD THE Y-INCREMENT SHOULD BE HIGH (FOR 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.



- **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

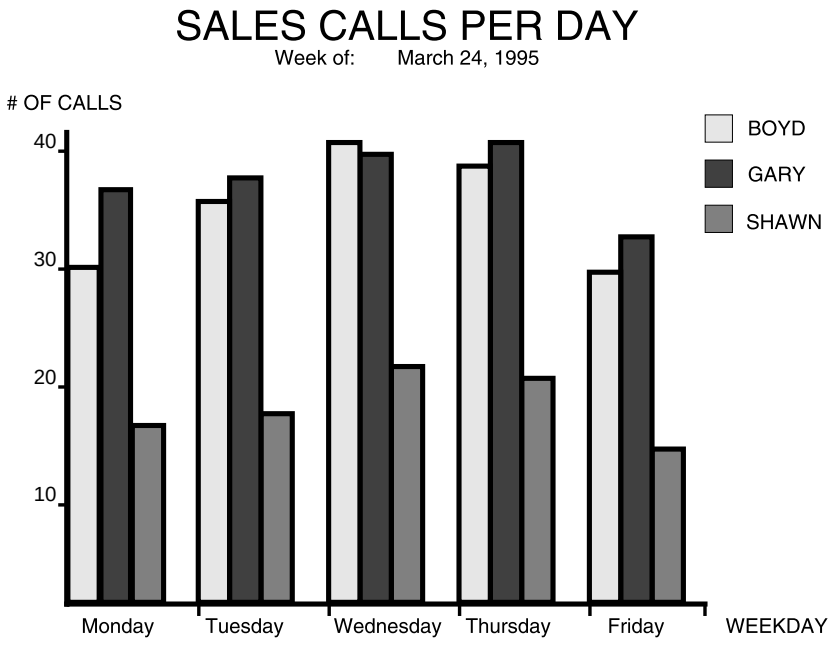
General Steps

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.

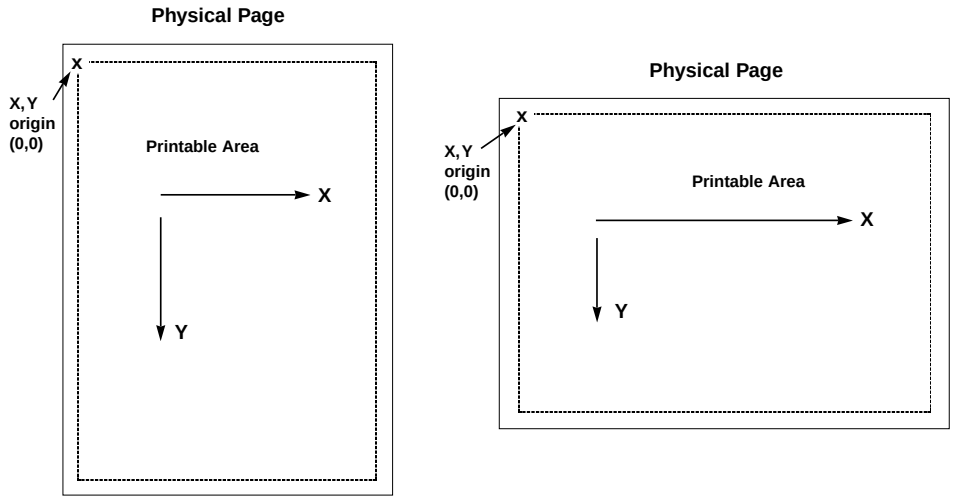
Tutorial

The following example shows how multiple IOGL elements interact to create a bar chart.

