I-O LAN Print Servers

User's Guide

VERSION 4.60

I-O LAN Print Server User's Guide Version 4.60
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1 INTRODUCTION

Thank you for purchasing one of I-O's local area network (LAN) print servers with built-in IBM printer emulations for reliable, seamless IBM mainframe, AS/400 and LAN printing.

I-O's Print Servers fall into two major families: AS/400 and Enterprise. The AS/400 family supports printing from IBM's AS/400 systems. I-O Enterprise Print Servers also support printing from AS/400 systems, but have the added benefit of supporting printing from IBM mainframe systems.

I-O Print Servers are available in a number of models, differing in the number of printers that can be attached to the print server, the protocols supported, the host data streams supported, and so on. The print server model is identified by a product number (such as 5450, 5435, etc.). I-O Enterprise Print Servers are identified by an "e" added to the product number. For example, the 5450 is an AS/400 print server, while the 5450e is an Enterprise print server.

The I-O 5755e IPDS/SCS Printer Gateway is a print server designed to redirect IBM mainframe and AS/400 IPDS and SCS print jobs to one, two or three Ethernet attached laser printers. The I-O 5755e also has one parallel port so that a printer can be attached. For IPDS printing, the PPR/PPD protocol is accepted from both the IBM mainframe and the AS/400. For SCS printing, TN3270e is supported from the IBM mainframe while TN5250e, AnyNet and SNA (APPC) is supported from the AS/400.

The I-O 5735e IPDS SCS Printer Gateway is a single session version of the 5755e.

The I-O 5755dp IPDS/SCS Printer Gateway is an enhanced version of the I-O 5755e that specifically supports the entire document finishing functions of Canon imageRUNNER™ digital printers.

The I-O 5735dp IPDS/SCS Printer Gateway is a single session version of the 5755dp.

The I-O 5755km IPDS/SCS Printer Gateway is an enhanced version of the I-O 5755e that specifically supports the entire document finishing functions of Kyocera printers.

The I-O 5735km IPDS/SCS Printer Gateway is a single session version of the 5755.km

The I-O 5450 and 5450e Print Servers are stand-alone print servers that attach up to three printers (2 parallel, 1 serial) directly to your Ethernet-based local area network. The I-O 5450 supports native AS/400 printing over TCP/IP, SNA, AnyNet, and TN5250e. The I-O 5450e includes TN3270e for mainframe SCS/DSC printing. Unix, Windows, or OS/2 hosts are supported using TCP/IP, IPX/SPX or NetBIOS protocols. Windows 95/98 is also supported using I-O's TCP/IP DirectPort™ print driver.

The I-O 5430 and 5430e Print Servers are single-parallel printer versions of the I-O 5450 and 5450e.

The I-O 5430b and 5431b Bar Code Print Servers, single-parallel or serial printer versions of the I-O 5450, have the added feature of supporting specialty bar code printers from manufacturers such as Zebra, Datamax, Sato, Tec, Intermec, Microcom, Datasouth, Avery Dennison/Novexx, Ring/Autonics, Eltron, UBI, Axiohm, Monarch and C.ITOH. This specialized software also enables the I-O 5430b and 5431b BarCode Print Server to print its self-tests and diagnostic outputs such as hex dumps on the bar code's standard label making trouble-shooting much easier. In addition to specialty bar code output capability, the I-O 5430b and 5431b support all the same protocols and printers as the I-O 5450 for both AS/400 and LAN printing.

The I-O 5435 and 5435e AFP/IPDS Print Servers, single-parallel printer versions of the I-O 5450 and 5450e, add the capability of printing AFP/IPDS print jobs over TCP/IP from the AS/400 or mainframe.

The I-O 5435dp AFP/IPDS Print Server is an enhanced version of the I-O 5435e that specifically supports all of the document finishing functions of the Canon imageRUNNER digital printers.

The I-O 5409 TCP/IP Print Server attaches one parallel laser printer to an AS/400 over a LAN running TCP/IP. Native TCP/IP AS/400 printing is supported using either LPR/LPD or TN5250e. UNIX, Windows NT, or OS/2 hosts are supported using LPR/LPD. Windows 95/98 is also supported using I-O's TCP/IP DirectPort print driver.

Throughout this manual, these I-O products will be referred to as "I-O Print Server". Where specific features and/or functions differ among the models, they will be specifically referred to as "I-O 5450 Print Server," "I-O 5435e AFP/IPDS Print Server," and so on.

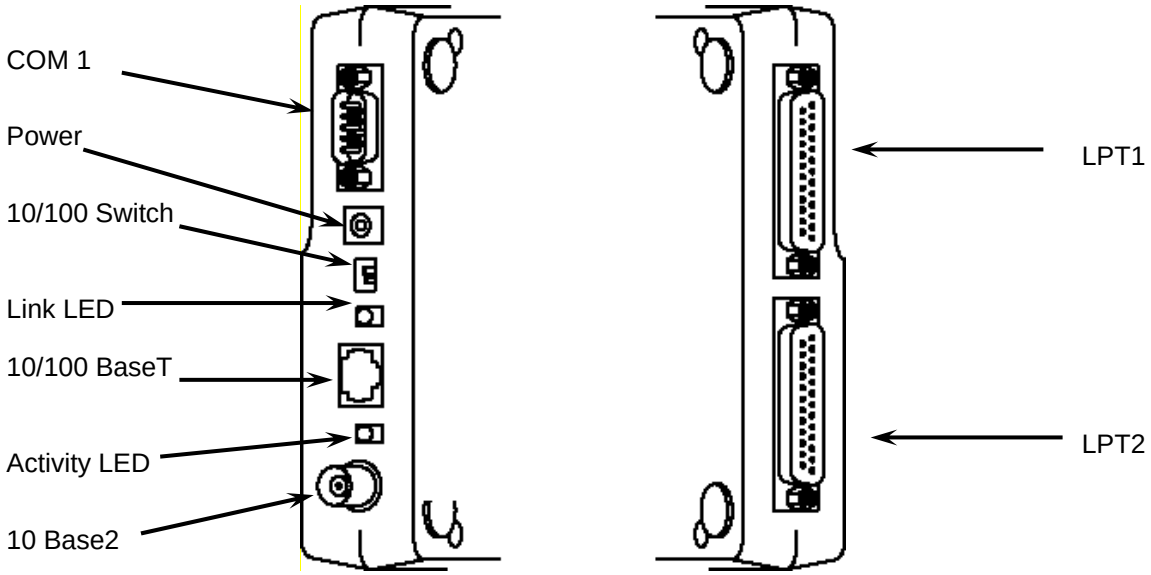
1.1 Unpacking

When you receive the interface, check the packaging for water or physical damage, and notify the carrier immediately if any damage is evident.

Keep the original packaging in case the interface needs to be moved or shipped. The following items are included in the package:

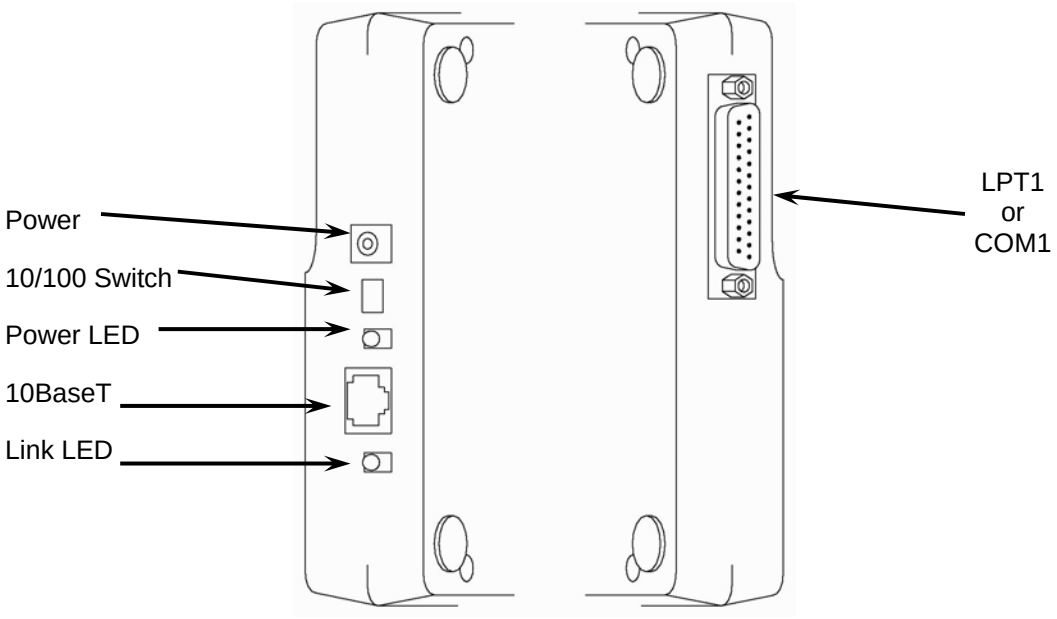
- An I-O Print Server
- A CD-ROM containing:
  - I-O Print Server User's Guide
  - I-O Configuration Utility
  - I-O PrintControl™ Utility (for use with print servers having firmware older than V1.36).
  - I-O TCP/IP DirectPort Installation Utility
- Getting Started Guide
- Power Supply

1.2 About the I-O Print Server



I-O 5435/5435e/5435dp, I-O 5755e/5755dp, I-O 5735e/5735dp, I-O 5755km/5735km
I-O 5450/5450e, I-O 5430/5430e and 5430b Print Servers

Note: The number of connectors, switches and LED's will vary depending on model. For example, the I-O 5450 will have all connectors, switches and LED's as shown above, where the I-O 5430 does not have the 10Base2, LPT2, or COM1 connectors and respective LED's.



I-O 5409 and 5431b Print Server

1.3 LED Indicators

Note: Some of these LED indicators are found on the top of the I-O Print Server, while others are located on the side of the Print Server.

Power - This green LED will be ON indicating that the I-O Print Server has successfully completed its internal self-tests and is READY. If this light blinks slowly, the I-O Print Server is not in operating mode (e.g. during Flash Upgrade). A rapidly blinking light indicates a problem with the I-O Print Server (e.g. failed self-test, faulty power supply...).

For the I-O 5431b BarCode Print Server, after the initial power up and diagnostics sequence is complete, and if there are no problems with the print server, the LED will indicate whether the serial printer is properly attached. If the serial printer is properly attached, the LED will be ON. If the printer is not properly attached (the serial cable may not be properly wired, the printer is off ...), the LED will turn OFF.

LPT1 - This green LED will be ON indicating that the printer attached to the interface's LPT1 port is READY. This light will blink slowly while the attached printer is printing. It is OFF if no printer is attached or the attached printer is NOT READY (e.g. paper jam, toner low, no communication...).

LPT2 - See description of LPT1. (Available only on the I-O 5450 and 5450e Print Servers.)

COM1 - See description of LPT1. (Available only on the I-O 5450, 5450e, and 5431 BarCode Print Servers.)

Session Status - For Gateway Print Servers, this green LED indicates the status of the connection with the printer. Use the I-O Configuration Utility to identify the error condition.

- ON indicates that any one of the three target printers is available to receive print jobs (applies whether the printers are attached to the LAN or locally via the LPT1 port).
- OFF indicates that none of the target printers are available.
- Slow blink indicates that any one of the three target printers is printing.
- Fast blink indicates that at least one of the target printers is not available due to a printer error (paper jam, toner low, etc.) .

Session 1 - For Gateway Print Servers, this green LED will be ON indicating that the first of the three target printers is available to receive print jobs (applied whether the printer is attached to the LAN or locally via the LPT1 port). This LED will blink slowly while the target printer is printing. It is OFF if the target printer is not available. This LED will blink fast if the target printer is not available due to a printer error (paper jam, toner low, etc.) Use the PrintControl utility to identify the error condition.

Session 2 - See description of Session 1.

Session 3 - See description of Session 1.

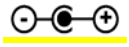
Mode - These two orange LEDs are associated with the mode button and indicated which I-O Print Server function is currently active. The test LEDs are turned ON and OFF through the mode button. Functions are: Self-Test, EBCDIC Hex Dump, ASCII Hex Dump, and Restore Factory Defaults. For more information refer to Troubleshooting later in this User's Guide.

Network Data - This green LED will be ON when network data is received by the I-O Print Server. This light may seem to be blinking at times since the I-O Print Server receives many small data packets in the form of status requests or other inquiries by servers in the network.

Link - This green LED located on the side of the print server indicates that the I-O Print Server has established communication with an Ethernet hub and has verified link integrity.

Activity - This green LED located on the side of the print server indicates that the I-O Print Server is detecting signals on the network.

1.4 Connector/Switch Descriptions

Power - This connector is used for the 5VDC 2.5A power supply shipped with the I-O Print Server  (the shield is the negative connection).

10/100 Switch - This switch should only be used when the auto sensing 10/100BaseT connector does not seem to function properly. The possible settings are shown below. The DOWN position is achieved by moving the switches toward the bottom of the I-O Print Server. (Not used on the I-O 5409 TCP/IP Print Server.)

Setting	Switch 1	Switch 2
Auto-sensing (default)	UP	UP
100BaseT Only	DOWN	UP
10BaseT Only	DOWN	DOWN

10/100BaseT - This connector is used for attaching a 10BaseT or 100BaseT cable. See also the description of the 10/100 Switch. Note that the I-O 5409 TCP/IP Print Server only supports 10BaseT connectivity.

10/Base2 - This connector is used for attaching a 10Base2 (coax) cable. (Available only on the I-O 5450 and 5450e Print Servers.)

LPT1 - This DB25 IEEE 1284 compliant parallel port allows the attachment of a parallel printer using a standard Centronics connector. Note: Use of cables longer than 6-10 feet may produce erratic results.

LPT2 - See description of LPT1. (Available only on the I-O 5450 and 5450e Print Servers.)

COM1 - This RS-232 serial port allows the attachment of a serial printer (available only on certain models.) On the I-O 5450 and 5450e Print Servers, this DB9 connector uses software and hardware flow control via X=On, X=Off and DSR/DTR. On the I-O 5431 BarCode Print Server, this DB25 connector uses software and hardware flow control via X=On, X=Off, and RTS/CTS. See Appendix C.

1.5 Network Connectivity

The I-O Print Server acts as a node in the local area network with its own unique network address. It receives data from across the network in the form of packets and converts the packets to a format that can be recognized by ASCII printers.

1.6 Multi-Protocol LAN Printing

When printing from ASCII hosts (PC, Unix) the I-O Print Server supports the following protocols:

- TCP/IP - Used by Unix, Netware, Windows NT, OS/2...
- IPX/SPX - Used by Netware*
- NetBIOS - Used by Windows 3.x, Windows for Workgroups, Windows NT, OS/2*

* Not available on the I-O 5409 TCP/IP Print Server. On the Gateway Print Server, their protocols are only supported when a printer is directly attached to the print server LPT1 port.

1.7 Multi-Host Printing

The I-O Print Server can support printing from several different types of hosts at the same time. This expands the capability of a printer attached to an I-O Print Server, yet still provides the benefits of a dedicated host-printer relationship. (The Gateway Print Server is designed to support only two types of hosts – the IBM mainframe and the AS/400.)

For example, in LAN printing, you may have Unix systems, Windows, and PCs running OS/2, all using various combinations of Netware and TCP/IP. All systems can send their printed data to a single I-O Print Server.

The I-O Print Server is also capable of supporting up to 10 different IBM mainframe or AS/400 hosts for each printer (when using TN5250e), greatly expanding the number of hosts that can utilize the printers attached to an I-O Print Server.

1.8 Multi-Protocol AS/400-to-LAN Printing

1.8.1 IBM AS/400 Printing

When printing from an IBM AS/400 host, the I-O Print Server supports the following protocols:

- TCP/IP (TN5250e)
- TCP/IP (LPR/LPD)
- AnyNet (SNA data encapsulated in TCP/IP)*
- SNA (APPC)*

* Not available on the I-O 5409 TCP/IP Print Server

1.8.2 IBM Mainframe Printing

When printing from an IBM mainframe, the I-O Enterprise Print Server supports SCS (LU1) and DSC (LU3) data stream via TN3270e. AFP/IPDS printing is supported via TCP/IP (PPR/PPD).

1.9 IBM Printer Emulations

The I-O Print Server converts native IBM host print jobs from EBCDIC to ASCII freeing the host or client PCs from the often heavy overhead associated with this task. The I-O Print Server will also convert the IBM command structure in to PCL, Epson or Proprinter commands.

The I-O 5450 and 5450e Print Servers run up to three independent printer emulations concurrently allowing each of the attached printers to be used for IBM mainframe and AS/400 printing. The I-O 5435 and 5435e AFP/IPDS Print Servers can handle two logical IBM host printer sessions: one for SCS or SCS/DSC data streams and the other for AFP/IPDS.

On the AS/400, when using SNA (APPC) or AnyNet, the AS/400 will output 3812-1, 4214, 5224, 5225 or 5256 SCS data streams. The I-O Print Server will convert these SCS data streams to ASCII data. All functionality of the IBM SCS printer is converted for use on the ASCII printers. For example, the IBM 3812-1 Paper Printer's Computer Output Reduction (COR) feature is fully implemented on PCL laser printers.

For IBM dot-matrix printers such as the 4214, the form alignment message allows users to properly align printed forms on Epson or Proprinter compatible printers.

When using one of I-O's AFP/IPDS Print Servers, full IBM 3812-2, 3816 and 4028 AFP/IPDS functionality is supported on a PCL 5e attached laser printer.

When using TN5250e, the AS/400 only outputs 3812-1 SCS data. I-O Printer Servers will convert the 3812-1 SCS to PCL for use with PCL laser printers. In addition, I-O Print Servers can also convert the 3812-1 SCS data for use with dot-matrix printers. However, certain dot-matrix features such as the form alignment messaging feature is not supported, as the AS/400 only accepts back from the printer 3812-1 page printer functions.

When using TN3270e, the IBM mainframe can output either SCS (LU1) or DSC (LU3) data. I-O Enterprise Print Servers will convert the SCS/DSC data to ASCII data on PC-type laser or dot matrix printers.

2 INSTALLATION

No special training is needed to install the I-O Print Server. Simply follow the steps outlined under *Hardware Installation*, then *PrintControl Installation*, and then configure the I-O Print Server for the protocol(s) that you will be using (see Chapter 3, Configuration).