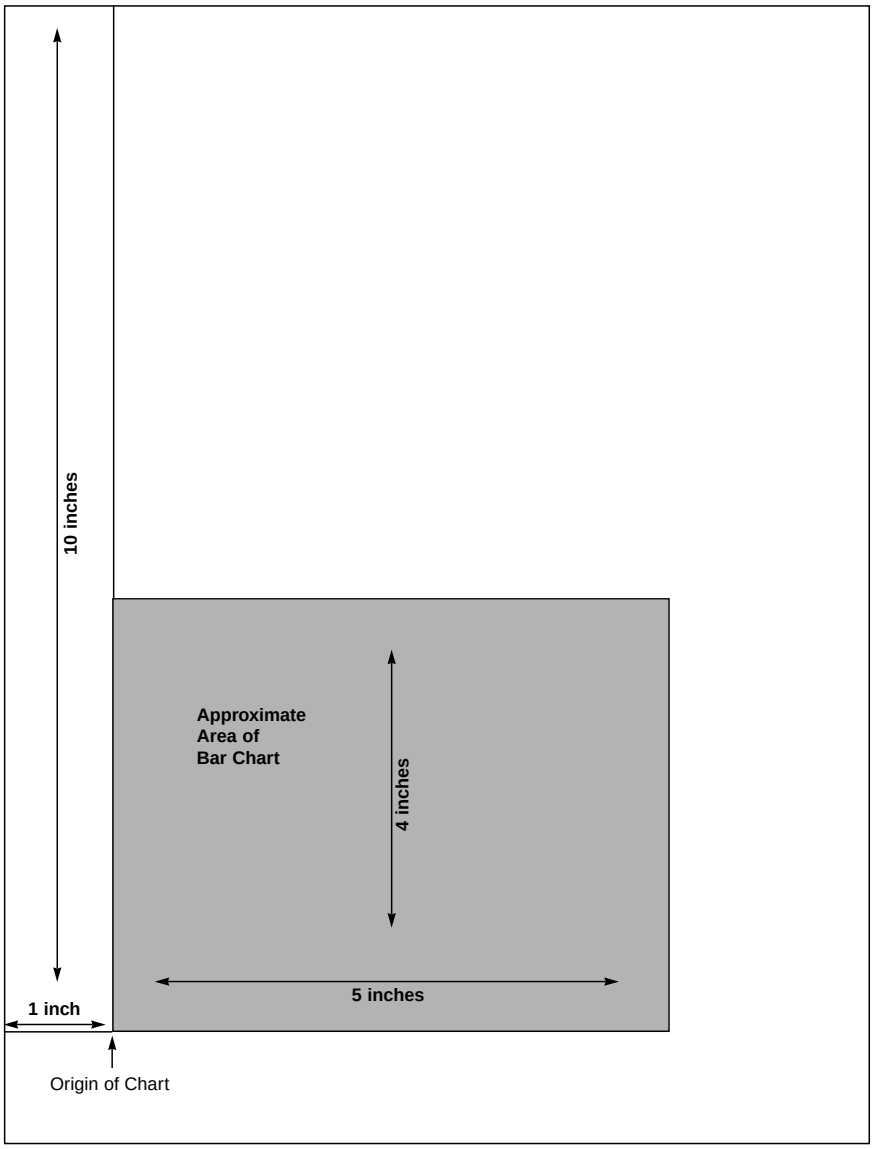


1. Following the above-mentioned general steps, we first determined the makeup of this bar chart. The example consists of four IOGL elements: bar charts, lines, boxes, and text.
2. To determine the printable area of the paper, we printed a box using 0;0 as the x;y -start coordinates. This was done by 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.



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



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 was created using the following parameters:

- **Bar Chart for 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 for 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 for 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

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.

Color Printing

The I-O 5250 Print Emulation module 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 that you want to colorize. Return to the "normal" black color by inserting ¬C00. The I-O color commands are:

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

For example, to print the 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 I-O 5250 PRINTER EMULATION MODULE 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 OFTHE 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. Mixing these three colors (red, blue, and green) creates the color of your choice. 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 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.

For example:

1. To define the color red and store the customized "red" command in the I-O 5250 Printer Emulation module 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:
3. 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.