2.1 Hardware Installation

1. Perform a self-test of the printer(s) you want to attach (check the printers' User's Guides). Then power OFF the printer(s). (If installing a Gateway Print Server, do not power off the LAN attached printers.)

2. Attach the LAN cable to the appropriate I-O Print Server connector. If the I-O Print Server supports multiple LAN cable types, it will automatically sense which type of cable is attached when it is powered up. The supported cable types are:

   - Thin Ethernet (10Base2, BNC connector)
   - Twisted Pair (10BaseT or 100BaseT, RJ45 connector)

   If the Link LED does not come on, you will need to set the 10/100 switch as follows:

Setting	Switch 1	Switch 2
Auto-sensing (default)	UP	UP
100BaseT only	DOWN	UP
10BaseT only	DOWN	DOWN

   Notes: Do not attach more than one network cable at a time. Also, do not change the network connector while the I-O Print Server is powered ON.

   The I-O 5409 TCP/IP Print Server only supports 10BaseT and does not have this switch.

3. Attach the printer cable(s) and power ON the printer(s). (This step does not apply to the Gateway Print Server.)

4. Connect the power supply to the I-O Print Server.

5. The I-O Print Server will then generate its own self-test and send it to the printer. After the self-test page prints, review it for more information regarding I-O Print Server settings. By default, an I-O self-test page will print on the printer attached to the I-O Print Server's LPT1 port or Session 1 target printer (except on BarCode models which will, by default, not print a self-test at power up). This default setting can be overridden through port or session specific selections made through the I-O PrintControl utility.

6. At this point you should install the I-O PrintControl software in preparation to configuring the I-O Print Server for the LAN protocols of your choice.

2.2 I-O Configuration Utility and PrintControl Installation

2.2.1 I-O Configuration Utility Installation

The I-O Configuration Utility is an enhanced version of the older I-O PrintControl utility. The I-O Configuration Utility will perform all the same functions as the older PrintControl, but includes the capability of configuring other IBM host to LAN devices such as IP controllers and thin clients.

It is recommended that the I-O Configuration Utility be used. Backward support for print servers with older firmware versions has been included back to V1.36. If there are print servers in your network with versions prior to V1.36, then the older I-O PrintControl utility will need to be run. Note that the I-O PrintControl Utility will no longer be upgraded and support for it has been frozen.

The I-O Configuration Utility runs under Windows 95/98/Me, Nt/200/XP. Before you begin, make sure your PC is attached to the same LAN segment as the I-O Print Server and has at least 2 MB of disk space available. The PC will have to be able to communicate to other network devices via TCP/IP.

1. Insert the CD containing the I-O Configuration Utility into your PC's CD-ROM drive.

2. An installation menu will appear. If not, click **Start**, and then select **Run**. Type **d:\autorun** then press **Enter** (d: is your CD-ROM).

3. Follow the instructions that appear on your computer screen during the installation process. The installation will create a group for I-O Configuration Utility.

Refer to the I-O Configuration Utility | Help menu option for specific information on using the utility.

2.2.2 I-O PrintControl Installation

The I-O PrintControl utility has been replaced by the I-O Configuration Utility. The software has been frozen and no new changes will be released for the I-O PrintControl utility. It is recommended that the I-O Configuration Utility be used. Backward support for print servers with older firmware versions has been included back to V1.36. If there are print servers in your network with versions prior to V1.36, it is recommended that they be upgraded. If you prefer to continue to run them with the earlier versions, then the older I-O PrintControl utility will need to be run.

I-O PrintControl is a utility that runs under Windows 3.1, 95/98/Me, NT/2000. Before you begin, make sure your PC is attached to the same LAN segment as the I-O Print Server and has at least 2 MB of disk space available. Also, the PC will have to be able to communicate to other network devices via TCP/IP or IPX/SPX.

1. Insert the CD or floppy containing the I-O PrintControl utility into your PC's CD-ROM or floppy drive.

2. If you are installing I-O PrintControl on a Windows 3.x or Windows NT 3.x PC, click **File** in the Program Manager, then select **Run**.

3. If you are installing I-O PrintControl on a Windows 95/98 or Windows 2000/XP PC and the autorun feature has been disabled, click **Start**, and then select **Run**. Otherwise, the PC will automatically load the I-O startup menu (then go on to step 4 below)

4. Type **d:\autorun** then press **Enter** (d: is your CD-ROM) or **a:\setup** (a: is your floppy drive).

5. Follow the instructions that appear on your computer screen during the installation process.

The installation creates a separate group for I-O PrintControl. The icon for the I-O PrintControl utility and a help file will appear in the group.

2.3 Using I-O Configuration or PrintControl Utility

The I-O Configuration Utility and the PrintControl can be used to configure, monitor, and reset I-O Print Server. Additional functions include downloading of firmware upgrades to the print server and the restoring of factory defaults. The utilities use the TCP/IP protocol to communicate to the I-O Print Server on the network. Make certain that the PC the utility is installed on supports TCP/IP.

It is recommended that the I-O Configuration Utility be used. Backward support for print servers with older firmware versions has been included back to V1.36. If there are print servers in your network with versions prior to V1.36, it is recommended that they be upgraded. If you prefer to continue to run them with the earlier versions, then the older I-O PrintControl utility will need to be run. Note that the I-O Print Control Utility will no longer be upgraded and support for it has been frozen.

Note: Reference and instructions used throughout this user's guide refer to and are written for the PrintControl utility. The process is similar for the I-O Configuration Utility.

2.4 Where To Now...

From the list below, select the protocol(s) your LAN environment is using and skip to the appropriate configuration section(s):

After you have completed the configuration of these protocols, go to either *Chapter 7 - IBM AS/400 SCS Printing, Chapter 8 - IBM Mainframe SCS/DSC printing* or *Chapter 9 - IBM IPDS Printing* to identify the target printer types, configure the IBM emulation types, select the SCS and IPDS printing options, set up custom finishing profiles, etc.

2.4.1 Protocol Descriptions for IBM Host Printing

TN5250e is IBM's newest TCP/IP printing protocol and I-O's recommended method of TCP/IP printing. This protocol is one of the easiest to use because the AS/400 will auto-configure a 3812-1-page printer with the IP address and printer

name you set up in I-O Configuration Utility. Both laser and dot matrix printers may be attached to the I-O Print Server because I-O also includes a 3812-1 to dot-matrix conversion.

TN3270e is a native TCP/IP printing protocol for the IBM mainframe systems. Both laser and dot-matrix printers may be attached to the I-O Enterprise Print Server. The IBM mainframe host will recognize a printer attached by TN3270e as an IBM 3287-type printer and will query the I-O Print Server for the printer capabilities that the print server emulates. Configuration on the IBM mainframe host is performed manually.

AnyNet is IBM's implementation of SNA encapsulated in TCP/IP. As SNA is not a routable protocol, IBM encapsulated SNA in TCP/IP to provide routability. Configuration is more complex and time consuming on the AS/400 than TN5250e. AnyNet does have the advantage of the AS/400 automatically creating a device type that you setup in the I-O Configuration Utility. Also, if you are attaching a dot-matrix printer, which will be used to print on pre-printed forms and desire the AS/400's form alignment message function, you would use AnyNet or SNA.

SNA (APPC) as implemented in the I-O Print Server actually looks like an IBM 5494 Remote Controller with a printer attached. SNA is not routable, so this protocol must be used in a local installation or where DSU/CSUs are in use just as one would setup a remote site using an IBM 5495 Remote Controller. This protocol also is auto configuring.

PPR/PPD is IBM's proprietary TCP/IP protocol for print AFP/IPDS. The I-O 5435, 5435e, 5435dp, 5755e and 5772dp Print Servers will automatically accept AFP/IPDS data streams from the IBM host converting them into ASCII and PCL 5e commands (Note that only PCL 5e compatible laser printers are supported). Manual configuration of the IBM host is required for any AFP/IPDS device.

2.4.2 Protocol Descriptions for LAN Printing

IPX/SPX is Novell's LAN protocol that has been actively used in all versions of NetWare. However, true TCP/IP support has been added to NetWare (V5.x and newer) and has become the suggested protocol to use.

I-O TCP/IP DirectPort print driver is a more reliable method of Windows 95/98 peer-to-peer printing than NetBIOS. I-O Print Servers can be accessed directly from a PC running Windows 95/98 via TCP/IP by installing the I-O TCP/IP Direct™ client software on the PC. Any number of PCs can be easily configured to print directly to a printer connected via an I-O Print Server. Also, any number of I-O Print Servers may be accessed from one PC.

LPR/LPD is a generic TCP/IP printing protocol. IBM does support this protocol through the use of Host Print Transform on the AS/400. Loss of control (such as page ranges, printer messaging, etc.) is the major disadvantage of using this protocol. However, LPR/LPD is a very popular protocol with Unix systems as well as an option on Windows NT/2000 and NetWare (V5.x).

NetBIOS is a peer-to-peer printing protocol used by Windows 95/98/NT, Windows for Workgroups, and OS/2.

3 TCP/IP AS/400 PRINTING

If you have not already installed the I-O Configuration or PrintControl utility, please go back *to I-O Configuration and PrintControl Installation* (see Section 2.2) and do so now. Then proceed configuring the I-O Print Server and the hosts that you will be printing from..

After you have completed the configuration of the protocols that you will be using with your print server, go to either *Chapter 7 - IBM AS/400 SCS Printing, Chapter 8 - IBM Mainframe SCS/DSC printing or Chapter 9 - IBM IPDS Printing* to identify the target printer types, configure the IBM emulation types, select the SCS and IPDS printing options, set up custom finishing profiles, etc.

3.1 Configuring the I-O Print Server

3.1.1 Assign TCP/IP Address

After starting the I-O Configuration Utility select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the Configure button displayed in the tool bar. Follow these simple steps to Configure the I-O Print Server for TCP/IP printing.

1. On the Print Server Information tab, enter a name for this print server that will appear in the List of Devices.
2. Select TCP/IP Info tab, check the DHCP box to have the IP address assigned automatically, or if the IP address is to be assigned manually, enter the following information:

    a. Enter the TCP/IP address of the I-O Print Server.
    b. If necessary, enter the IP address for the default router and the subnet mask. If you intend to communicate remotely with the print server (for printing or configuration), the default router and subnet mask must be entered here.
    c. Enabling Dynamic Host Configuration Protocol allows for automatic assignment of the IP Address by a DHCP server on the network. The IP Address is assigned to the print server by the DHCP server on a temporary basis, and is renewed or a new address assigned periodically unless the System Administrator freezes the address in the DHCP server. If this option is checked, you will not be able to enter an IP Address, Router or Sub-net Mask.

    Note: The IBM Host requires a fixed IP Address when AnyNet, PPR/PPD or LPR/LPD protocols are used to connect the print server with the host. It is recommended that DHCP not be used with these protocols, and that the IP Address be set manually.

3. Click on the **Apply** button on the bottom of the configuration window.

3.1.2 Setup the Print Driver

Printers are attached to I-O Print Server either physically, or in the case of Gateway Print Servers, remotely via an Ethernet connection. I-O Print Servers feature up to three physical printer ports (LPT1, LPT2, COM1) or remote gateway session allowing up to three printers to be attached simultaneously. Depending on the type of printer being attached to the I-O Print Server, you may need to change the factory default settings.

For example, for parallel printers, the I-O Print Server defaults to a high-speed selection, which works well for laser and newer dot-matrix printers. However, some older printers are not able to handle the high-speed data transfer. In these cases, you would want to change the I-O Print Server's parallel port speed to a slower setting. Serial printers require that the baud rate, stop bits, and parity match. Factory defaults are 9600-baud, no parity, and 1 stop bit. In the case of Gateway Print Servers, you will need to select the protocol to communicate with the printer.

Once you have configured the physical printer ports or gateway sessions you will need to make certain selections based upon the data stream that is being sent to the I-O Print Server. A brief description is listed below with more detailed configuration information given in the respective sections of this user's guide:

- AS/400 SCS Printing: The I-O Print Server features up to three SCS sessions for AS/400 printing. Each SCS session is associated with an independent 5250 printer emulation, which can be configured by clicking on the respective button listed in this section. For example, on an I-O 5450 Print Server, you could attach a laser printer to LPT1 using 3812-1 emulation, a dot-matrix printer on LPT2 using 4214 emulation, and a specialty bar code printer on COM1 using 5256 emulation. SCS sessions are linked to the I-O Print Server's physical ports in the following manner: SCS1 to LPT1, SCS2 to LPT2, SCS3 to COM1

- IPDS/AFP Printing: Certain I-O Print Servers support IPDS/AFP printing for PCL5/5e printers via TCP/IP (using PPR/PPD). Click on the AFP1 button to configure the IPDS/AFP parameters.

- TCP/IP Logical Port Configuration: The I-O Print Server features up to three TCP/IP Logical Ports that can be used for additional filtering of LPR/LPD data streams. Each TCP\IP port can be configured by clicking on the respective button listed in this section.

  TCP/IP logical ports are linked to the print server's physical ports in the following manner: TCP1 to LPT1, TCP2 to LPT2, TCP3 to COM1.

3.1.2.1 Configure Physical Ports

To configure the I-O Print Server's physical ports, follow these steps:

1. On the list of print servers, highlight the desired print server, then double click on that print server.

2. Click on the Printer Ports tab.

3. Click on the **LPT1, LPT2, or COM1** button.

4. For LPT1 and/or LPT2:
   a. Click on the check box to either select or deselect the printing of the configuration report that occurs when the I-O Print Server is powered up or when reset.
   b. Using the Port Speed drop down box, select the speed of the parallel port desired.

5. For COM1:

   a. Click on the check box to either select or deselect the print of the configuration report that occurs when the I-O Print Server is powered up or when reset. On the I-O 5431 BarCode Print Server, the factory default for this box is not checked.
   b. Using the drop down boxes, select the baud rate, the length/parity, and the stop bits.

6. Click on the **Apply** button on the bottom of the configuration window. Then Exit the Configuration Utility.

3.1.2.2 Configure LAN attached Printers (for Gateway Print Servers)

The Gateway Print Server receives from the host either IPDS or SCS data and converts it into ASCII. The printer server then sends the converted IPDS or SCS data to one, two or three printers connected to an Ethernet link. As an alternate, one printer may be directly attached to the Gateway Print Server using a parallel cable with up to two additional printers attached via Ethernet.

Connection to Ethernet attached printers is done via TCP/IP using one of two protocols, Port 9100 or SMB. The SMB protocol follows the CIFS V1.0 variation.

When using Port 9100, the setup process of the Gateway Print Server is as simple as specifying the IP address of the target printer.

When using SMB, more information is required. The Gateway Print Server must be given a NetBIOS name. The target printer must be identified by either an IP address and share name or a NetBIOS name and share name. When the NetBIOS name is used, the IP address of a WINS server may be required to provide name resolution functionality. (A WINS server keeps track of varying IP addresses where static device names are assigned and used.) In essence a printer that connects using SMB mimics a PC with a printer attached. The Printer's TCP/IP Address or Server Name is equivalent to the PS's IP address or name. The Printer's Share Name is equivalent to the name of the printer as found in the Windows Start | Setting | Printers group.

To configure the I-O Gateway Print Server to communicate to its targeted printers, follow these steps:

1. On the List of Devices, highlight and then double-click on the desired print server.
2. Click on the **Gateway** Settings tab.
3. For Session 1, click the radio button for type of protocol that will be used for communicating with the targeted LAN-attached printer.
   - 9100 is the most common protocol that is used by laser printer network interfaces today (such as Hp’s JetDirect cards and Canon imageRUNNER 7200/8500/105 digital printers).
   - SMB is used by a limited number of manufacturers (such as Canon in their imageRUNNER 330/400/550/600/60 series digital printers.)
   - LPT1 is also available so that a printer can be locally attached to the Gateway Print Server.
4. Click the **Session 1 Configuration** button.
   a. For Port 9100, enter the TCP/IP address of the targeted LAN-attached printer. Click OK.
   b. For SMB, enter the following, than click OK:
      - Printer's TCP/IP Address or Server Name: Enter the IP address or NetBIOS name of the target printer (sometimes called the SMB server). If using the target printer's Server Name, a WINS Server IP address will need to be entered in the SMB Options for Print Server area (see step 6) if this Gateway Print Server and the target printer are not located within the same local subnet.
      - Share Name: Enter the NetBIOS name of the target printer. This is a required field.
5. If additional LAN-attached printers are to be configured, repeat steps 3 and 4. If session is not going to be used, click the "Not Used" radio button.
6. If SMB was selected for any of these sessions, in the SMB Options for Print Server section, enter the following:
   - Print Server NetBIOS Name: Enter the NetBIOS name that this Gateway Print Server will be identified as. This name must be unique in the network. This is a required field.
   - WINS Server IP Address: Enter the IP address of the Microsoft WINS server. Required only when the target printer's NetBIOS name is used in lieu of the target printer's IP address and if this Gateway Print Server and the target printer are not located within the same local subnet. This address must be the same for all sessions that use SMB to connect to the target printer.
7. Click the **Apply** button on the bottom of the configuration window. Then Exit the Configuration Utility.

Note: For optimum IPDS through-put, only one print session should be active. The more print sessions that are running concurrently, the slower the output to a specific printer will be. Keep Ethernet traffic to a minimum by locating the target printer and the Gateway Print Server on an Ethernet link of their own. The priority of print jobs on the IBM host may also need to be adjusted so pauses in sending out the IPDS/SCS data stream will be shortened or eliminated.

3.1.3 Verify Correct Installation

From the command line (or DOS prompt) of a TCP/IP enabled host, type

ping <TCP/IP address of I-O Print Server>.

If you are getting responses, your configuration of the I-O Print Server has been successful.

3.1.4 Configuring an I-O Print Server on a Remote TCP/IP Subnet

The I-O PrintControl utility can also change the configuration of an I-O Print Server that is located on a remote TCP/IP subnet. The I-O Print Server must initially be configured with an IP address from a PC running PrintControl that is located within the same TCP/IP subnet as the print server. After this step is completed, the I-O Print Server may be moved to a remote location.

There are two ways to change the configuration of an I-O Print Server that is located on a remote TCP/IP subnet. The first is to have the exact IP address of the print server.