Troubleshooting

This chapter contains solutions for problems you may encounter while using the product. If a problem persists even after you implement the solutions provided here, or if you encounter a problem not listed here, please contact your dealer, or I-O Corporation at 801-972-1446 or by email at support@iocorp.com.

Telnet 5250e Printing

Problem	*Solution*
• The AS/400 assigns a 3812 printer device with a name of QPADEVnnnn (where nnnn is a 4-digit number).	✓ If the IBM Host Printer Name is left blank when configuring the I-O 5250 Printer, the AS/400 will create a 3812 device but will give the printer the name of QPADEVnnnn, with nnnn being a 4-digit number. However, each time the I-O 5250 Printer Emulation connects to the host, the nnnn number for the printer may be different. This may cause problems where specific printer name is used in specifying the location of printed output. I-O does not recommend that you let the AS/400 create the printer name. ✓ Do the following to correct this situation: 1. From the Configure tab from the Terminal Connection Manager screen, edit the I-O Printer connection. 2. On the General tab in the IBM Host Printer Name field, enter the unique name you would like the AS/400 to use for this printer session.
• The AS/400 assigns a VT100 display device with a name of QPADEVnnnn (where nnnn is a 4- digit number).	✓ The AS/400's Telnet server is not up to the most current version and does not support TN5250e printing. Install the most recent PTF's. Also make certain to have installed the most recent version of Client Access on the IBM host.
• The writer is in a writing status, but no printing is occurring and there are no messages on the AS/400.	✓ This usually occurs when communication has been lost with the host. Re-establish the session by do the following: 1. End the writer. 2. Vary off the device. 3. Close the I-O 5250 Printing connection on the thin client. 4. Re-connect the I-O 5250 Printing connection on the thin client.
• The printer device is in a Vary On pending state.	✓ Restart the session by do the following: 1. End the Telnet session by using the AS/400's TCPADM command. (You may also use the NETSTAT command, option 3 as an alternate.) a. At the command line, type GO TCPADM, take selection "7", then "3".

	b. Find the IP address for the I-O 5250 Printer connection, then execute option "4 - End of Session". c. Close the I-O 5250 Printing connection on the thin client. d. Re-connect the I-O 5250 Printing connection on the thin client. 2. Restart the I-O 5250 Printing connection. 3. If the connection status message does not indicate a successful Telnet session has been established, you may need to change the name of the IBM Host Printer Name of the I-O 5250 Printer connection. This occurs because the AS/400 often does not allow the original printer device name to be used until an IPL is performed at the AS/400. This may also occur when the original name objects have been deleted.
• The I-O 5250 Printer session loses connection with the AS/400 host after a period of inactivity.	✓ The AS/400 has a timeout value that can be set to terminate any Telnet display or printer session. Setting this value to a longer timeout will allow the I-O 5250 Printer session to remain connected for a longer period. However, this longer timeout will also allow an unattended Telnet display session to remain open for a longer period as well, and may create a security issue. To change the Telnet inactivity timer, follow these steps: 1. Using the AS/400's CFGTCP command, select menu option 20, Configure TCP/IP Applications. 2. Select menu option 11, Configure Telnet. 3. On the next screen, select menu option 12, Inactive Job Time-out. 4. Change the QINACTITV value to a longer value, or use *NONE to deactivate the inactivity timeout.

TN5250e Connection Status Message

The I-O 5250 Printer session reports the success or failure of an attempt to communicate with the host by printing a brief connection status message on the attached printer.

The message will show whether the connection succeeded or not, the name of the host AS/400 which this I-O 5250 Printer session is connected to, the printer name, and the session status. (If there is no Host or printer name in the message it is because the host AS/400 did not send that information with the status message.)