The second is to scan the remote TCP/IP subnet where the I-O Print Server is located. To do this, you will need to have the "subnet mask" and an IP address of any device on that subnet (the device does not have to be an I-O Print Server). Obtain this information from your network manager. With these two pieces of addressing information, the PrintControl utility can scan the remote TCP/IP subnet and find all I-O Print Servers on that subnet.

The following steps will guide you through selecting a remotely or locally attached I-O Print Server:

1. From the menu bar on the List of Devices screen, select the **VIEW** option.

2. Select the **SCAN**... option.

   - To scan for a specific I-O Print Server located on a remote TCP/IP subnet:

     a. Check the radio button to the left of the **"Scan for a Single Print Server"** option.

     b. Enter the IP address of the I-O Print Server in the "IP Address" field. You may view the last eight addresses entered in this field by clicking on the down arrow. If the desired IP address is listed, click on that entry.

     c. Click Scan.

   - To scan a remote TCP/IP subnet for all I-O Print Servers located on that subnet:

     a. Check the radio button to the left of the "**Scan a Remote Subnet**".

     b. Enter the address of any device in the remote TCP/IP subnet in the "IP Address" field. You may view the last eight addresses entered in this field by clicking on the down arrow. If the desired IP address is listed, click on that entry.

     c. Enter the remote TCP/IP subnet mask in the "Remote Subnet Mask" field. You may view the last eight subnet mask entries made in this field by clicking on the down arrow. If the desired subnet mask is listed, click on that entry.

     d. Click Scan.

   - To scan for all I-O Print Servers located on the local subnet:

a. Check the radio button to the left of the "**Scan the local subnet**" option.

b. Click Scan.

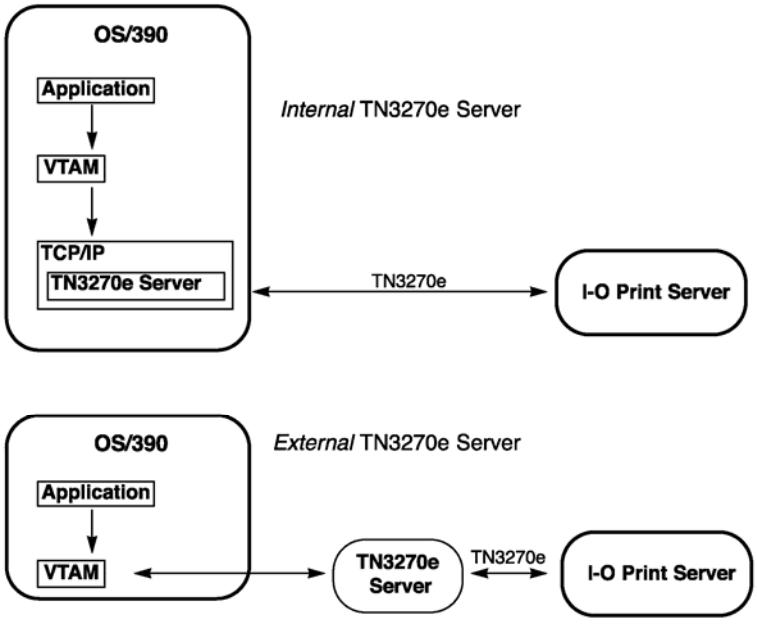
3. Once you have made a selection of scanning the local subnet, a remote TCP/IP subnet, or for a specific I-O Print Server, pressing the Scan button on the button bar will refresh the listing of I-O Print Server(s). From here, you can double click on the desired print server or clicking on the Configure button to view or change the highlighted print server's configuration.

3.1.5 Where to Now…

You are now ready to configure the host(s). From here go to the appropriate section for each host to be configured.

3.2 Configuring the IBM Mainframe for TN3270e

The I-O Enterprise Print Server communicates to the IBM mainframe via TCP/IP using the TN3270e protocol. TN3270e is an extension of the Telnet display protocol. IBM has limited to types of printers that can be configured in TN3270e to one type - a 3287. Connection to the IBM mainframe is accomplished through a TN3270e server. The TN3270e server can be either internal to the IBM mainframe or externally attached, such as a channel or LAN-attached gateway. The I-O Enterprise Print Server then accepts LU1/LU3 (SCS/DSC) data from the IBM mainframe application through TCP/IP (TN3270e). Printer messages are returned through the same TN3270e link.



Refer to the appropriate IBM mainframe and TN3270e server documentation for configuration instructions, such as *OS/390 Communication Server - IP Configuration Guide* # SC31-8725-001.

In general, configuring the IBM mainframe to print to an I-O Enterprise Print Server is the same as configuring for a new TN3270e printer. The VTAM TCP/IP profiles are modified to indicate the Telnet device, the printer group name, the IP address group, and the printer map. JES is then modified to include the I-O Enterprise Print Server destination id and description. Lastly the mainframes print application, such as JES23X or VPS, is configured for the remote printer.

When configuring the printer device on the 3270 host, it is recommended that the CKPTPAGE value be set to a value of "10" or lower. This configuration option controls how many pages are transmitted from the host to the 3270 SCS Printer Emulation session before the host sends the actual print instruction. If the value is too large, loss of data could occur.

Once you have assigned a TCP/IP address to the I-O Enterprise Print Server and verified the address (see section 3.1.1), go to *Chapter 8 - IBM Mainframe SCS/DSC Printing* to continue the configuration of the I-O Print Server.

3.3 Configuring for IPDS Printing

Once you have assigned a TCP/IP address and verified the address (see section 3.1.1), go *to Chapter 9 – IBM IPDS Printing* to continue the configuration of both the IPDS-enabled I-O Print Server (such as the I-O 5435 AFP/IPDS Print Server) and the AS/400 or IBM mainframe system.

3.4 Configuring OS/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 Print Servers to include the same laser and dot-matrix printer emulations as are used in all I-O printer emulation products. The host AS/400 sees a TN5250e printer as a 3812 page printer, yet I-O's 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 other TCP/IP printing processes (LPR/LPD and AnyNet). 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 a twinax-attached printer.

3.4.1 Configuring the AS/400

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

- Be running OS/400 V3R2 or newer,
- Have the most recent version of Client Access installed on the AS/400 (Client Access for Windows 95/NT V3R1M3 or newer, or Client Access Enhanced for Windows 3.1 V3R1),
- Have the most recent version of the Telnet server installed (See Appendix D for a list of the required PTFs).
- Have the AS/400's auto configuration function turned on.

- Make certain that the AS/400 can create virtual devices and that there is 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 will automatically configure TN5250e printer devices as 3812 printers.

3.4.2 Configuring the I-O Print Server for TN5250e Printing

1. After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. (Only those I-O Print Servers located on the same LAN segment as the PC where the I-O PrintControl utility is running are seen in the list.) I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

2. Open the configuration dialog box by double clicking on the desired I-O Print Server or by highlighting the desired I-O Print Server and then pressing the Configure button displayed in the tool bar.

3. If the I-O Print Server already has an IP address, proceed directly with step 4. Otherwise, follow these instructions:
   a. Select **TCP/IP** by checking the white box in front of that selection. The right column titled "Object Information" will display the available configuration parameters.

   b. Enter the I-O Print Server **IP Address**

   c. If necessary enter the IP address for the default router and sub-net mask. You may need to get this from your system administrator.

4. Select **TN5250e** by checking the white box in front of that selection in the left column of the I-O PrintControl configuration screen. The right column titled "Object Information" will display the available configuration parameters.

5. The I-O Print Server supports up to 10 IBM hosts. Enter the **Host IP Address** (see your system administrator for this address). A host may not be entered more than one time.

6. In the **Type** field, select the type of IBM host by clicking on the drop down arrow and high lighting the type of host.

7. Click on the **Printer** button to display the **Printer Device Names** screen. The I-O Print Server supports an individual TN5250e printer session for each attached printer. Click on the box for each printer that is attached and enter a printer name (maximum of 8 characters). I-O 5450, 5450e, 5755e and 5755dp Print Servers support up to three printers, all other models support only one printer.

   When the I-O Print Server is reset, the AS/400 will automatically configure a printer device for each attached printer that has been selected and named here.

The printer must be in the “ready” mode for this auto-configuration to occur.

If the printer name is left blank, the host AS/400 will still automatically 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 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.

8. The I-O Print Server will automatically restart a TN5250e printer session on the AS/400 whenever any of the attached printers are powered on. However, at times it may be advantageous to restart a TN5250e printer session while leaving other protocols uninterrupted. This can be accomplished by clicking on the **Restart Now** button.

9. To ensure continued communication with the AS/400 host, the I-O Print Server can be configured to periodically contact the host and attempt to re-establish TN5250e sessions if required. Clicking on the Options button sets these options.

   a. The automatic restarting of a TN5250e session when a printer is powered on is checked by default and cannot be changed. The I-O Print Server will always restart TN5250 sessions when an attached printer is powered on.

   b. You may select to have the I-O Print Server **restart sessions every five minutes** that have been terminated by the AS/400 by checking the box to the left of this option.

   c. You may also set the I-O Print Server to **restart sessions only upon receiving a TCP/IP PING command** by checking the box to the left of this option. The PING can come from any other device with an IP address or from a specific AS/400 by entering the desired host’s IP address in the address field. Leave this field as 0.0.0.0 if you do not want to select a specific host.

   d. The I-O Print Server reports the success or failure of an attempt to communicate with the AS/400 by **printing a brief connection status message** on each attached printer.
   For a description of the connection status message, see TN5250e Printing in *Chapter 9 - Trouble Shooting*.
   Printing of these status messages can be disabled in order to save paper or to preserve alignment of continuous forms. Checking the box to the left of this option will turn this option off.

   e. After setting these options, click on the **Return** button.

10. Set up any other protocols desired, then click on the **Apply Changes** button, and exit the PrintControl utility.

3.5 Configuring OS/400 for AnyNet

AnyNet is an IBM gateway technology that allows any application to run over any networking protocol. I-O's implementation of AnyNet allows printing of SNA (APPC) data over TCP/IP, giving users the security and functionality of SNA (APPC) as well as the routability and easy-of-use of the popular TCP/IP protocol.

Proceed with the following steps to configure the I-O Print Server and your AS/400 for AnyNet printing:

3.5.1 AnyNet Configuration Worksheet

As you configure the AS/400 and later the I-O Print Server, you will be asked to supply various names and parameters. To make the process easier, you should retrieve or decide on the information now. Before you proceed, you should enter the requested names and parameters in the following worksheet:

1. *Host Network ID:* _____
   The AS/400's network ID can be retrieved from the network attributes listing: On the AS/400 command line type **DSPNETA** (Display Network Attributes). Press **<Enter>**. The Host Network ID is listed as the **Local network ID**.

2. *Host Control Point Name:* _____
   The AS/400's control point name can be retrieved from the network attributes listing. On the AS/400 command line type, **DSPNETA** (Display Network Attributes) and press **<Enter>**. The Host Control Point Name is listed as the **Local control point name**. While in the DSPNETA screen, page down to the third page and verify that the field **Allow AnyNet** support is set to *YES. If set to *NO, see Section 3.5.2.1.

3. *I-O Print Server Name:* _____
   Choose a unique name to assign to the I-O Print Server later. This name must comply with the following requirements:
   A. This name must be unique to the AS/400
   B. The name must be no longer than 8 characters.
   C. The name must start with an alpha character (A-Z).
   D. The name must consist of the characters A-Z, a-z or 0-9. Spaces, underscores, slashes, etc. are not accepted.
   E. The first four characters should uniquely identify the device, since the I-O Print Server will automatically create printer devices on your AS/400 using the first four characters of the name you assigned to the I-O Print Server followed by PRTXX.

4. *AS/400 TCP/IP Address:* _____
   The AS/400's TCP/IP address can be retrieved by typing at the AS/400 command line, **CFGTCP** and pressing **<Enter>**. Then select option **1 Work with TCP/IP interfaces**. The correct address for the AS400 will have a line type of *ELAN.

5. *I-O Print Server TCP/IP Address:* _____
   Choose a unique IP address to assign to the I-O Print Server. At the AS400 command line type **CFGTCP** and press **<Enter>**. Choose option **10 Work with TCP/IP host table entries**. Verify Host Name is in the format*: I-OPrintServerName.HostNetworkID.SNA.IBM.COM* (for example: IO5450PS.APPN.SNA.IBM.COM). To create a new IP address or change the host name see section 3.5.2.2

6. *AnyNet Controller Name:* _____
   If you already have an AnyNet Controller defined on your AS/400 and plan to use the I-O Print Server under this controller, enter the AnyNet controller name in the worksheet space above. To check for the name of the AnyNet controller, type at the command line **WRKCFGSTS** then press **F4**. The type is ***CTL** and the Configuration description should be ***APPC**. Press **<Enter>** twice and you will see all the APPC controllers on your system. If you are unsure of the name of the AnyNet controller, you will need to display each controller. To display a controller, type an "**8**" in front of each controller and press **<Enter>**. Then enter a "5" to display the controller and find the one with the link type of ***Anynw**.

   If there is not an AnyNet controller already configured on the AS/400, you will have to create one.

If you are not following I-O's recommended method of using only one AnyNet controller for all your AnyNet devices (including I-O Print Servers), the AnyNet controller name and the AnyNet remote control name must be different from the I-O Print Server Name. If your AS/400 is using more than 254 AnyNet devices, you should configure one AnyNet controller for every I-O Print Server. In this case, the name of the AnyNet controller and the AnyNet remote control point must be the same as the I-O Print Server Name. The AnyNet Controller Name can be up to 10 characters long. See Section 3.5.2.4.

7. *AnyNet Remote Control Point Name:* _____
   If you already have an AnyNet Controller defined on your AS/400 and plan to use the I-O Print Server under this controller, do the following: On the AS/400 command line, type **WRKCTLD** and press **<Enter>**. Locate the AnyNet Controller, enter the value "**5**" in front of that controller and press **<Enter>.** Locate the **Remote Control Point** and enter the value in the worksheet space above. Otherwise, if you are not following I-O's recommended method of using only one AnyNet controller for all your AnyNet devices (including I-O Print Servers) and you are creating a new AnyNet controller, the *AnyNet Remote Control Point Name* should be different *from the I-O Print Server Name.*

   If your AS/400 supports more than 254 AnyNet devices, you should configure one AnyNet controller for every I-O Print Server. In this case, the *AnyNet Remote Control Point Name* should be the same as the *I-O Print Server Name.*

3.5.2 Configuring the AS/400 (AnyNet)

Before proceeding with these instructions, make sure that the AS/400's system values for Qautocfg is on, Qautormt is on, and Qautovrt is large enough for additional devices to be created. (See 3.4.1)

3.5.2.1 Changing the AS/400's Network Attribute

To allow AnyNet communication from your AS/400, the *Allow AnyNet Support* option must be set to *Yes. You may want to check the current setting first by executing the **DSPNETA** command and then scrolling to the last page of the available parameters. If the value is set to *No, return to the command prompt (CMD3) and enter the following:

CHGNETA ALWANYNET (*YES)

3.5.2.2 Adding the I-O Print Server to the AS/400 TCP/IP Host Table

1. On your AS/400's command line, type "**CFGTCP**" to enter the configure TCP/IP menu.

2. Select **10 Work with TCP/IP host table entries**. Scroll down and make sure there are no duplicate I-O Print Server addresses.

3. Place a "**1**" in front of the blank line on top of the list to add another TCP/IP device. Press **<Enter>**.

4. Enter the *I-O Print Server TCP/IP* address in the **Internet address** field.

5. Under **Host names: Name...** enter the following: *I-O Print Server Name.Host Network ID.SNA.IBM.COM* (for example: IO5450PS.APPN.SNA.IBM.COM)

6. If you wish, you may enter an additional description for the I-O Print Server in the **Text description** field.

7. Press **<Enter>**.

3.5.2.3 Creating an AnyNet Controller

I-O's recommended method for configuring the I-O Print Server is to have only one AnyNet APPC controller on the AS/400. However, this method is limited to attaching a maximum of 254 AnyNet devices (including the I-O Print Server). If you are using more than 254 AnyNet devices, you should skip to the section *Creating one AnyNet Controller for each I-O Print Server* below. Otherwise proceed with these instructions:

1. If you already have an AnyNet Controller defined on your AS/400 skip to step 2. Otherwise, type the following on the AS/400 command prompt:

   CRTCTLAPPC CTLD (AnyNet Controller Name) **LINKTYPE**
   (*ANYNW)
   RMTCPNAME (AnyNet Remote Control Point Name) **RMTNETID**
   (*NETATR)

   Press **<Enter>.**

2. **Vary On** the AnyNet controller by typing the following on the AS/400 command prompt:

   WRKCFGSTS *CTL AnyNet Controller Name
   Press **<Enter>.**

3. Type a "**1**" in front of the APPC controller and press **<Enter>**.

3.5.2.4 Alternate Method: Creating one AnyNet Controller for each I-O Print Server

It is possible to create an individual AnyNet controller for every I-O Print Server installed. However, this approach can be confusing since any programmable AnyNet APPC device (and the printers attached to the I-O Print Server will fall into this category) will randomly configure under the different APPC controllers. Although this does not affect operation, it does make it more difficult to locate and administer the various AnyNet APPC devices.

To create an AnyNet controller specifically for the I-O Print Server type the following on the AS/400 command prompt**: CRTCTLAPPC CTLD** (I-O Print Server Name**) LINKTYPE (*ANYNW) RMTCPNAME** (I-O Print Server Name) **RMTNETID (*NETATR)**
Press **<Enter>.**

3.5.2.5 Changing the AS/400's APPN Remote Configuration List

When using I-O's recommended method of just one AnyNet APPC controller for all AnyNet APPC devices, each I-O Print Server needs to be added to the AS/400's APPN remote configuration list. To accomplish this, follow these steps:

1. On the AS/400 command prompt, type

   CHGCFGL *APPNRMT
   Press **<Enter>.**

2. Scroll to the bottom of the displayed list and enter the requested parameters. Refer to the worksheet for the needed information. The other parameters are optional. Press <**Enter**> when done.

Item number from worksheet	AS/400 Value	What to Use
3	Remote Location	I-O Print Server Name
1	Remote Network ID	Host Network ID
2	Local Location	Host Control Point Name
7	Remote Control Point	AnyNet Remote Control Point Name
1	Control Point Net ID	Host Network ID

3.5.3 Configuring the I-O Print Server for AnyNet Printing

1. After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server, as well as on the self-test print out.

2. Open the configuration dialog box by double clicking on the desired I-O Print Server or by highlighting the desired I-O Print Server and then pressing the **Configure** button displayed in the tool bar.

3. If the I-O Print Server already has an IP address, proceed directly with step 4. Otherwise, follow these instructions:

   a. Select **TCP/IP** by clicking on the white box in front of that selection. The right column titled “Object Information” will display the available configuration parameters.

   b. Enter the **I-O Print Server IP address** (see worksheet).

   c. If necessary, enter the IP address for the default router and the subnet mask. You may need to get this from the system administrator.

4. Select **AS/400 AnyNet** by clicking on the white box in front of that selection in the left column of the I-O PrintControl configuration screen.

5. The right column titled “Object Information” will display the available configuration parameters (see worksheet).

   a. In the field titled “AS/400 IP Address” enter the **AS/400's TCP/IP address**. Make sure to use the format specified in the field (XXX.XXX.XXX.XXX; e.g. 128.0.1.12)

   b. Enter the **Host Network ID**.

   c. Enter the **Host Control Point Name**.

   d. In the field titled “Interface Control Point Name” enter the **I-O Print Server Name**.

6. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window and **reset** the I-O Print Server. Then **Exit** the PrintControl utility.

7. The I-O Print Server will now automatically create the following devices on your AS/400:

   - A 5494 Controller with the first five characters of the "Interface Control Point" name followed by the identifier RMT.

   - A printer device for every printer that was attached to the I-O Print Server at the time the new configuration was sent to the I-O Print Server or when the I-O Print Server was last reset. Names for the printer devices are actually given by the AS/400 system and follow this format:

     ABCDPRTXX

     where

     ABCD are the first four characters of the "Interface Control Point";

     PRT is a fixed identifier for printers;

XX identifies the printer(s) that was(were) actually attached to the I-O Print Server at the time the SNA (APPC) configuration was applied to the I-O Print Server or at the time the I-O Print Server was last reset. XX identifies the printer(s) attached to the I-O Print Server in the following manner:

XX-Value	Printer Attached to I-O Printer Server physical port or Gateway Session	Corresponding logical port with 5250 Printer session
00	LPT1 or Session 1	SCS1
01	LPT2 or Session 2	SCS2
02	COM1 or Session 3	SCS3

3.6 Configuring OS/400 for LPR/LPD

Printing from your AS/400 via TCP/IP can be done using an industry standard mechanism called Line Printer Requester/Line Printer Daemon (LPR/LPD). However, since only an OUTQUE and not an actual DEVICE is created on the AS/400, this printing mechanism lacks the level of control inherent to SNA printing and is more difficult to implement. Basic functions like printing multiple copies, page ranges, and printer error reporting are not supported.

There are two ways to print data from the AS/400. The first approach uses an AS/400 feature called Host Print Transform to convert EBCDIC data into ASCII and then sending it to the LAN printer. This method utilizes precious AS/400 CPU cycles that could impact the overall performance of the host system, especially when large numbers of documents and reports need to be converted. Also, I-O Corporation does not offer customer support for problems associated with the use of IBM's Host Print Transform.

The second approach is to have the I-O Print Server do the conversion. The I-O Print Server's powerful RISC processor can off load EBCDIC-ASCII conversion from the AS/400 and to assure that the attached printers print at their rated speed.

Follow these steps to configure the AS/400 for LPR/LPD printing. If you haven't already done so, refer *to Configuring the I-O Print Server* (section 3.1) to assign an IP address to the I-O Print Server.

3.6.1 Adding the I-O Print Server to the AS/400 TCP/IP Host Table

1. On your AS/400's command line, type **go tcpadm** to enter the TCP/IP Administration menu.

2. Select 1. **Configure TCP/IP**.

3. Select **10**. **Work with TCP/IP host table entries**.

4. Place a **1** in front of the blank line on top of the list to add another TCP/IP device. Press <**Enter**>.

5. Enter the **IP address** you assigned to the I-O Print Server in the section "Configuring the I-O Print Server (see section 3.1) in the **Internet address** field.

6. Under **Host names: Name...** enter a name for the I-O Print Server.

7. If you wish, you may enter an additional description for the I-O Print Server in the **Text 'description'** field.

8. Press <**Enter**>.

3.6.2 Creating a Remote OUTQUE

1. On your AS/400's command line type **crtoutq**.

2. Enter a name for the **Output queue** and for the **Library**.

3. In the **Remote system** field enter the name you assigned to the I-O Print Server when adding it to the TCP/IP host table (see step 6 above). Press **F10** to display additional parameters.

4. In the **Remote printer queue** field enter the name of the I-O Print Server's logical port. Use the table below to determine the proper logical port.

If your printer is attached to this physical port or Gateway Session of the I-O Print Server	... enter the name of this logical port in the Remote printer queue field
LPT1 or Session 1	SCS1
LPT2 or Session 2	SCS2
COM1 or Session 3	SCS3

Note: If you are planning to use the AS/400 Host Print Transform utility or a third party EBCDIC-ASCII conversion program, the remote printer queue is one of the TCP/IP logical ports (TCP1/TCP2/TCP3).

5. Scroll to the next screen and specify:
   Connection type.. > *IP
   Destination type.. > *OTHER

6. Press <**Enter**>.

7. We recommend you select **Host print transform >*NO**. This will allow you to take advantage of the I-O Print Server's printer emulations and off load the host from any unnecessary conversion processing.

8. Press <**Enter**>.

3.6.3 Start the Remote Writer

On the AS/400's command line type "**strrmtwtr outq_name**", where outq_name is the name you assigned to the outque (see step 2 above).

3.6.4 Printing from the AS/400 via LPR/LPD

To print from the AS/400 send your print jobs to the newly created OUTQ. This can be done by modifying the user profiles of those individuals who will be using the printer(s). Type the following on the AS/400's command line:

CHGUSRPRF USRPRF(user_name) OUTQ(library/outq_name)

where

user_name	is the name of the user whose profile you want to change.
library	is the name of the library where the new outq is stored.
outq_name	is the name of the new outque you created above.

Alternately, you may want to change or create a new Job Description and then have the user profile make use of that description. Type the following on the AS/400's command line:

CHGJOBD JOBD(job_name) OUTQ(library/outq_name)

where

job_name	is the name of the job you want to change.
library	is the name of the library where the new outq is stored.
outq_name	is the name of the new outq you created above.

In either case, the AS/400 must have a valid printer device description to format the print data properly. In the User Profile, the Job Description of the Office Vision Print Options menu you should specify a printer device description of an existing, similar printer in your AS/400 network. The printer device whose description you are "borrowing" can be attached in a myriad of ways (twinax, remote, LAN,...). It may be a printer that doesn't even physically exist.

It is important that the AS/400 recognizes the printer description as valid and that the "borrowed" printer device description is of the same type as the IBM printer emulation you are running on the I-O Print Server (i.e. IBM 3812, 4214, 5224, 5225, 5256). The AS/400 will use this device description to format the print job properly and then use the OUTQ to route it to the right printer.

If you haven't already done so, you should review the default 5250 print parameters and modify them if necessary. Refer to "Self-Test" for information on how to print a self-test showing the active parameters and section 7 **"IBM Printer Emulations"** for information on the different 5250 print parameters.

3.7 I-O TCP/IP DirectPort™ Printing for Windows 95/98

The I-O TCP/IP DirectPort print river is a more reliable method of Windows 95/98 peer-to-peer printing than NetBIOS. I-O Print Servers can be accessed directly from a PC running Windows 95/98 via TCP/IP by installing the I-O TCP/IP DirectPort client software on the PC. Any number of PCs can be easily configured to print directly to a printer connected via an I-O Print Server. Also, any number of I-O Print Servers may be accessed from one PC.

3.7.1 I-O TCP/IP DirectPort Installation

To install the I-O TCP/IP DirectPort print driver for Windows 95/98, follow these simple steps:

1. Insert the CD or floppy containing the I-O TCP/IP DirectPort utility in the PC's CD-ROM or floppy drive.

2. If installing from a CD and the autorun feature is active, the CD will automatically load the I-O Startup Menu. If the autorun feature has been disabled, click **Start**, select **Run**, type **d:\autorun** (d: represents the drive letter for your CD-ROM drive), then press **Enter**.

   If installing from a floppy drive, click **Start**, select **Run**, type **a:\setup.exe** (a: represents the drive letter of your floppy drive), then press **Enter**.

3. Follow the instructions that appear on your computer screen during the installation process. During this installation process, you will be given the opportunity to either accept the suggested I-O TCP/IP DirectPort peer-to-peer printer port name (IPPort1) or enter a name of your choice. Remember this name as you will need it to complete the configuration process.

3.7.2 Selecting DirectPort Printing

To access a printer attached to a I-O Print Server using the I-O TCP/IP DirectPort print driver, you may either add a new printer to your Windows 95/98 system, or reconfigure an existing printer to use the I-O TCP/IP DirectPort print driver.

To add a new printer, follow these steps:

1. Click on **Start**, select **Settings**, and then go to **Printers**.

2. Click on the **Add Printer Wizard** icon. Follow the normal Windows process to add a **local** printer. Select the brand and type of printer attached to the I-O Print Server.

3. When the screen appears giving you a listing of the available ports, select **IPPort1 I-O TCP/IP DirectPort** (or the port name you choose during the DirectPort installation process).

4. Click on the **Configure Port**… button.

5. On the Port Configuration screen, enter the TCP/IP address of the I-O Print Server in the **IP Address** field.

6. Select the physical port that the printer is attached to on the I-O Print Server:

   a. If your I-O Print Server is a single-parallel printer model, verify that **LPT1** appears in the **Select Device Port…** field. If not click on the **Select Device Port>>** button, and select **LPT1**.
   b. If your printer is a serial printer, click on the **Select Device Port>>** button, and select **COM1**.
   c. If you are using an I-O 5450 MPS Print Server (which supports up to three printers), you can select LPT1, LPT2, or COM1 as the physical port that the printer is attached to on the I-O Print Server.

7. Make any other desired changes to port configuration. Then click on **OK**.

8. Continue with the remainder of the Add Printer Wizard steps to complete the process.

To re-configure an already installed printer as the printer attached to an I-O Print Server for DirectPort printing, follow these steps.

1. Click on **Start**, select **Settings**, and then go to **Printers**.

2. **Right Click** on the desired printer.

3. Take the Properties option, and select the **Details** tab.

4. In the "**Print to the following port**" drop down box, select **IPPort1 (I-O TCP/IP DirectPort)** or name you gave the port during the DirectPort installation process.

5. Click on the **Port Settings…** button.

6. On the Port Configuration screen, enter the TCP/IP address of the I-O Print Server in the **IP Address** field.

7. Select the physical port that the printer is attached to on the I-O Print Server:

    a. If your I-O Print Server is a single-parallel printer model, verify that **LPT1** appears in the **Select Device Port…** field. If not click on the **Select Device Port>>** button, and select **LPT1**.
    b. If your printer is a serial printer, click on the **Select Device Port>>** button, and select **COM1**.
    c. If you are using an I-O 5450 MPS Print Server (which supports up to three printers), you can select LPT1, LPT2, or COM1 as the physical port that the printer is attached to on the I-O Print Server.

8. Make any other desired changes to port configuration. Then click on **OK**.

9. Make any other desired changes to the printer configuration. Click on **OK**, then **Apply**.

Now when you print to that specific printer, the output will be automatically redirected to the printer attached to the I-O Print Server.

3.7.3 Adding Another Printer For DirectPort Printing

To access a printer attached to another I-O Print Server or to add a second or third printer to the I-O 5450 MPS Print Server using DirectPort printing, you will need to add both a new printer and DirectPort device to your Windows 95/98 system. Do not install the I-O TCP/IP DirectPort print driver again – instead, just follow these steps:

1. Click on **Start**, select **Settings**, and then go to **Printers**.

2. Click on the **Add Printer** icon. Follow the normal Windows process to add and configure a **local** printer. Do not print a Windows test page.

3. After the printer has been added, **right click** on the printer.

4. Take the **Properties** option, and select the **Details** tab.

5. Click on the **Add Port** button.

6. Click the **Other** radio button, highlight **TCP/IP DirectPort** in the dialog box, then click **OK**.

7. On the Port Configuration screen, enter the TCP/IP address of the I-O Print Server in the **IP Address** field. If you are setting up another printer on an I-O 5450 MPS Print Server, this address will be the same as the first printer you set up during the initial port monitor installation above. Otherwise, enter the address of any other I-O Print Server.

8. Select the physical port that the printer is attached to on the I-O Print Server:

    a. If your I-O Print Server is a single-parallel printer model, verify that **LPT1** appears in the **Select Device Port…** field. If not click on the **Select Device Port>>** button, and select **LPT1**.
    b. If your printer is a serial printer, click on the **Select Device Port>>** button, and select **COM1.**

c. If you are using an I-O 5450, click on the Select Device Port>> button, and select LPT2 or COM1 identifying the physical port that the printer is attached to the I-O 5450.

9. Enter the TCP/IP DirectPort name that you would like this port to be known as in the **Name** field.

10. Make any other desired changes to port configuration. Then click on **OK**.

11. Make any other desired changes to the printer's configuration. Click on **OK**, then **Apply**.

3.7.4 Removing DirectPort from Windows 95/98

To remove the DirectPort print driver from your Windows 95/98 system, use the standard Windows **Add/Remove Programs** option from within the control panel.

Do not attempt to delete the folder that the DirectPort installation program creates. Doing so will cause the Windows Add/Remove Programs function to fail. In addition, you will not be able to reinstall the DirectPort print driver. If the DirectPort folder has been deleted, you must also delete the IOPMON.DLL file from the Windows/System directory.

3.8 Configuring Windows NT V3.x

Make sure your Windows NT workstation has the TCP/IP protocol and the TCP/IP Printing service active. If you are unsure do the following:

1. Go to the workstation's **Main** group and double-click on the **Control Panel** icon.

2. In the **Control Panel**, double-click on the **Network** icon.

3. Review the Installed Network Software list.

If the *TCP/IP protocol* and *Microsoft TCP/IP Printing* service are not found, you must add them before continuing with the instructions below. Consult your Microsoft documentation for more information.

Follow the procedures below to create printers for the I-O Print Server on a Windows NT workstation. If there is more than one printer attached to the I-O Print Server, perform this procedure once for each attached printer.

1. Go to the **Main** program group and open the **Print Manager**.

2. Go to the Print Manager's Printer menu and choose **Create Printer. . .**

3. In the Create Printer's **Printer Name** dialog box, enter a name for the printer.

4. Use the Driver pull-down list to choose a **printer driver** that matches the type of printer that you are creating on the workstation.

5. In the Description text box, enter a **description** that helps you remember the printer.

6. In the **Print to**: pull-down list, go to the bottom of the list and choose **Other. . .**

7. In the Print Destination dialog box's **Available Print Monitors** list, click on **LPR Port** and choose **OK**.

8. In the **Name or Address of host providing LPD**: text box, enter the IP address you assigned to the I-O Print Server (see section 3.1.1).

9. In the **Name of printer on that machine** text box, enter the physical or logical port of the I-O Print Server that the target printer is attached to (i.e. **LPT1, LPT2, COM1, TCP1, TCP2, TCP3**).

   Note: Selecting one of the TCP/IP logical ports will give you added configuration options, such as turning banner (header and trailer) pages off and suppressing blank pages when printing to an HP LaserJet printer.

10. Choose **OK**. The printer attached to the I-O Print Server is now available. Simply select it from your application as you would any other printer.

11. (Optional) Go to Print Manager's **Default** pull-down list and select the new printer as the workstation's default printer.

3.9 Configuring Windows NT V4.x

Make sure your Windows NT workstation has the TCP/IP protocol and the TCP/IP Printing service active. If you are unsure do the following:

A. Click on **Start**, then select **Settings** and lastly **Control Panel**.

B. Double-click on the **Network** icon and review the lists under the **Protocol** and **Services** tabs.

If the *TCP/IP protocol* and *Microsoft TCP/IP* Printing service are not found, you must add them before continuing with the instructions below. Consult your Microsoft documentation for more information.

Follow the procedures below to create printers for the I-O Print Server on a Windows NT workstation. If there is more than one printer attached to the I-O Print Server, perform this procedure once for each attached printer.

1. From the Windows NT desktop click on **Start**.

2. Select **Settings** then open the **Printer** folder.

3. Double click on the **Add Printer** icon.

4. Choose **My Computer**.

5. Select **Add Port.**

6. From the **Available Printer Ports** list double-click on **LPR Port**.

7. In the **Name or address of server LPD**: field, enter the **IP address** you assigned to the I-O Print Server (see section 3.1.1).

8. In the **Name of printer or print queue on that server**: field, enter the physical or logical port of the I-O Print Server that the target printer is attached to (i.e. **LPT1, LPT2, COM1, TCP1, TCP2, TCP3**)

   Note: Selecting one of the TCP1, TCP2 or TCP3 logical ports will give you added configuration options, such as turning banner (header and trailer) pages off and suppressing blank pages when printing to an HP LaserJet printer.

9. Click **OK** and **Close** the Printer Ports screen.

10. From **Add Printer Wizard** screen select the LPR port you just added and press **Next**.

11. Complete the remaining requests from the Windows NT Add Printer Wizard. The printer attached to the I-O Print Server is now available. Simply select it from your application as you would any other printer.

3.10 Configuring Windows 2000/XP

Make sure your Windows workstation has the TCP/IP protocol and the TCP/IP Printing service active.

If the *TCP/IP protocol* and *Microsoft TCP/IP* Printing service are not found, you must add them before continuing with the instructions below. Consult your Microsoft documentation for more information.

Follow the procedures below to create printers for the I-O Print Server on a Windows workstation. If there is more than one printer attached to the I-O Print Server, perform this procedure once for each attached printer.

(The following steps are for Windows 2000, XP steps are similar.)