The connection status message will look somewhat like:

AS/400 Host Communication Status:
Connection attempt succeeded
Host system S101256R
Printer name TNPRT00

Status code I902 - Session successfully started

The status code (I902) shown in the above example is the normal code indicating successful host communication. The possible values of the status code and suggested actions to take for that status code are as follows:

Message	***Solution***
• 0101 — Host not responding to pings	✓ This message usually indicates one of the following: • TCP/IP has not been started on the host. • The host's IP address has not been correctly entered in the I-O 5250 Printer's configuration on the thin client. • The thin client has not been correctly connected to the LAN.
• 0102 — Host rejected connect to Telnet port	✓ The host answers pings, but rejects a TCP/IP connect attempt, probably because its Telnet server has not been started.
• 0111 — Host Telnet session lost	✓ Usually means that the printer has been varied off at the host. Also if the host has gone down, or if there is a communication (e.g. router) failure.
• 2777 — Damaged device description	
• 8902 — Device not available	✓ This code appears when the I-O 5250 Printer connection attempts to start a session for a printer whose name duplicates the name of a printer already active on the host. In many cases, this status code means that the thin client with an I-O 5250 Printer session has been powered-off and then powered back on within a few minutes. When the thin client with an active I-O 5250 Printer session is turned off, it takes the AS/400 about 10 minutes to determine that the TCP/IP sessions for the printers are no longer active. If the I-O 5250 Printer session is restarted while the host shows the old printer sessions is still active, requests for new sessions will be rejected with this code. You can recover by doing one of the following: • Wait 10 minutes trying to establish another I-O 5250 Printer session. • At the AS/400, manually terminate the old TCP/IP sessions. • Avoid the problem by allowing the I-O 5250 Printer session to end its TCP/IP connection gracefully before powering the thin client off. Do this by powering-off the attached printer 2 minutes or more before powering closing the I-O 5250 Printer session itself.

• 8906 — Session initiation failed	
• 8907 — Session failure	
• 8920 — Object partially damaged	
• 8921 — Communications error	
• 8922 — Negative response received	
• 8925 — Creation of device failed	
• 8928 — Change of device failed	
• 8930 — Message queue does not exist	
• 8935 — Session rejected	
• 8940 — Automatic configuration failed or not allowed	
• E001 — No Telnet printer support at host	✓ The operating system on the AS/400 supports only display (not printer) devices in Telnet sessions. Update your AS/400 to support TN5250e printer sessions.
• I902 — Session successfully started	
• I904 — Source system at incompatible release	

Appendix A – ¬Q Font References

The following chart lists the **laser printer resident fonts and available font cartridges** that are available along with the font ID (FGID) number used to select the font when using the **¬Q Font Change Command**. The fonts listed in this Appendix can be used in two ways:

1. Enter the Font ID (FGID) number in the Typestyle/Color menu of OfficeVision/400.
2. Embed the Font ID (FGID) number preceded by ¬Q in your host document or report.

For more information, consult the Font Change section of the SCS Printing Operation chapter.

Typeface	Symbol Set	Orientation	Pitch	Point	FGID
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
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
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
Univers Med Cond. Italic	L1/R8/850	P/L	Prop.	6	4865
	L1/R8/850	P/L	Prop.	8	4866
	L1/R8/850	P/L	Prop.	10	4867
	L1/R8/850	P/L	Prop.	12	4868
	L1/R8/850	P/L	Prop.	14	4869
	L1/R8/850	P/L	Prop.	18	4871
	L1/R8/850	P/L	Prop.	24	4876
	L1/R8/850	P/L	Prop.	30	4877
Univers Bold	L1/R8/850	P/L	Prop.	6	4905
	L1/R8/850	P/L	Prop.	8	4906
	L1/R8/850	P/L	Prop.	10	4907
	L1/R8/850	P/L	Prop.	12	4908
	L1/R8/850	P/L	Prop.	14	4909
	L1/R8/850	P/L	Prop.	18	4911
	L1/R8/850	P/L	Prop.	24	4914
	L1/R8/850	P/L	Prop.	30	4917
Univers Bold Italic	L1/R8/850	P/L	Prop.	6	4925
	L1/R8/850	P/L	Prop.	8	4926
	L1/R8/850	P/L	Prop.	10	4927
	L1/R8/850	P/L	Prop.	12	4928
	L1/R8/850	P/L	Prop.	14	4929
	L1/R8/850	P/L	Prop.	18	4931
	L1/R8/850	P/L	Prop.	24	4934
	L1/R8/850	P/L	Prop.	30	4937
Univers Bold Condensed	L1/R8/850	P/L	Prop.	6	4945
	L1/R8/850	P/L	Prop.	8	4946
	L1/R8/850	P/L	Prop.	10	4948
	L1/R8/850	P/L	Prop.	12	4949
	L1/R8/850	P/L	Prop.	18	4951
	L1/R8/850	P/L	Prop.	24	4954
	L1/R8/850	P/L	Prop.	30	4957
Univers Bold Cond. Italic	L1/R8/850	P/L	Prop.	6	4965
	L1/R8/850	P/L	Prop.	8	4966
	L1/R8/850	P/L	Prop.	10	4967
	L1/R8/850	P/L	Prop.	12	4968
	L1/R8/850	P/L	Prop.	14	4969
	L1/R8/850	P/L	Prop.	18	4971

	L1/R8/850	P/L	Prop.	24	4974
	L1/R8/850	P/L	Prop.	30	4977
ITC Zapf Dingbats	14L	P/L	Prop.	6	4985
	14L	P/L	Prop.	8	4986
	14L	P/L	Prop.	10	4987
	14L	P/L	Prop.	12	4988
	14L	P/L	Prop.	14	4989
	14L	P/L	Prop.	18	4991
	14L	P/L	Prop.	24	4994
	14L	P/L	Prop.	30	4997

Optional Fonts as originally found in ProCollection Cartridge					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**
Line Printer	ASCII	P/L	17.1	8.5	253
Courier Bold	ASCII	P/L	10	12	45
Courier Italic	ASCII	P/L	10	12	17
Courier	ASCII	P/L	12	10	84
Courier Bold	ASCII	P/L	12	10	108
Courier Italic	ASCII	P/L	12	10	92
Courier	Legal	P	10	12	51
Courier Bold	Legal	P	10	12	52
Courier Italic	Legal	P	10	10	53
Courier	Legal	P	12	10	93
Courier Bold	Legal	P	12	10	94
Courier Italic	Legal	P	12	10	95
Prestige Elite	ASCII	P/L	15	7	220
Prestige Elite	ASCII	P/L	12	10	83
Prestige Elite Bold	ASCII	P/L	12	10	113
Prestige Elite Italic	ASCII	P/L	12	10	114
Prestige Elite	Legal	P	15	7	219
Prestige Elite	Legal	P	12	10	97
Prestige Elite Bold	Legal	P	12	10	98
Prestige Elite Italic	Legal	P	12	10	99
Letter Gothic	ACSII	P/L	27	3.6	291
Letter Gothic	ASCII	P/L	19	6	281
Letter Gothic	ASCII	P/L	17.1	9.5	257
Letter Gothic	ASCII	P/L	12	12	66

Letter Gothic Bold	ASCII	P/L	12	12	69
Letter Gothic Italic	ASCII	P/L	12	12	68
Times Roman	ASCII	P	Prop.	8	163
Times Roman	ASCII	P	Prop.	10	164
Times Roman Bold	ASCII	P	Prop.	10	165
Times Roman Italic	ASCII	P	Prop.	10	166
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
Helvetica Bold	ASCII	P	Prop.	12	188
Helvetica Italic	ASCII	P	Prop.	12	189
Helvetica Bold	ACSII	P	Prop.	14	190
Helvetica Bold	Legal	P	Prop.	14	191

Optional Font as originally found in WordPerfect Cartridge					
Typeface	**Symbol Set**	**Orient**	**Pitch**	**Point**	**FGID**
CG Times	DskTop	P	Prop.	6	4685
CG Times	DskTop	P	Prop.	8	4686
CG Times Bold	DskTop	P	Prop.	8	4706
CG Times Italic	DskTop	P	Prop.	8	4814
CG Times	DskTop	P	Prop.	10	4867
CG Times Bold	DskTop	P	Prop.	10	4707
CG Times Italic	DskTop	P	Prop.	10	4815
CG Times	DskTop	P	Prop.	12	4688
CG Times Bold	DskTop	P	Prop.	12	4708