1. From the Windows desktop click on **Start.**
2. Click on the **Add Printer** icon.
3. Click the **Next** button.
4. Click the **Local** printer radio button. Then click the **Next** button.
5. Click the **Create a new port** radio button. From the drop box, select **Standard TPC/IP port** option. Than click on the **Next** button.
6. Follow the instructions, and click on the **Next** button.
7. Enter the **IP Address** for the I-O Print Server in the **Printer Name or IP Address** field. In the **Port Name** field, either accept the default name created by Windows 2000, or enter a name of your choice. Then click on the **Next** button.
8. Click on the **Custom** radio button, then click on the **Setting** button.
9. In the **Protocol** section, click on the **LPR** radio button. In the **LRP Settings** section, in the **Queue Name** field, enter the name of the I-O Print Server port that the printer is attached. Available choices are LPT1, LPT2, COM1, TCP1, TCP2 or TCP3. Choosing TCP1, 2 or 3 will allow you to use I-O's PrintControl utility to control the use of banner pages, etc. Then click on the OK button.
   Note: If after completing this setup, you find your are receiving a blank page at the end of each print job, come back to this section and put a check mark in the box for "LPR Byte Counting Enabled."
10. Click on the **Next** button.
11. Review the information. When done click on the **Finish** button.
12. Select the printer manufacturer and printer model for the printer attached to the I-O Print Server. Then click on the **Next** button.
13. Make the appropriate choice for the Print driver. Then click on the **Next** button.
14. Enter the name you would like for the Windows 2000 printer icon. Select whether you want the I-O Print Server attached printer to be the default printer. Then click on the **Next** button.
15. Select whether to share the printer attached to the I-O Print Server. Then click on the Next button.
16. Print a test page, if desired. Then click on the **Next** button.
17. Review the configuration information, and click on the **Finish** button.

3.11 Configuring for LPR/LPD Printing (Unix, Linux, etc.)

The I-O Print Server is capable of receiving LPR printing jobs via its built in LPD protocol. The host may be a Unix, Linux or even Windows type of server.

3.11.1 Configure the I-O Print Server

At the I-O Print Server, using the I-O Configuration Utility:

1. Configure the I-O Print Server's TCP/IP automatically via DHCP, or enter a static address.
2. On the LPR/LPD tab, do the following:
   - To disable the extra pages, check the respective boxes by the pages not desired.
   - Select how to handle LF/CR if needed
   - Enter any pre and post processing command strings if desired.

3.11.2 Configure the Host

At the Unix, Linux or Windows host, enter the following:

1. Target Printer's IP address: enter the TCP/IP address of the I-O Print Server
2. Target Printer's Port or Queue Name: enter "LPT1" or "TCP1" depending upon the following conditions:
   - LPT1 will cause the I-O Print Server to generate a banner page, a trailer page, and a blank page after the trailer page.
   - TCP1 will cause the I-O Printer to not print any of the extra pages, or selectively print only certain pages.

If using an I-O 5450e Print Server, you may send LRP/LPD print jobs to any of the three ports. On the host, use as the following queue name:

LPT1 for the printer attached to the print server's first parallel (LPT1) port.
LPT2 for the printer attached to the print server's second parallel (LPT2) port.
COM1 for the printer attached to the print server's serial (COM1) port.

To use the customization feature of the print server to disable the extra pages, LF/CR handling, or to use pre and post processing strings, use as the following queue name:

TCP1 for the printer attached to the print server's physical LPT1 port
TCP2 for the printer attached to the print server's physical LPT2 port
TCP3 for the printer attached to the print server's physical COM1 port

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If you have not already installed the I-O Configuration or PrintControl utility, please go back to I-O Configuration and PrintControl Installation (see Section 2.2) and do so now.

4.1 Configuring the I-O Print Server

The instructions in this chapter refer to the older I-O PrintControl Utility. Even though the processes are similar for the I-O Configuration Utility, you may want to refer to the I-O Configuration Utility | Help menu option for specific information on using the configuration utility with Novell. Netware instructions do not change whether using the PrintControl or the Configuration Utility.

After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double-clicking on the desired print server or by high-lighting the desired print server and then pressing the Configure button displayed in the tool bar. Follow these simple steps to configure the I-O Print Server according to the Connection Type you chose above. The options were:

4.1.1 Remote (printer on IPX)

1. Select **NW Remote Printer** by clicking on the white box in front of that selection.

2. The right column titled “Object Information” will display the available configuration parameters.

   a. In the Print Server field enter the SAP Name assigned during step 8A in section “Creating a NDPS Printer Object”.

   b. In the field next to the I-O Print Server’s local port (LPT1, LPT2 or COM1) that the target printer is attached to enter the Printer number

3. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

4.1.2 Remote (LPR on IP)

1. If you haven’t already done so, assign an IP address to the I-O Print Server. Refer to “Assign TCP/IP Address” for more information.

2. To turn off the printing of the banner page, the trailer page or any possible blank pages configure the TCP/IP logical ports: TCP1, TCP2, and/or TCP3. On the main Print Server Information screen, click on Printer Ports/Emulation and then on the respective TCP/IP Logical Port.

4.1.3 Forward Jobs to a Queue

1. If the I-O Print Server isn't already configured for servicing a NDS queue, refer to "Configuring the I-O Print Server" for more information.

4.1.4 Client Configuration

Public Access printers can be configured from any client running the NetWare 5 client software. The user does not have to be signed on to the Novell network. To set up a Controlled Access printer, the client has to be signed on to the Novell network.

4.1.5 Public Access Printers

1. Double-click on the Network Neighborhood icon on the Windows desktop.
2. Double-click on the Entire Network icon.
3. Open the NDPS Public Access Printers folder.
4. Double-click on the desired Public Access printer.
5. Follow the instructions given by the Windows Add Printer Wizard.

4.1.6 Controlled Access Printers

1. Double-click on the Network Neighborhood icon on the Windows desktop.
2. Open the NDS context the NDPS printer object resides in.
3. Locate the desired NDPS printer object and double-click its icon.
4. Follow the instructions given by the Windows Add Printer Wizard.

4.2 Controlled or Public Access Printer, Netware 5.x (NDPS), NWAdmin

Under NetWare 5.x printers attached through an I-O Print Server can be configured as Controlled Access or Public Access printers. The instructions below cover types unless noted otherwise. The following steps are covered:

4.2.1 Prerequisites

To create a Printer Agent under NDPS, the following requirements must be met:

- User must have at least Read, Write, Modify, and Create rights for the destination container where its associated Printer object will reside. This is not necessary when creating a Public Access printer.

- User must be designated as a Manager of the NDPS Manager that will control this Printer Agent.
- A NDPS Broker must be running.
- A NDPS Manager object must be created.

Please refer to your Novell documentation for more information on these requirements. An on-line user's guide can be found at www.novell.documentation.com.

4.2.2 Creating a NDPS Printer Object

1. After logging into the Novell network with the above-mentioned rights, start the NetWare Administrator.
2. Creating a printer:
    a. When creating a Controlled Access printer, click on the container where you want the NDPS Printer object to reside.
        i. From the Object menu, select **Create**.
        ii. From the displayed list, select **NDPS Printer**. Click **OK**.
        iii. Enter a name of your choice in the NDPS Printer Name field.
        iv. Select **Create a New Printer Agent** as the Printer Agent Source and click **Create**.
        v. If desired, change the default **Printer Agent (PA) Name,** then browse for the **NDPS Manager Name**.
    b. When creating a Public Access printer, double-click on the NDPS Manager.
        i. Click on the **Printer Agent List** button on the right side of the displayed window.
        ii. Click **New**.
        iii. Enter a name of your choice in the **Printer Agent (PA) Name** field.
3. Click on the **Novell Printer Gateway** and then click **OK**.
4. If the NDPS Manager has not been loaded before, you will now be prompted to do so. Click **OK**, then respond with **OK** again.
5. Select the most appropriate **Printer Type** and then highlight the **Novell Port Handler** in the bottom window. Click **OK**.
6. Select the appropriate **Connection Type** (see below).
    a. Remote (printer on IPX)
    b. Remote (LPR on IP)
    c. Forward Jobs to a Queue

Note that the last option - Forward Jobs to a Queue - should only be selected if you already have created and linked the following NDS objects: Print Server, Printer, and Print Queue. You should also have configured the I-O Print Server for NDS Print Server mode printing. See "Print Server, Novell NetWare 4.x (NDS), NWAdmin" in this User's Guide.

7. If you selected "Remote (printer on IPX)" select **Port Type "Other"**.
8. Click **Next**.
    a. If you selected "Remote (printer on IPX)", specify a **SAP Name** and a **Port Number**. These values will later be used to configure the I-O Print Server. [Note: The SAP Name is specific to the I-O Print Server. If

multiple printers are attached to the I-O Print server, then the SAP Name should be different from the name of the Printer Agent, since it will be shared by the other printer(s).]

b. If you selected "Remote (LPR on IP)", enter the I-O Print Server's IP address in the **Host Address** field. In the **Printer Name** field enter TCPx where x corresponds to the I-O Print Server's physical port(s) as shown on the following table:

Printer Server Type	Physical Port	x Value	TCP/IP Port
Single Port	LPT1 or COM1	1	TCP1
Multi-Port	LPT-1	1	TCP1
	LPT-2	2	TCP2
	COM1	3	TCP3

c. If you selected "Forward Jobs to a Queue", enter the Queue Name that is associated with the I-O Print Server and a Queue User Name.

9. Click **Finish**. [Note: If you have selected Remote (printer on IPX) your workstation will post an error message. Click OK. Once you have configured the I-O Print Server, this error condition will be resolved.]

10. Select a printer driver for each client operating system. Click **Continue** and then **OK**.

11. Proceed with configuration of the I-O Print Server below.

4.3 Print Server, Novell Netware 4.x (NDS), NWAdmin

Configuring the I-O Print Server as a NetWare Print Server under NDS requires the following steps:

4.3.1 Entering NWAdmin

1. Login to NetWare as ADMIN, or as a user with ADMIN security equivalence.

2. Open the **NetWare Tools group** and double click on **NWAdmin**.

3. Check the current context on the **Title Bar**. If it is incorrect select the appropriate context from the displayed list.

4.3.2 Adding a Print Server Object

1. Using the right mouse button, click the context to which the I-O Print Server is to be added.

2. Select **Create** from the displayed menu.

3. Select **Print Server** and type a **new print server name**.

Important: Observe the following points concerning the I-O Print Server's name:

- **Do not use more than 19 characters in the I-O Print Server's name**. NWAdmin allows you to enter print server names longer that this, but the I-O Print Server does not support names longer than 19 characters.
- **Do not use spaces in the print server name**. Use dashes or underscores instead. NWAdmin allows spaces in the print server name, but the I-O Print Server does not support this. However, you can use spaces in the names of the queues or printer objects.

4. Click the **Create** button.

4.3.3 Adding Printer Objects

1. Using the Right mouse button, click the context to which the printer is to be added.

2. Select **Create** from the displayed menu.

3. Select **Printer** object.

4. Enter the **new printer name**.

5. Click the **Create** button.

6. At the main NWAdmin screen, double-click the icon for the just created **Print Server**.

7. From the **Print Server** window, click the **Assignments** button.

8. Select **Add**.

9. Select **Printer**.

10. Select **OK**.

11. Select **OK** at the Print Server window.

4.3.4 Adding Print Queue Objects

1. Using the Right mouse button, click the context in which the queue is to be created.

2. Select **Create** from the displayed menu.

3. Select **Print Queue**.

4. At the **Create Print Queue** window, enter the queue name in the **Print Queue Name** field.

5. Select the volume from the **Print Queue Volume** pull down list on the Select Object window.

6. Click **OK**.

7. Click the **Create** button on the **Create Print Queue** window.

8. Double-click the icon for the just-created **Printer**.

9. Click the **Assignments** button.

10. Click the **Add. . .** button.

11. Select the Queue name. This name becomes the selected object.

    Note: The selected printer is automatically set as the default.

12. Click **OK**.

13. Click **OK**.

4.3.5 Configuring the I-O Print Server

After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the **Configure** button displayed in the tool bar. Follow these simple steps to configure the I-O Print Server as a Novell Netware 4.x NDS Print Server:

1. Select **NW Print Server** by clicking on the white box in front of that selection.
2. The right column titled "Object Information" will display the available configuration parameters.

    a. Replace the default **Print Server Name** (i.e. the I-O serial number) with the Print Server Name assigned during *Adding a Print Server Object* (see section 4.3.2).
    b. If necessary enter the **Password** for this print server object and change the **Ethernet** [frame] **Type** and the **Queue Polling Time**.

    The *Queue List* and *Notify List* are for information only. This information must be changed on the Novell NetWare server.

3. In the left column of the I-O PrintControl screen, click on the white circle in front of **NDS**.

4. Then click the button labeled **NDS**.

5. The right column titled "Object Information" will display the available configuration parameters. Enter the name of the correct **NDS Tree** and **NDS Context** (see section 4.3.2) manually or using the **Browse** button.

6. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

4.3.6 Client Configuration

To enable a client workstation to print to a NetWare queue, a local port must be captured. This can be accomplished using the NetWare User Tools from within MS Windows or through a capture command from the DOS prompt.
To capture a local port using NetWare User Tools from within MS Windows:

1. Open **NetWare User Tools** from your desktop.

2. Click on the **printer icon** on the top tool bar. The client's available ports (LPT1, LPT2...) will be displayed on the left side of the screen. The available queues (resources) will be displayed on the right.

3. Click on the desired **port**, then on the **queue** you want to capture, and finally on the **Capture** button.

4. Complete the capture process by configuring the **LPT Settings** and making the capture **Permanent** if so desired. Then **Exit** the program.

The same results can be obtained by using the CAPTURE command from the DOS prompt:
- At the DOS prompt type the following command:

capture local=*n* **queue**=*name*

where **n** is the number of the LPT port you want to assign the queue to and **name** is the name of the queue you want to capture.

4.4 Print Server, Novell Netware 4.x (NDS), PCONSOLE

Configuring the I-O Print Server as a NetWare print server under NDS requires the following steps:

4.4.1 Adding a Print Server Object

1. Login to Netware as ADMIN, or as a user with ADMIN security equivalence.

2. Start NetWare's **PCONSOLE** program.

3. If necessary, use PCONSOLE's **Change Context** selection to change to the context where you want to install the print server. If you are not sure which context you should install the print server in, install the print server in the context that contains the users that will be using the print server most. For more information about contexts and other NetWare 4.x concepts, see your NetWare manuals.

4. On a piece of paper, write down the context in which you are installing the print server. You can read this from the *Context*: item at the top of PCONSOLE's screen. Later, you will use this information to configure the I-O Print Server.

5. Go to PCONSOLE's **Available Options** menu and choose **Print Servers**. The Print Servers list appears.

6. Press <**Ins**> to add a new print server to the list. The **New Print Server Name** form appears.

7. Enter a name for the new print server and press <**Enter**>.

Important: Observe the following points concerning the I-O Print Server's name:

- **Do not use more than 19 characters in the I-O Print Server's name**. PCONSOLE allows you to enter print server names longer that this, but the I-O Print Server does not support names longer than 19 characters.
- **Do not use spaces in the print server name**. Use dashes or underscores instead. PCONSOLE allows spaces in the print server name, but the I-O Print Server does not support this. However, you can use spaces in the names of the queues or printer objects.

After a moment, PCONSOLE returns to the **Print Servers** list. The new print server appears in the list.

4.4.2 Adding Printer Objects

Perform the procedures below to associate NetWare printer objects with the printers connected to the I-O Print Server's ports. Do this when installing a new I-O Print Server, or when connecting a new printer to the I-O Print Server to service NetWare print queues.

1. If you haven't already done so, start PCONSOLE, and change to the context where the I-O Print Server is installed.

2. In the **Print Servers** list, select the I-O Print Server and press <**Enter**>. The **Print Server Information** menu appears.

3. In the **Print Server Information** menu, select **Printers** and press <**Enter**>. The **Serviced Printers** list appears.

4. Press <**Ins**> to insert a new printer into the print server's **Serviced Printers** list. The **Object, Class** list appears.

5. Navigate the **Object, Class** list to the context where the printer object resides, or where you want to install a new printer object. This should be the context where the majority of the printer's users reside.

6. If the printer you want to add to the **Serviced Printer** list does not exist yet, press <**Ins**> to add a new printer to the Object, Class list. PCONSOLE prompts you for a name, then adds the new printer to the Object, Class list.

7. In the Object, Class list, select a printer to add to the print server's **Serviced Printers** list. If you just added a new printer to the Object, Class list, select that new printer. Then press <**Enter**>. The new printer appears in the print server's **Serviced Printers** list.

8. In the **Serviced Printers** list, select the printer you just added, and press <**Enter**>. The **Printer Configuration** form appears.

   NOTE: Ignore the Printer Type, Configuration, Buffer size, and Sampling Interval items on the Printer Configuration form. These items are not relevant to I-O Print Server installations.

9. Select the **Printer Number** entry, and enter a value from the table below to associate that printer with one of the I-O Print Server's ports.

NetWare Printer Number	Associated Physical Port on I-O Print Server
0	LPT1
1	LPT2
2	COM1

10. If you want to add another printer to the print server's Serviced Printers list, return to the **Serviced Printers** list. Then repeat steps 2 through 9 for this procedure.

11. If you are going to add print queues to the new printers, proceed to Adding Print Queue Objects below. Otherwise, reset the I-O Print Server by powering it OFF and back ON again or by using the Reset button in the I-O PrintControl Utility.

4.4.3 Adding Print Queue Objects

Perform the procedure below to associate NetWare print queue objects with the I-O Print Server's NetWare Printer objects (see section 4.4.2). Do this when installing a new I-O Print Server, or when adding a new queue to be serviced by an existing NetWare Printer object associated with the I-O Print Server.

1. If you haven't already done so, start PCONSOLE, and change to the context where the I-O Print Server's NetWare Printer object resides. Then select the **Printer** you want to associate the print queue(s) with, and press <**Enter**>. The **Printer Configuration** form appears.

2. Select the **Print queues assigned <see list>** entry and press <**Enter**>. The **Print Queues** list appears. Make sure that there is at least one queue in the list.

3. Press <**Ins**> to add a queue to the Print Queues list. The Object, Class list appears.

4. Navigate the **Object, Class** list to the context where the print queue object resides, or where you want to create a new print queue object. This should be the context where the majority of the queue users reside.