CG Times Italic	DskTop	P	Prop.	12	4816
CG Times	DskTop	P	Prop.	14	4689
CG Times Bold	DskTop	P	Prop.	14	4709
CG Times Italic	DskTop	P	Prop.	14	4817
CG Times Bold	DskTop	P	Prop.	18	4711
CG Times Bold	DskTop	P	Prop.	24	4714
Univers	DskTop	P	Prop.	14	4789
Univers	DskTop	P	Prop.	18	4791
Univers	DskTop	P	Prop.	24	4794

Optional fonts as originally found in Microsoft Cartridge					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**
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
Helvetica Bold	L1/R8	P	Prop.	12	34124
Helvetica Italic	L1/R8	P	Prop.	12	34232
Helvetica Bold	L1/R8	P	Prop.	14	34125
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
TmsRmn	L1/R8	P	Prop.	12	5688
TmsRmn Bold	L1/R8	P	Prop.	12	5708
TmsRmn Italic	L1/R8	P	Prop.	12	5816
TmsRmn Bold	L1/R8	P	Prop.	14	5709
Line Printer	L1/R8	P	Prop.	835	223

Optional Fonts as originally found in Polished Worksheet Cartridge					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**
Prestige Elite	L1/R8/850	P/L	15	7	221
Prestige Elite	L1/R8/850	P/L	12	10	86
Prestige Elite Bold	L1/R8/850	P/L	12	10	111
Prestige Elite Italic	L1/R8/850	P/L	12	10	112

Prestige Elite	Legal	P/L	15	7	219
Prestige Elite	Legal	P/L	12	10	97
Prestige Elite Bold	Legal	P/L	12	10	98
Prestige Elite Italic	Legal	P/L	12	10	99
Letter Gothic	L1/R8/850	P/L	27	3.6	290
Letter Gothic	L1/R8/850	P/L	12	12	87
Letter Gothic Bold	L1/R8/850	P/L	12	12	110
Letter Gothic Italic	Legal	P/L	12	12	109
Letter Gothic	Legal	P/L	27	3.6	292
Letter Gothic	Legal	P/L	12	12	90
Letter Gothic Bold	Legal	P/L	12	12	107
Letter Gothic Italic	Legal	P/L	12	12	106
Presentational Bold	ASCII	P/L	8.1	16	434
Presentational Bold	Legal	P/L	8.1	16	431

Optional Fonts as originally found in Persuasive Cartridge					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**
Letter Gothic	ASCII	P/L	10	14	39
Letter Gothic	Legal	P/L	10	14	38
Presentational Bold	ACSII	P/L	10	14	6
Presentational Bold	Legal	P/L	10	14	7
Presentational Bold	ACSII	P/L	8.1	16	434
Presentational Bold	Legal	P/L	8.1	16	431
Presentational Bold	ACSII	P/L	6.5	18	435
Presentational Bold	Legal	P/L	6.5	18	432
Presentational Bold	ACSII	P/L	5.7	24	436
Presentational Bold	Legal	P/L	5.7	24	433
Helv Outline	ASCII	P/L	Prop.	24	34115
Helv Outline	Legal	P/L	Prop.	24	34116
Serifa	ASCII	P/L	Prop.	24	34215
Serifa	Legal	P/L	Prop.	24	34216
Line Draw	LinDrw	P/L	10	14	31
PC Line Bold	PCLin	P/L	10	14	32

Optional Fonts as originally found in Forms, Etc. Cartridge					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**

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
Tax Line Draw	Taxlin Drw	P/L	10	12	30