5. If the queue you want to add to the Print Queue list does not exist yet, press <**Ins**> to add a new queue to the Object, Class list. PCONSOLE prompts you for a name and volume, then adds the new queue to the Object, Class list.

6. In the Object, Class list, select a **Printer Queue** to add to the printer's Print Queues list. Then press <**Enter**>. The new queue appears in the printer's Print Queues list.

7. If you want to add another queue to the printer's Print Queues list, repeat step 2 through 6 of this procedure.

8. Press <**Esc**> several times until the Exit? menu appears. Select **Yes** and press <**Enter**>.

9. If you are installing a new I-O Print Server, proceed to *Configuring the I-O Print Server* below. Otherwise, reset the I-O Print Server by powering it OFF and back ON again or by using the Reset button in the I-O PrintControl Utility.

4.4.4 Configuring the I-O Print Server

After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the **Configure** button displayed in the tool bar. Follow these simple steps to configure the I-O Print Server as a Novell Netware 4.x NDS Print Server:

1. Select **NW Print Server** by clicking on the white box in front of that selection.

2. The right column titled "Object Information" will display the available configuration parameters.

a. Replace the default **Print Server Name** (i.e. the I-O serial number) with the Print Server Name assigned during *Adding a Print Server Object* (see section 4.4.1).

b. If necessary enter the Password for this print server object and change the *Ethernet* [frame] *Type* and the *Queue Polling Time*.

The *Queue List* and *Notify* List are for information only. This information must be changed on the Novell NetWare server.

3. In the left column of the I-O PrintControl screen, click on the white circle in front of **NDS**.

4. Then click the button labeled "**NDS**".

5. The right column titled "Object Information" will display the available configuration parameters. Enter the name of the correct **NDS Tree** and **NDS Context** (see section 4.4.1) manually or using the **Browse** button.

6. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

4.4.5 Client Configuration

To enable a client workstation to print to a NetWare queue, a local port must be captured. This can be accomplished using the NetWare User Tools from within MS Windows or through a capture command from the DOS prompt.
To capture a local port using NetWare User Tools from within MS Windows:

1. Open **NetWare User Tools** from your desktop.

2. Click on the **printer icon** on the top tool bar. The client's available ports (LPT1, LPT2,...) will be displayed on the left side of the screen. The available queues (resources) will be displayed on the right.

3. Click on the desired **port**, then on the **queue** you want to capture, and finally on the **Capture** button.

4. Complete the capture process by configuring the *LPT Settings* and making the capture *Permanent* if so desired. Then **Exit** the program.

The same results can be obtained by using the CAPTURE command from the DOS prompt by typing the following command:

capture local=*n* **queue**=*name*

where **n** is the number of the LPT port you want to assign the queue to and **name** is the name of the queue you want to capture.

4.5 Remote Printer, Novell Netware 4.x (NDS), NWAdmin

Configuring the I-O Print Server as a NetWare remote printer under NDS requires the following steps:

4.5.1 Entering NWAdmin

1. Login to NetWare as ADMIN, or as a user with ADMIN security equivalence.

2. Open the **NetWare Tools group** and double click on **NWAdmin**.

3. Check the current context on the **Title Bar**. If it is incorrect select the appropriate context from the displayed list.

4.5.2 Optional: Adding a Print Server

If the print server NLM is already running on your Novell server, skip this section and proceed directly to *Adding Printer Objects* - Section 4.3.3 on the Novell Server, otherwise follow these steps:

1. Using the right mouse button, click the context to which the Novell print server is to be added.

2. Select **Create** from the displayed menu.

3. Select **Print Server** and type a **new print server name**.

Important: Observe the following points concerning the print server's name:

- **Do not use more than 19 characters in the print server's name.** NWAdmin allows you to enter print server names longer that this, but the I-O Print Server does not support names longer than 19 characters.

- **Do not use spaces in the print server name.** Use dashes or underscores instead. NWAdmin allows spaces in the print server name, but the I-O Print Server does not support this. However, you can use spaces in the names of the queues or printer objects.

4. Click the **Create** button.

4.5.3 Adding Printer Objects

1. Using the Right mouse button, click the context to which the printer is to be added.

2. Select **Create** from the displayed menu.

3. Select **Printer** object.

4. Enter a new **Printer Name**.

5. Click the **Create** button.

6. Double-click the **Printer** icon for the just-created printer.
7. Click the **Configuration** button.
8. At the **Printer Type** window, select **Other/Unknown**.
9. Optionally, set the IPX/SPX network address.
10. Click **OK**.
11. At the main NWAdmin window, double-click the Novell print server that exists in the context.
12. From the **Print Server** window, click the **Assignments** button.
13. Select **Add**.
14. Select **Printer**.
15. Select **OK**.
16. Select **OK** at the Print Server window.

4.5.4 Adding Print Queue Objects

1. Using the Right mouse button, click the context in which the queue is to be created.
2. Select **Create** from the displayed menu.
3. Select **Print Queue**.
4. At the **Create Print Queue** window, enter the queue name in the **Print Queue Name** field.
5. Select the volume from the **Print Queue Volume** pull down list on the **Select Object** window.
6. Click **OK**.
7. Click the **Create** button on the **Create Print Queue** window.
8. Double-click the **Printer** icon for the just-created printer.
9. Click the **Assignments** button.
10. Click the **Add...** button.
11. Select the Queue name. This name becomes the selected object.

    Note: The selected printer is automatically set as the default.
12. Click **OK**.
13. Click **OK**.

4.5.5 (Re-) loading the Print Server NLM

1. Go to the **console** of the file server where the print server NLM is running or will be running.

2. If you already have a print server NLM loaded, unload it now by typing

   unload pserver

   at the prompt. Otherwise proceed directly to step 3.

3. (Re-) load the print server NLM by typing the following at the prompt:

   load pserver *pserver_name*

   pserver_name is the name of the existing print server NLM or of the print server created in the section titled "*Optional - Adding a Print Server"* (see section 4.5.2).

4.5.6 Configuring the I-O Print Server

After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.
Open the configuration dialog box by double clicking on the desired I-O Print Server or by highlighting the desired I-O Print Server and then pressing the Configure button displayed in the tool bar. Follow these simple steps to configure the I-O Print Server as a Novell Netware Remote Printer.

1. Select **NW Remote Printer** by clicking on the white box in front of that selection.

2. The right column titled "Object Information" will display the available configuration parameters.

   a. In the **Print Server** field enter the name of the Novell Print Server NLM.

   b. In the field next to the I-O Print Server's local port that the target printer is attached to enter the **Printer Number** assigned in the section titled "*Adding Printer Objects*" step 9 (see section 4.5.3) or select the **printer** by name from the pop-up menu.

3. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

4.5.7 Client Configuration

To enable a client workstation to print to a NetWare queue, a local port must be captured. This can be accomplished using the NetWare User Tools from within MS Windows or through a capture command from the DOS prompt.
To capture a local port using NetWare User Tools from within MS Windows:

1. Open **NetWare User Tools** from your desktop.

2. Click on the **printer icon** on the top tool bar. The client's available ports (LPT1, LPT2,...) will be displayed on the left side of the screen. The available queues (resources) will be displayed on the right.

3. Click on the desired **port**, then on the **queue** you want to capture, and finally on the **Capture** button.

4. Complete the capture process by configuring the *LPT Settings* and making the capture *Permanent* if so desired. Then **Exit** the program.

The same results can be obtained by using the CAPTURE command from the DOS prompt:

- At the DOS prompt type the following command:

  capture local=*n* **queue**=*name*

where **n** is the number of the LPT port you want to assign the queue to and name is the **name** of the queue you want to capture.

4.6 Remote Printer, Novell Netware 4.x (NDS), PCONSOLE

Configuring the I-O Print Server as a NetWare remote printer under NDS requires the following steps:

4.6.1 Optional: Adding a Print Server

If the print server NLM is already running on your Novell server, skip this section and proceed directly to Adding Printer Objects on the Novell Server, otherwise follow these steps:

1. Login to Netware as ADMIN, or as a user with ADMIN security equivalence.

2. Start NetWare's **PCONSOLE** program.

3. If necessary, use PCONSOLE's **Change Context** selection to change to the context where you want to install the print server. If you are not sure which context you should install the print server in, install the print server in the context that contains the users that will be using the print server most. For more information about contexts and other NetWare 4.x concepts, see your NetWare manuals.

4. On a piece of paper, write down the context in which you are installing the print server. You can read this from the Context: item at the top of PCONSOLE's screen. Later, you will use this information to configure the I-O Print Server.

5. Go to PCONSOLE's **Available Options** menu and choose **Print Servers**. The Print Servers list appears.

6. Press <**Ins**> to add a new print server to the list. The **New Print Server Name** form appears.

7. Enter a name for the new print server and press **<Enter>**.

Important: Observe the following points concerning the I-O Print Server's name:

- **Do not use more than 19 characters in the print server's name**. PCONSOLE allows you to enter print server names longer that this, but the I-O Print Server does not support names longer than 19 characters.

- **Do not use spaces in the print server name**. Use dashes or underscores instead. PCONSOLE allows spaces in the print server name, but the I-O Print Server does not support this. However, you can use spaces in the names of the queues or printer objects.

After a moment, PCONSOLE returns to the **Print Servers** list. The new print server appears in the list.

4.6.2 Adding Printer Objects

Perform the procedures below to associate NetWare printer objects with the printers connected to the I-O Print Server' ports. Do this when installing a new I-O Print Server, or when connecting a new printer to the I-O Print Server to service NetWare print queues.

1. If you haven't already done so, start PCONSOLE, and change to the context where the I-O Print Server is installed.

2. In the **Print Servers** list, select the desired Novell print server and press <**Enter**>. The Print Server Information menu appears.

3. In the **Print Server Information** menu, select **Printers** and press <**Enter**>. The Serviced Printers list appears.

4. Press <**Ins**> to insert a new printer into the print server's **Serviced Printers** list. The **Object, Class** list appears.

5. Navigate the **Object, Class** list to the context where the printer object resides, or where you want to install a new printer object. This should be the context where the majority of the printer's users reside.

6. If the printer you want to add to the **Serviced Printer** list does not exist yet, press <**Ins**> to add a new printer to the Object, Class list. After you have entered a new name PCONSOLE adds the new printer to the Object, Class list.

7. In the Object, Class list, select a printer to add to the print server's **Serviced Printers** list. If you just added a new printer to the Object, Class list, select that new printer. Then press <**Enter**>. The new printer appears in the print server **Serviced Printers** list.

8. In the **Serviced Printers** list, select the printer you just added, and press <**Enter**>. The **Printer Configuration** form appears.

   NOTE: Ignore the Configuration, Buffer size, and Sampling Interval items on the Printer Configuration form. These items are not relevant to I-O Print Server installations.

9. It is recommended that you use the default **Printer Number**. If you do need to change the number, make sure it uniquely identifies the printer among other printers associated with the Novell print server.

10. In the **Printer Type** field select **Other/Unknown**.

11. If you want to add another printer to the print server's Serviced Printers list, return to the **Serviced Printers** list. Then repeat steps 2 through 10 for this procedure.

12. Return to the **Available Options** menu by pressing <**Esc**> repeatedly.

4.6.3 Adding Print Queue Objects

Perform the procedure below to associate NetWare print queue objects with the I-O Print Server's NetWare Printer objects (see section 4.6.2). Do this when installing a new I-O Print Server, or when adding a new queue to be serviced by an existing NetWare Printer object associated with the I-O Print Server.

1. If you haven't already done so, start PCONSOLE, and change to the context where the I-O Print Server's NetWare Printer object resides. Then select the **Printer** you want to associate the print queue(s) with, and press <**Enter**> the **Printer Configuration** form appears.

2. Select the **Print queues assigned <see list>** entry and press <**Enter**>. The **Print Queues** list appears. Make sure that there is at least one queue in the list.

3. Press <**Ins**> to add a queue to the Print Queues list. The Object, Class list appears.

4. Navigate the **Object, Class** list to the context where the print queue object resides, or where you want to create a new print queue object. This should be the context where the majority of the queue users reside.

5. If the queue you want to add to the Print Queue list does not exist yet, press <**Ins**> to add a new queue to the Object, Class list. PCONSOLE prompts you for a name and volume, then adds the new queue to the Object, Class list.

6. In the Object, Class list, select a **Printer Queue** to add to the printer's Print Queues list. Then press <**Enter**>. The new queue appears in the printer's Print Queues list.

7. If you want to add another queue to the printer's Print Queues list, repeat step 2 through 6 of this procedure.

8. Press <**Esc**> several times until the Exit? menu appears. Select **Yes** and press <**Enter**>.

4.6.4 (Re-) loading the Print Server NLM

1. Go to the **console** of the file server where the print server NLM is running or will be running.

2. If you already have a print server NLM loaded, unload it now by typing

   unload pserver

   at the prompt. Otherwise proceed directly to step 3.

3. (Re-) load the print server NLM by typing the following at the prompt: **load pserver** *pserver_name*

   pserver_name is the name of the existing print server NLM or of the print server created in the section titled *"Optional - Adding a Print Server"* (see section 4.6.1).

4.6.5 Configuring the I-O Print Server

After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double clicking on the desired I-O Print Server or by highlighting the desired I-O Print Server and then pressing the Configure button displayed in the tool bar.

Follow these simple steps to configure the I-O Print Server as a Novell Netware Remote Printer.

1. Select **NW Remote Printer** by clicking on the white box in front of that selection.

2. Click the button labeled "**NW Remote Printer**".

3. The right column titled "Object Information" will display the available configuration parameters.

   a. In the **Print Server** field enter the name of the Novell Print Server NLM.

   b. In the field next to the I-O Print Server' local port that the target printer is attached to enter the **Printer Number** assigned in the section titled "*Adding Printer Objects*" step 9 (see section 4.6.2) or select the **printer** by name from the pop-up menu.

4. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

4.6.6 Client Configuration

To enable a client workstation to print to a NetWare queue, a local port must be captured. This can be accomplished using the NetWare User Tools from within MS Windows or through a capture command from the DOS prompt.
To capture a local port using NetWare User Tools from within MS Windows:

1. Open **NetWare User Tools** from your desktop.

2. Click on the **printer icon** on the top tool bar. The client's available ports (LPT1, LPT2,...) will be displayed on the left side of the screen. The available queues (resources) will be displayed on the right.

3. Click on the desired **port**, then on the **queue** you want to capture, and finally on the **Capture** button.

4. Complete the capture process by configuring the *LPT Settings* and making the capture *Permanent* if so desired. Then **Exit** the program.

The same results can be obtained by using the CAPTURE command from the DOS prompt:

1. At the DOS prompt type the following command:

   capture local=*n* **queue**=*name*

where **n** is the number of the LPT port you want to assign the queue to and **name** is the name of the queue you want to capture.

4.7 Print Server, NetWare 3.x and 2.x

Configuring the I-O Print Server as a bindery print server under NetWare can be done from within the PrintControl utility. This section contains the following two parts:

4.7.1 Creating NetWare Objects

1. Identify the name of the Novell Server and insure that it is up and running with all printing functions enabled before proceeding.

   Important: When installed as NetWare Print Server, the I-O Print Server's master file server must have a name that is no longer than 19 characters. If you file server has a longer name, you must either choose a different file server as the I-O Print Server's master file server, or shorten the file server's name.

2. If you haven't already done so, start the I-O PrintControl utility, located on a Netware client PC.

3. Select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address.

   Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

4. Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the **Configure** button displayed in the tool bar.

5. Select **NW Print Server** by clicking on the white box in front of that selection.

6. Then click the button labeled "**NW Print Server**."

7. The right column titled "Object Information" will display the available configuration parameters.

   a. Replace the default **Print Server Name** (i.e. the I-O serial number) with a Print Server Name of your choice.

Important: Observe the following points concerning the I-O Print Server's name:

- **Do not use more than 19 characters in the I-O Print Server's name**. PCONSOLE allows you to enter print server names longer that this, but the I-O Print Server does not support names longer than 19 characters.

- **Do not use spaces in the print server name**. Use dashes or underscores instead. PCONSOLE allows spaces in the print server name, but the I-O Print Server does not support this. However, you can use spaces in the names of the queues or printer objects.

   b. If necessary enter the *Password* for this print server object and change the *Ethernet* [frame] *Type* and the *Queue Polling Time*.

8. In the left column of the I-O PrintControl screen, click on the white circle in front of **bindery**.

9. Then click the button labeled "**bindery**".

10. The right column titled "Object Information" will display the available configuration parameters. Enter the name of the **Master File Server**.

11. Click on the button labeled "**Queues**".

12. Select the I-O Print Server' printer **port** you want to assign queues to from the available options displayed in the field labeled "**Ports**".

13. Add a new queue by typing the name of the new queue into the field labeled "**New Queue Name**".

14. Click on the button next to the "*New Queue Name*" field labeled "**Add** >>".

15. Repeat steps 12 through 14 to add additional queues to the same or other print server printer ports. Click **OK**.

16. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

17. I-O PrintControl will automatically create the following objects on the NetWare file server:

    - a print server object,
    - print queue object(s) and
    - printer objects for all physical ports on the I-O Print Server

4.7.2 Client Configuration

To enable a client workstation to print to a NetWare queue, a local port must be captured. This can be accomplished using the NetWare User Tools from within MS Windows or through a capture command from the DOS prompt.

To capture a local port using NetWare User Tools from within MS Windows:

1. Open **NetWare User Tools** from your desktop.

2. Click on the **printer icon** on the top tool bar. The client's available ports (LPT1, LPT2,...) will be displayed on the left side of the screen. The available queues (resources) will be displayed on the right.

3. Click on the desired **port**, then on the **queue** you want to capture, and finally on the **Capture** button.

4. Complete the capture process by configuring the *LPT Settings* and making the capture *Permanent* if so desired. Then **Exit** the program.

The same results can be obtained by using the CAPTURE command from the DOS prompt by typing the following:

capture local=*n* **queue**=*name*

where **n** is the number of the LPT port you want to assign the queue to and **name** is the name of the queue you want to capture.

You may also use the Windows capture printer port function from within the properties option of the desired printer.