Optional Fonts as originally found in Bar Codes & More Cartridges					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**
Letter Gothic	L1/R-8	P/L	15	9.5	230
Letter Gothic	L1/R-8	P/L	112	12	87
Letter Gothic	L1/R-8	P/L	10	14	40
OCR-A	OCR-A	P	10	12	19
OCR-B	OCR-B	P	10	12	3
Code 3 of 9	3 of 9	P	8.1	12	60
Code 3 of 9	3 of 9	P	4.6	12	240
EAN/UPC 10 Mil	UPC	P	Prop.	12	170
EAN/UPC 13 Mil Bold	UPC	P	Prop.	12	171
USPS Zip	ZIP	P/L	Prop.	12	172
Line Draw	LinDrw	P/L	10	12	33

Optional Fonts as originally found in Text Equations Cartridge					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**
Prestige Elite	L1/R-8	P	15	7	221
Prestige Elite	L1/R-8	P	17.1	1	256
Prestige Elite	L1/R-8	P	12	10	86
Prestige Elite Bold	L1/R-8	P	12	10	111
Prestige Elite Italic	L1/R-8	P	12	10	112
CG Times	L1/R-8	P	Prop.	8	157
CG Times	L1/R-8	P	Prop.	10	158
CG Times Bold	L1/R-8	P	Prop.	10	159
CG Times Italics	L1/R-8	P	Prop.	10	155

Optional Fonts as originally found in Global Text Cartridge					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**
CB Century Schoolbook	L1/R-8/850	P/L	Prop.	8	16950
CB Century Schoolbook	L1/R-8/850	P/L	Prop.	10	16951
CD Century Schlbk Bold	R-8	P/L	Prop.	10	16971
CD Century Schlbk Italic	R-8	P/L	Prop.	10	17079
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					
Typeface	**Symbol Set**	**Orientation**	**Pitch**	**Point**	**FGID**
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 – ¬F Font References

The following chart lists the **laser printer scalable resident fonts** that are available along with the font ID (FGID) number used to select the font when using the **¬F Font Change Command**. The fonts listed in this Appendix can be used in two ways:

3. Enter the Font ID (FGID) number in the Typestyle/Color menu of OfficeVision/400.
4. Embed the Font ID (FGID) number and desired point side preceded by ¬F in your host document or report.

For more information, consult the Font Change section of the SCS Printing Operation chapter.

Font	FGID
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
Arial Italic	6327
Arial Bold Italic	6347
Garamond Antique	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
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
ITC 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

3812 Font Numbers Which Use the CG Times Typeface	
Font	**FGID**
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 – Sample Configuration Report

```
PRINTER TEST

TEST 4 LPI 10 CPI

Line 3

Line 4
```

TEST 8 LPI 15 CPI
Line 6
Line 7

```
    EBCDIC  Symbol  Set

  4 5 6 7 8 9 A B C D E F
0-  & - › ø æ ^ { } \ 0
1-  , /   a j ~ œ A J @ 1
2-ƒ ^ ¶ Ò b k s ¾ B K S 2
3-„ ‰ Ž Ó c l t ú C L T 3
4-… Š · Ô d m u Ÿ D M U 4
5-  ¡ µ Ö e n v õ E N V 5
6-Æ Œ Ç × f o w Ô F O W 6
7-† ‹   Ø g p x ¬ G P X 7
8-‡   • Þ h q y « H Q Y 8
9-¤ á ¥ ` i r z ó I R Z 9
A-½ ! | : ® ¦ - [ - Õ ý ü
B-. $ , # ¯ § ¨ ] ‟  – â ê
C-< * % @ Đ ' Ñ î ″   ™ š
D-( ) _ ' ì ÷ í ù • —  ã ë
E-+ ; > = ç ′ è ï ¢ £ à é
F-³ ª ? " ñ Ï © ò ä ~ å


   ASCII  Symbol  Set

  2 3 4 5 6 7 8 9 A B C D E F
0-  0 @ P ` p •     ° À Đ à ð
1-! 1 A Q a q   ' ¡ ± Á Ñ á ñ
2-" 2 B R b r , ’ ¢ ² Â Ò â ò
3-# 3 C S c s ƒ “ £ ³ Ã Ó ã ó
4-$ 4 D T d t „ ” ¤ ´ Ä Ô ä ô
5-% 5 E U e u … • ¥ µ Å Õ å õ
6-& 6 F V f v † – ¦ ¶ Æ Ö æ ö
7-' 7 G W g w ‡ — § · Ç × ç ÷
8-( 8 H X h x ^ ~ ¨ ¸ È Ø è ø
9-) 9 I Y i y ‰ ™ © ¹ É Ù é ù
A-* : J Z j z Š š ª º Ê Ú ê ú
B-+ ; K [ k { ‹ › « » Ë Û ë û
C-, < L \ l ¦ Œ œ ¬ ¼ Ì Ü ì ü
D-- = M ] m }  - ½ Í Ý í ý
E-. > N ^ n ~ Ž ž ® ¾ Î Þ î þ
F-/ ? O _ o   Ÿ ¯ ¿ Ï ß ï ÿ

CPT Delimiter must be set to & (Ampersand)
% (Percent) for correct ASCII Symbol Set testing
```

```
----------- 5250 Printer Emulation Parameters ----------

Physical Port                    COM1
5250 Printer Emulation           4214
Printer Driver                   Eps ESC/P2

Parameters            Cmd
CPT Start Delim        01        &%
CPT End Delim          02        &%
Host Language          05        USA/Canada
Orientation            07        n/a
APO                    08        n/a
Paper Size             09        n/a
LPI                    10        n/a
IBM Drawer 1           13        n/a
IBM Drawer 2           14        n/a
IBM Drawer 3           15        n/a
Override FP            16        None
Character Set          17        CP 850
Vertical Margin        18        n/a
Horizontal Margin      19        n/a
4214 Print Quality     22        Draft
Draft Printing         23        Normal
IBM Motion             25        FF
Truncate/Wrap          26        Wrap
15 CPI Printing        28        No
IBM Drawer 4           30        n/a
IBM Drawer 5           31        n/a
11x17 /A3              32        n/a
Duplexing              33        n/a
Left Margin and CPT    35        After
EBCDIC Dump            42        No Action
ASCII Dump             43        No Action
Default CPT (&%)       44        Enabled

-------------- SCS Printer Emulation Strings ------------

 User Defined Strings 04
  U0
  U1
  U2
  U3
  U4
  U5
  U6
  U7
  U8
  U9
 Host Initialization  11
 User Defined Fonts   21
```

Manufacturer's Warranty & Repair Policy

Manufacturer's Three 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 three years 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.

I-O shall not be liable for non-performance or delays hereunder due to causes beyond its control. These shall include, but not be limited to, acts of God, wars, strikes, fires, flood, storm, earthquake, shortages of labor or materials, labor disputes, transportation embargoes, acts of any government or agency thereof.

MODIFICATIONS OR RECONFIGURATION OF THE HARDWARE BY ANYONE OTHER THAN I-O OR I-O'S AUTHORIZED REPAIR FACILITY WILL VOID THIS HARDWARE WARRANTY.

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.

Buyer will pay reasonable labor and handling charges for each product returned for repair which is found to have no defect.

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 Three 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 three years 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.

I-O shall not be liable for non-performance or delays hereunder due to causes beyond its control. These shall include, but not be limited to, acts of God, wars, strikes, fires, flood, storm, earthquake, shortages of labor or materials, labor disputes, transportation embargoes, acts of any government or agency thereof.

MODIFICATIONS OR RECONFIGURATION OF THE HARDWARE BY ANYONE OTHER THAN I-O OR I-O'S AUTHORIZED REPAIR FACILITY WILL VOID THIS HARDWARE WARRANTY.

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.

Buyer will pay reasonable labor and handling charges for each product returned for repair which is found to have no defect.

Install Your Repaired Unit

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

You are responsible for installing the returned unit.

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

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