4.8 Remote Printer, NetWare 3.x and 2.x, PCONSOLE

Configuring the I-O Print Server as a remote printer under NetWare requires the following steps:

- Adding Print Queue Objects on the Novell Server
- Optional: Adding a Print Server Object on the Novell Server
- Adding Printer Objects on the Novell Server

- Associating Printer Objects with Print Queue Objects
- (Re-)loading the PServer NLM
- Configuring the I-O Print Server
- Client Configuration

4.8.1 Adding Print Queue Objects on the Novell Server

If you are going to set up the I-O Print Server remote printer to use print queues that already exist, skip this section. Otherwise, perform the procedure below to create NetWare print queue objects. Do this when installing a new I-O Print Server, or when adding a new queue to be serviced by an existing NetWare Printer object associated with the I-O Print Server.

1. Login to a Netware file server as SUPERVISOR, or as a user with SUPERVISOR security equivalence. If there are more than one file server on your network, log into the one you want to be the I-O Print Server's master file server.

2. If you haven't already done so, start PCONSOLE.

3. From the **Available Options** menu, select **Print Queue Information** and press <**Enter**>.

4. Press <**Insert**> to add a new queue to the list.

5. Type a queue name, and press <**Enter**>.

6. If you want to add additional queues, repeat steps 3 and 4.

7. Press <**Esc**> until the **Available Options** menu appears.

4.8.2 Optional: Adding a Print Server Object on the Novell Server

If the print server NLM is already running on your Novell server, skip this section and proceed directly to *Adding Printer Objects on the Novell Server*, otherwise follow these steps.

1. From PCONSOLE's **Available Options** menu, select **Print Server Information**.

2. Press <**Ins**>.

3. Enter a name for the new print server and press <**Enter**>.

Important: Observe the following points concerning the I-O Print Server's name:

- **Do not use more than 19 characters in the I-O Print Server's name**. PCONSOLE allows you to enter print server names longer that this, but the I-O Print Server does not support names longer than 19 characters.

- **Do not use spaces in the print server name**. Use dashes or underscores instead. PCONSOLE allows spaces in the print server name, but the I-O Print Server does not support this. However, you can use spaces in the names of the queues or printer objects.

After a moment, PCONSOLE returns to the Print Servers list. The new print server appears in the list.

4. Press <**ESC**> to return to the Available Options menu.

4.8.3 Adding Printer Objects on the Novell Server

Perform the procedures below to associate NetWare printer objects with the printers connected to the I-O Print Server's ports. Do this when installing a new I-O Print Server, or when connecting a new printer to the I-O Print Server to service NetWare print queues.

1. From the **Available Options** menu select **Print Server Information**.
2. In the **Print Servers** list, select the desired Novell print server and press <**Enter**>.
3. Select **Print Server Configuration** and press <**Enter**>.
4. Select **Printer Configuration** and press <**Enter**>.
5. For each of the I-O Print Server ports to which you are connecting a printer select one of the **Not Installed** printers and press <**Enter**>.
6. Assign a **name** to the printer and select the **type** according to the following table :

Printer Attached to I-O Printer Server's Physical Port	NetWare Printer Type
LPT1	Remote Parallel, LPT1
LPT2	Remote Parallel, LPT2
COM1	Remote Serial, COM1

7. Press <**ESC**> and select **Save Changes**? **Yes**.
8. Press <**ESC**> again to return to the **Print Server Configuration** menu.

4.8.4 Associating Printer Objects with Print Queue Objects

1. From the **Printer Server Configuration** menu, select **Queues Serviced by Printer** and press <**Enter**>.
2. Select the printer you want to assign a print queue to and press <**Enter**>.
3. Press <**Insert**> to add a queue to the list.
4. Select the queue that you want the printer to service and press <**Enter**>.
5. Enter a priority level and press <**Enter**>.
6. If you have additional printers attached to the I-O Print Server, repeat steps 2 through 5 to assign at least one queue to the additional printers.
7. Press <**Esc**> until the **Exit PCONOLE** dialog box appears. Choose **Yes** and press <**Enter**>.

4.8.5 (Re-) Load the NetWare PServer NLM

1. Go to the console of the file server where the print server NLM is running or will be running.

2. If you already have a print server NLM loaded, unload it now by typing

   unload pserver

   at the prompt. Otherwise proceed directly to step 3.

3. (Re-) load the print server NLM by typing the following at the prompt:

   load pserver *pserver_name*

   pserver_name is the name of the existing print server NLM or of the print server above (see section 4.8.1).

4.8.6 Configuring the I-O Print Server

After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the Configure button displayed in the tool bar. Follow these simple steps to configure the I-O Print Server as a Novell Netware Remote Printer.

1. Select **NW Remote Printer** by clicking on the white box in front of that selection.

2. The right column titled “Object Information” will display the available configuration parameters.

   a. In the **Print Server** field enter then name of the Novell Print Server NLM.

   b. In the field next to the I-O Print Server’s local port that the target printer is attached to enter the **Printer Name** assigned earlier (see *Adding Printer Objects*, section 4.8.1). Alternately you may enter the Novell **printer number** associated with the printer.

3. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

4.8.7 Client Configuration

To enable a client workstation to print to a NetWare queue, a local port must be captured. This can be accomplished using the NetWare User Tools from within MS Windows or through a capture command from the DOS prompt.

To capture a local port using NetWare User Tools from within MS Windows:

1. Open **NetWare User Tools** from your desktop.

2. Click on the **printer icon** on the top tool bar. The client's available ports (LPT1, LPT2,...) will be displayed on the left side of the screen. The available queues (resources) will be displayed on the right.

3. Click on the desired **port**, then on the **queue** you want to capture, and finally on the **Capture** button.

4. Complete the capture process by configuring the *LPT Settings* and making the capture *Permanent* if so desired. Then **Exit** the program.

The same results can be obtained by using the CAPTURE command from the DOS prompt by typing the following:

capture local=*n* **queue**=*name*

where **n** is the number of the LPT port you want to assign the queue to and **name** is the name of the queue you want to capture.

5 NETBIOS PRINTING

If you have not already installed the I-O Configuration or PrintControl utility, please go back to I-O configuration and PrintControl Installation (see Section 2.2) and do so now. Then proceed with the following instructions.

5.1 Configuring the I-O Print Server

The instructions in this chapter refer to the older I-O PrintControl Utility. Even though the processes are similar for the I-O Configuration Utility, you may want to refer to the I-O configuration Utility | Help menu option for specific information on using the configuration utility.

After starting the I-O PrintControl utility, select one of the listed print servers. Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the Configure button displayed in the tool bar. Follow these simple steps to configure the I-O Print Server for NetBIOS printing:

1. Select the **NetBIOS** protocol by clicking on the white box in front of the protocol selection **NetBIOS**.

2. The right column titled "Object Information" will display the available configuration parameters. In this case the only configuration parameter is the **Print Server Name**. The default name consists of "SDE_xxxxxxxx", where xxxxxxx represents the Print Server's serial number. As you change this name, make sure that:

   a. The new name starts with an alphanumeric character.

   b. The total number of characters does not exceed 15.

3. If you want to configure additional protocols, refer to the respective section herein. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

At this point you should proceed with the section that matches your client environment. The sections are:

5.2 Configuring Windows 95 for Peer-to-Peer Printing

1. Open Window 95 and click on **Start**.

2. Select **Settings** then open the **Printer** folder.

3. Double click on the **Add Printer** icon.

4. At the prompt *How is the printer attached to your computer?*, choose **Local Printer**.

5. Select the printer parameters that best describe the printer attached to the I-O Print Server.

6. Select one of the available **local ports**. You will further modify this later.

7. Do NOT print a test page. Click **Finish** to close the Add Printer wizard.

8. Double click on the **printer icon** of the printer you just created.

9. From the **Printer** menu, select **Properties**.

10. Click on the **Details** tab and then on the **Capture Printer Port** button.

11. Choose the **Device** (LPT1, LPT2 or COM1) and the desired **Path**. Make sure that the path is of the following format:

    *print server name**print server port*

    print server name is the same as assigned to the I-O Print Server during its NetBIOS configuration (see section 5.1) and the **print server port** is the corresponding printer port on the I-O Print Server.

    Note: For NetBIOS to run effectively, the PC printer port being captured should be assigned to the corresponding Print Server port. i.e., Device LPT1 goes to print server port LPT1.

12. You may want to check the **reconnect at logon** box to automatically capture the PC's local port every time Windows 95 starts up.

5.3 Configuring Windows for Workgroups

Windows for Workgroup allows redirection of up to three local ports (LPT1 through LPT3) without additional configuration. You can add up to six more ports, LPT4 through LPT9 by modifying WIN.INI. Refer to your Windows for Workgroup documentation for instructions on how to add more ports. This instruction describes how to configure a Workgroup client workstation to print through the I-O Print Server directly.

1. Open the **Control Panel** in the Windows Main folder.

2. Select **Printer** and click on **Add>>.**

3. Add the printer that is attached to the I-O Print Server to the list of printers available to the client workstation. Be sure to assign a local port for the remote device. You can make this your default printer.

4. Click on **Connect...**

5. Click on **Network**.

6. From the **Device Name** list, select a local port to redirect to your I-O Print Server.

7. In the **Path** field, type:

    *print server name**print server port*

    where **print server name** is the same as assigned to the I-O Print Server during its NetBIOS configuration (see section 5.1) and the **print server port** is one of the available printer ports on the I-O Print Server.

Note: For NetBIOS to run effectively, the PC printer port being captured should be assigned to the corresponding Print Server port. i.e., Device LPT1 goes to print server port LPT1.

8. Make sure the **Reconnect at Startup** box is checked, and click on **OK**.

Note: If the printer attached to the print server is slow, increase the Transmission Retry value option in the Connect dialog box to 900.

9. Click **OK** to close the Connect dialog and **Close** to close Printers. The printer attached to the I-O Print Server is now available. Simply select it from your application as you would any other printer.

Note: This setup defaults to the fastest printing method - Foreground printing. If you want a slower printing method, enable Background printing. You can find the switch to enable Background printing in the Options menu of Print Manager. Be sure to clear the Send Documents Directly to Network option.

5.4 Configuring Windows NT 4.XX

Make sure your Windows NT workstation has the NetBIOS protocol active. If you are unsure do the following:

A. Click on **Start**, then select **Settings** and lastly **Control Panel**.

B. Double-click on the **Network** icon and review the lists under the **Protocol** tab.

If the *NetBIOS* protocol is not found, you must add it before continuing with the instructions below. Consult your Microsoft documentation for more
information.

Follow the procedures below to create printers for the I-O Print Server on a Windows NT workstation. If there is more than one printer attached to the I-O Print Server, perform this procedure once for each attached printer.

1. From the DOS prompt type:

   net use *local port \\print server name\print server port*

   local port is one of the PC's local ports (LPT1, LPT2, or COM1), **print server name** is the same as assigned to the I-O Print Server during its NetBIOS configuration (see section 5.1) and **print server port** is one of the available physical printer ports on the I-O Print Server.

   Note: For NetBIOS to run effectively, the PC printer port being captured should be assigned to the corresponding Print Server port. i.e., Device LPT1 goes to print server port LPT1.

2. Exit MS-DOS.

3. From the Windows NT desktop click on **Start**.

4. Select Settings then open the **Printer** folder.

5. Double click on the **Add Printer** icon.

6. Choose **My Computer**.

7. Select **Add Port**.

8. From the **Available Printer Ports** list double-click on **Local Port**.

9. Type **print server name\print server port** (see step 1 above).

10. Click **OK** and **Close** the Printer Ports screen.

11. From **Add Printer Wizard** screen select the NetBIOS port you just added and press **Next**.

12. Complete the remaining requests from the Windows NT Add Printer Wizard. The printer attached to the I-O Print Server is now available. Simply select it from your application as you would any other printer.

5.5 Configuring OS/2 Warp for Peer-to-Peer Printing

The OS/2 Warp Peer-to-Peer Setup consists of these steps:

5.5.1 Creating a Printer Object

1. Double-click on the **OS/2 System** icon.

2. Double-click on **Templates**.

3. Point to the **Printer** template.

4. Press and hold the right mouse button.

5. Drag the template to a folder or the Desktop.

6. Release the right mouse button.

7. Type a name for the printer in the **Name** field.

8. Select a LPT **port**. This local printer port will later be associated with the I-O Print Server.

9. Select the appropriate **printer driver**. Complete additional instructions associated with loading the desired printer driver.

10. Click on **Create**.

5.5.2 Optional: Sharing

Share the printer with other clients on the network, by doing the following:

1. Right-click on the icon of the printer you just created.

2. Select **Start Sharing**.

5.5.3 Mapping the I-O Print Server to a Local Printer Port

1. Open an **OS/2 Window** (from the **LaunchPad** or by clicking on **OS/2 System** and then on **Command Prompts**).

2. At the OS/2 prompt, enter the following:

   net use *local port* *remote name**port*

   Where:

   local port is a port on the OS/2 workstation that is used for printing (for example: lpt1, lpt2, lpt3 and so on)

   remote name is the name used to identify the I-O Print Server. (i.e. the name assigned during NetBIOS configuration using the I-O PrintControl utility. See section 5.1)

   port is the I-O Print Server's physical port that the target printer is attached to. For example, the I-O 5450 Print Server offers three physical ports, LPT1, LPT2, and COM1.

   Note: For NetBIOS to run effectively, the PC printer port being captured should be assigned to the corresponding I-O Print Server port. i.e., Device LPT1 goes to print server port LPT1.

Example:

```
net use lpt1 \\sde_123456\lpt1
```

5.5.4 Modifying the Startup.cmd

By including the **net use** command in the OS/2 STARTUP.CMD, the printer attached to the I-O Print Server will automatically be made available to the OS/2 workstation. In addition, the **net share** command will automatically make the printer available to other OS/2 workstations on the LAN.

To modify the STARTUP.CMD do the following:

1. Open the **Enhanced Editor** (EPB) or another text editor.

2. From the menu bar, select **File**, then **Open**... .

3. Click on the **STARTUP.CMD** file, then press **OK**.

4. Add the following lines to the STARTUP.CMD file:

   net use *local port* *remote name**port*
   net share *printer name* /**PR**

   Where:

   local port is a port on the OS/2 workstation that is used for printing (for example: lpt1, lpt2, lpt3 and so on)

   remote name is the name used to identify the I-O Print Server (i.e. the name assigned during NetBIOS configuration using the I-O PrintControl utility. See section 5.1)

port is the I-O Print Server's physical port that the target printer is attached to. For example, the I-O 5450 Print Server offers three physical ports, LPT1, LPT2, and COM1.

printer name is the name you assigned to the printer object (see section --).

5. If the STARTUP.CMD file does not already end with it, enter the word **EXIT** on the last line of the script. (See following example)

```
NET USE LPT4 \\SDE_123456\LPT1
NET SHARE 5450_PRT /PR
EXIT
```

6 SNA (APPC) PRINTING

If you have not already installed the I-O Configuration or PrintControl utility, please go back to I-O Configuration and PrintControl Installation (see Section 2.2) and do so now. Then proceed with the following instructions. The section "*Retrieving AS/400 Parameters*" will help you locate the necessary AS/400 parameters to properly configure the I-O Print Server.

After you have completed the configuration of these protocols, go to either *Chapter 7 - IBM SCS Printing, Chapter 8 - IBM Mainframe SCS/DSC printing* or *Chapter 9 - IBM IPDS Printing* to identify the printer types attached to the physical port(s) of the I-O Print Server, their IBM emulation types, etc.

6.1 Configuring the I-O Print Server

The instructions in this chapter refer to the older I-O PrintControl Utility. Even though the processes are similar for the I-O Configuration Utility, you may want to refer to the I-O Configuration Utility | Help menu option for specific information on using the configuration utility.

After starting the I-O PrintControl utility, select the desired I-O Print Server from the displayed list. The I-O Print Servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the **Configure** button displayed in the tool bar. Follow these simple steps to configure the I-O Print Server for SNA (APPC) printing.

1. Select **SNA (APPC)** by clicking on the white box in front of that selection.

2. The right column titled "Object Information" will display the available configuration parameters.

    a. In the field titled "Adapter Address" enter the **Local adapter** address found in the AS/400's line description. If the I-O Print Server is attached to a remote controller or gateway enter the address of the Ethernet adapter of that remote controller or gateway. Make sure to use the format specified in the field (XX:XX:XX:XX:XX:XX). Refer to section 6.2.1 if you need help locating this address on your AS/400.

    b. In the field titled "Host Network ID" enter the **Local network ID** found in the AS/400's network attributes listing. Again, refer to section 6.2.2 if you need more help locating this information.

    c. In the "Host Control Point Name" field enter the **Local control point name** found in the AS/400's network attributes listing.

    d. In the field titled "Interface Control Point Name" enter a **name** for the I-O Print Server. Make sure the name complies with the following requirements:

        1) The name must be exactly 8 characters.

        2) The name must start with a alphanumeric character (i.e. A-Z).

        3) The name must consist of alphanumeric (a-z, A-Z) or numeric (0-9) characters only. Spaces, underscores, slashes, etc., are not accepted.

4) The first four characters should uniquely identify the device, since the I-O Print Server will automatically create printer devices on your AS/400 using the first four characters of the name you assigned to the I-O Print Server followed by PRTXX.

3. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

4. The I-O Print Server will now automatically create the following devices on you AS/400:

   a. APPC Controller with the name you assigned as the "*Interface Control Point*". This step will be omitted if the I-O Print Server is attached to a 5494 controller.

   b. 5494 Controller with the first five characters of the "*Interface Control Point*" name followed by the identifier **RMT**.

   c. A printer device for every printer that was attached to the I-O Print Server at the time the new configuration was sent to the I-O Print Server or when the I-O Print Server was last reset. Names for the printer devices are actually given by the AS/400 system and follow this format:

      ABCD**PRT**XX

      where

      ABCD are the first four characters of the "*Interface Control Point*" name;

      PRT is a fixed identifier for printers;

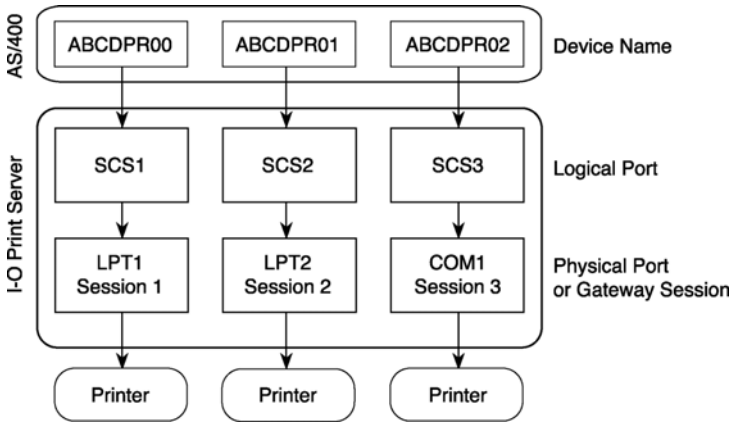
      XX identifies the printer(s) that was(were) actually attached to the I-O Print Server at the time the SNA (APPC) configuration was applied to the I-O Print Server or at the time the I-O Print Server was last reset. XX identifies the printer(s) attached to the I-O Print Server in the following manner:

XX-Value	Printer Attached to I-O Print Server Physical Port or Gateway Session	Corresponding logical port with 5250 printer session
00	LPT1 or Session 1	SCS1
01	LPT2 or Session 2	SCS2
02	COM1 or Session 3	SCS3

5. To send a print job to the printer attached to the LPT1 port of the I-O Print Server, simply direct the print job on the AS/400 to the print device ABCDPRT00. When the print server receives a print job, it will direct that job through a "logical port" so that the EBCDIC data and SCS commands can be converted into ASCII and the appropriate printer command language for the printer attached to the print server.

   Logical ports act as filters. They convert incoming EBCDIC data according to a pre-determined 5250 printer profile before sending the data to the associated physical port and from there to the attached ASCII printer. See the IBM AS/400 SCS Print chapter for a description of setting up the printer profile.

The following diagram illustrates how the host's printer devices, logical ports, physical ports and attached printer relate to each other.



6.2 Retrieving AS/400 Parameters

This section explains how to locate the parameters needed for the configuration of the I-O Print Server, namely:

6.2.1 Adapter Address (AS/400)

1. Type **WRKLIND** (Work Line Description) on the AS/400's command line. Press **Enter**.

2. Locate the line that the I-O Print Server is attached to from the displayed lines. Enter **5** (Display) in the field in front of that line. Press **Enter**.

3. Locate the **Local adapter address**. This is the value you wanted to find. As you enter it in the I-O PrintControl's menu, make sure to change the format to XX:XX:XX:XX:XX:XX.

6.2.2 Host Network ID and Host Control Point Name

1. Type **DSPNETA** (Display Network Attributes) on the AS/400's command line. Press **Enter**.

2. The *Host Network ID* is listed as the **Local network ID** and the *Host Control Point Name* is listed as the **Local control point name**.

6.2.3 AS/400 Auto-Configuration

Make certain that the AS/400 is set up for auto-configuration of new devices by doing the following:

1. On the AS/400 command line type; DSPSYSVAL SYSVAL(QAUTOCFG), then press <ENTER>. The **Auto Configure device** parameter should be set to **1=ON**.

2. On the AS/400 command line type: DSPSYSVAL SYSVAL(QAUTORMT), then press <ENTER>. The **Auto Configure Remote** Controller parameter should be set to **1=ON**.

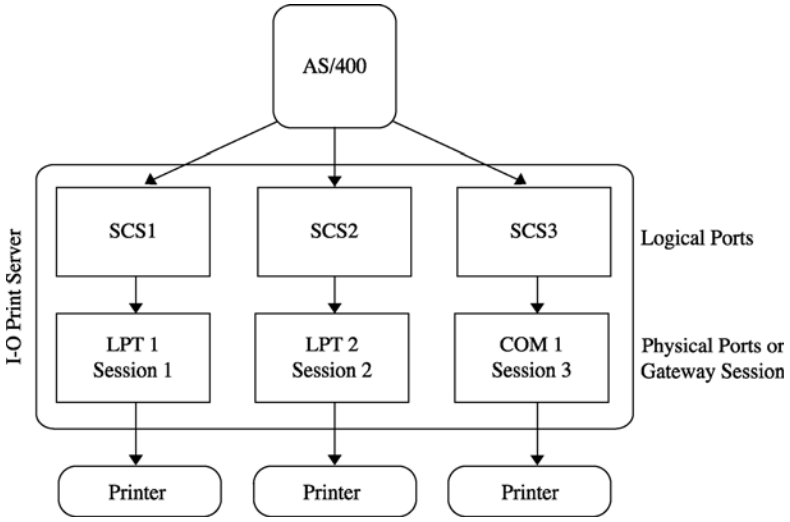
3. On the AS/400 command line type; DSPSYSVAL SYSVAL(QAUTORMT), then press <ENTER>. The **Number of devices to auto configure** should be large enough to account for all virtual (APPC) devices on your network. If you are unsure, you may want to increase this number.

4. On the AS/400 command line type ; WRKLIND, then press <ENTER> Enter a **5** to display, or **2** to change in front of the line that the I-O LAN RPC is attached to. Press <ENTER> several times until **Autocreate controller** is displayed in the lower section of the menu options. Verify that the **Autocreate controller** parameter is set to ***Yes**.

7 IBM AS/400 SCS PRINTING

The I-O Print Server allows you to turn every attached printer into a unique, individually configurable 5250 printer. For instance, if you are operating an I-O 5450 print server you will be able to run up to three different 5250 printer sessions.

To assure trouble-free operation, 5250 EBCDIC data streams (SCS) are sent to "logical ports". Logical ports act as filters. They convert incoming EBCDIC data according to a pre-determined 5250 printer profile before sending the data to the associated physical port or Gateway session and from there to the ASCII printer. The following diagram illustrates how logical ports, physical ports and attached printers relate to each other.



Follow the instructions below to configure the I-O Print Server's 5250 printer emulations.

7.1 Configuration Using I-O PrintControl

The instructions in this chapter refer to the older I-O PrintControl Utility. Even though the processes are similar for the I-O Configuration Utility, you may want to refer to the I-O Configuration Utility | Help menu option for specific information on using the configuration utility.

After starting the I-O PrintControl utility, select the desired I-O print server from the displayed list. The I-O print servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the **Configure** button displayed in the tool bar. Follow these simple steps to configure the IBM 5250 logical ports.

1. Click on the **Printer Ports/Emulations** button.

2. From the table below select the appropriate **AS/400 SCS Printing** port by clicking on the respective button.

   a. Select the IBM **Printer Emulation** that best fits your needs from the pop-up list.

If your printer is attached to this physical port or Gateway Session of the I-O Print Server	Click on this logical port button
LPT1 or Session 1	SCS1
LPT2 or Session 2	SCS2
COM1 or Session 3	SCS3

   b. From the available pop-up list select the **Printer Driver** that best matches the attached printers personality.

3. If you need to configure more 5250 printer emulation parameters, click on **Advanced**. Refer to *Description of Configuration Options* (see section 7.4) for descriptions of the various parameters.

4. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O print server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

7.2 Configuration Using Host Download Commands

Host Download commands are an alternative to the I-O PrintControl utility for configuring the I-O Print Server. Host Download commands are sent from the AS/400 to the I-O Print Server. All configuration parameters pertaining to the IBM printer emulation can be modified using Host Download commands. For a description of the Host Download commands see *Description of Configuration Options*. The text below explains how to use Host Download commands.

Host Download commands are placed in a Host document or on the screen. The document or screen print is then sent to one of the SCS logical ports of the I-O Print Server. As part of the 5250 data stream processing, the I-O Print Server monitors the data stream and filters out Host Download commands. These commands will not print, but will be used to configure the I-O Print Server.

Host Download commands sent to the I-O Print Server take effect immediately and stay only in the print server's active memory. To save the changed configuration beyond a power off, Host Download command &%Z99,0 must be sent.

Take the following steps to enter a host download command.

1. Type the Command Pass-Thru (CPT) delimiter **&%** (or the alternate CPT start delimiter) in the document 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. &%Z**05**,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 Print Server 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.

7.3 Configuration Options

The following table shows the available configuration options for the 5250 printer emulations of the I-O Print Server in alphabetical order. However, please refer to the associated Reference Number to locate the corresponding description later in this chapter.

Configuration Option	Ref. No.	Host Download	Found in I-O PrintControl Section
10 CPI String	86	Yes	User-Defined Strings
15 CPI Printing	28	Yes	Dot-Matrix Printing
12 CPI String	88	Yes	User-Defined Strings
15 CPI String	87	Yes	User-Defined Strings
17.1 CPI String	89	Yes	User-Defined Strings
6 LPI Strings	84	Yes	User-Defined Strings
8 LPI Strings	85	Yes	User-Defined Strings
ASCII Hex Dump	43	Yes	Troubleshooting
Auto Print Orientation	08	Yes	Laser Printing
Bin Selection	09	Yes	Dot-Matrix Printing
Character Set	17	Yes	5250 Setup
CPT End Delimiter	02	Yes	5250 Setup
CPT Start Delimiter	01	Yes	5250 Setup
Default Command Pass Thru	44	Yes	N/A
Default Print Quality	22	Yes	Dot-Matrix Printing
Draft Printing	23	Yes	Dot-Matrix Printing
Duplex Printing	33	Yes	Paper Handling Supp.
EBCDIC Hex Dump	42	Yes	Troubleshooting
Font Strings	21	Yes	User-Defined Strings
Horizontal Margin	19	Yes	Laser Printing
Host Initialization String	11	Yes	User-Defined Strings
Host Language	05	Yes	5250 Setup
IBM Drawer 1	13	Yes	Paper Handling Supp.

IBM Drawer 2	14	Yes	Paper Handling Supp.
IBM Drawer 3	15	Yes	Paper Handling Supp.
IBM Drawer 4	30	Yes	Paper Handling Supp.
IBM Drawer 5	31	Yes	Paper Handling Supp.
IBM Motion Commands	25	Yes	Dot-Matrix Printing
LPI	10	Yes	Laser Printing
Override Format Commands	16	Yes	5250 Setup
Paper Size	09	Yes	Laser Printing
Print Orientation	07	Yes	Laser Printing
Print Setup Parameters	98	Yes	N/A
Printer Emulation	24	No	SCS
Process Left Margin	35	Yes	N/A
Restore Factory Defaults	98	Yes	Factory Defaults
Save All Current Settings	99	Yes	N/A
User Defined Strings	04	Yes	User-Defined Strings
Vertical Margin	18	Yes	Laser Printing
Warp/Truncate	26	Yes	Dot-Matrix Printing

7.4 Description of Configuration Options

The following pages will describe the configuration options available for your particular printer.

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

The last valid setting will be unchanged.

REFERENCE NO 01: CPT START DELIMITER

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

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

Example: &%Z01,#* This Host Download command creates the CPT start delimiter #*.

REFERENCE NO 02: CPT END DELIMITER

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

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

REFERENCE NO 04: USER-DEFINED STRINGS

Creates up to ten user-defined strings to send to the printer later. 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 the interface's memory under the selected value number (0 to 9). To activate the command, place a &%UX (where X is the value number) in the document.

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

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

REFERENCE 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 Host Download command selects the multinational character set.

REFERENCE NO 07: PRINT ORIENTATION

HP PCL. Determines the print orientation if it is not already determined through the host or the interface's Automatic Page Orientation (APO) feature (Reference No. 08).

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

Note: Refer to Section 7.5.4 for a detailed description regarding print orientation.

Example: &%Z07,2 This Host Download command selects landscape

REFERENCE NO 08: AUTOMATIC PRINT ORIENTATION

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

VALUE	DESCRIPTION
0	APO Off
*1	APO On

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

Example: &%Z08,1 This Host Download command turns the Automatic Print Orientation on.

REFERENCE 09: PAPER SIZE/BIN SELECTION

Selects paper size settings if the printer attached is a laser. With the default "*Host Selected*", the I-O Print Server 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 Print Server 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 Only*" selected, the I-O Print Server will always instruct the printer to load A4 size paper. If the "*Printer Selected*" option is chosen, the I-O Print Server 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	DESCRIPTION	EPSON DFX DOT-MATRIX PRINTERS
*0	Paper size specified by host software	Bin commands are sent to the printer
1	A4 size paper	No bin commands are sent to the printer
2	Paper size selected through Printer's front panel	

Example: &%Z09,1 This Host Download command selects A4 size paper.

Reference No 10: LPI

Laser Printing Only: 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. The last selection applies only if you want to run software that was set up for older XPoint Twinax Controllers.

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.

Reference No 11: HOST INITIALIZATION STRING

Laser Printing Only: Stores a string of up to 25 ASCII hex pairs that is sent to the printer after the print server has reconfigured the printer for host printing. This allows you to further modify the printer configuration (e.g. select a different font for all host printing). This init string will be sent to the printer at the beginning of each printed page.

VALUE	DESCRIPTION
0 (hex codes)	Stores the hex command as a part init string

Example: &%Z11,0(1B 26 6C 38 44) This Host Download command sets LPI to 8 LPI on a PCL laser printer.

Reference No 13: IBM DRAWER 1

Laser Printing Only: 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 print file) or Paper Drawer (in OfficeVision/400). 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 Print Server 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 Print Server 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 an HP LaserJet 4Plus, this would be the 500 sheet Cassette.

REFERENCE NO 14: IBM DRAWER 2

HP PCL only. 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 an HP LaserJet 4 Plus to the host's paper drawer 2 command.

REFERENCE NO 15: IBM DRAWER 3

HP PCL only. 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 an HP LaserJet 4 Plus to the host's paper drawer 3 command.

REFERENCE NO 16: OVERRIDE FORMAT COMMANDS

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

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

Example: &%Z16,1 This Host Download command enables the front panel to override all IBM format commands

REFERENCE 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 This Host Download command selects the Latin 1 character set which includes the Euro symbol.

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

REFERENCE NO 18: VERTICAL MARGIN

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

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

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

REFERENCE NO 19: HORIZONTAL MARGIN

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

VALUE	DESCRIPTION
-127 to 127	
*0	Default

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

REFERENCE NO 21: FONT STRINGS

This section only applies when operating IBM 3812 emulation. 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 an HP LaserJet or Lexmark Laser printer:

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

Note: Font IDs assigned through this Font String feature cannot be used with the ¬F font change command. (see Section7.5.2)

REFERENCE NO 22: DEFAULT PRINT QUALITY

The selection only applies when running the IBM 4214 printer emulation. Defines the print quality when the host sends command to use the "*default*" print quality. The I-O Print Server offers the selections *Draft* and *NLQ*. If the attached printer has the capability, Draft printing can be further defined. Refer to *Reference No. 23*: *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 *Reference No. 16: Override Format Commands*, for more information.

VALUE	DESCRIPTION
*0	DRAFT is default print quality
1	NLQ is default print quality

Example: &%Z22,1 This Host Download command selects NLQ as the default print quality.

REFERENCE NO 23: DRAFT PRINTING

This section only applies when running the IBM 4214 printer emulation. Selects the Draft Printing mode when a draft print command comes from the host or from the I-O Print Server (see Reference 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

REFERENCE NO 24: PRINTER EMULATION

This selection is not accessible through Host Download command! Selects the IBM printer emulation.

If you are attaching a PCL laser or ink jet printer, select the IBM 3812 emulation. If you are attaching a dot-matrix or line printer the IBM 4214 emulation is the recommended choice. If you are printing to a specialty printer such as a bar code label printer or embosser, or if you are printing to an older, lower-featured dot-matrix or line printer, you should select the IBM 5256 printer emulation.

The AS/400 will auto-configure when the I-O Print Server is reset, which happens automatically when you click on the I-O PrintControl's *Apply Changes* button.

Refer to *Matrix/Specialty Printer Operation* for more information on the available IBM printer emulations.

REFERENCE NO 25: IBM MOTION COMMANDS

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

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

Note: The Generic printer driver is strongly recommended when using a selection other than the default.

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

REFERENCE NO 26: WRAP/TRUNCATE

This selection only applies when a dot-matrix or printer is attached. 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: Also see *Reference No. 09: Paper Size*

REFERENCE NO. 28: 15 CPI PRINTING

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

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

Note: IBM Proprinters cannot print 15 CPI. The I-O Print Server 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.

If your printer down support 15 CPI printing, you should select the Epson DFX+ printer driver.

Example: &%Z28,1 This Host Download command sets the printer interface to "artificially" produce 15 CPI printing.

REFERENCE NO. 30: IBM DRAWER 4

HP PCL only: Matches the host's Paper Drawer 4 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 4, the printer will feed from the paper source assigned to paper drawer 4. Consult the printer's user's guide for the available paper sources and respective numbers.

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 an HP LaserJet 4 Plus to the host's paper drawer 4 command.

REFERENCE NO. 31: IBM DRAWER 5

HP PCL only: Matches the host's Paper Drawer 5 command with a physical paper source from the printer. When the host sends a command to the printer to feed from paper drawer 5, the printer will feed from the paper source assigned to paper drawer 5. Consult the printer's user's guide for the available paper sources and respective numbers.

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 an HP LaserJet 4 Plus to the host's paper drawer 5 command.

REFERENCE NO. 33: DUPLEX PRINTING

HP PCL only. Sets the I-O Print Server to duplexing mode. This applies only when a printer with duplexing capability is attached.

VALUE	DESCRIPTION
*0	Off
1	Duplexing
2	Duplexing-Tumble

Example: &%Z33,2 This Host Download command instructs the I-O Print Server to duplex and tumble all host print jobs.

REFERENCE NO. 35: Process Left Margin Before/After Command Pass-Thru

This command is used in certain special applications where an end user desires to send Command Pass-Thru commands at the beginning of a line after the left margin. This command allows the left margin to be positioned either before or after the Command Pass-Thru (CPT) command. Normally at the beginning of a line the left margin is inserted after the CPT command. However, if a customer were to use a &%1B&% as the Escape command at the beginning of a command string such as &%1B&%k0S, the Escape command 1B would be sent first, then a left margin, and then the rest of the command string k0S as text. This would result in no escape command being acted upon and the string k0S being printed. To keep the CPT and the string together, use option 1 to cause the left margin to be inserted prior to the CPT and its associated string.

VALUE	DESCRIPTION
0*	Left margin positioned after the CPT command (normal functioning)
1	Left margin positioned before the CPT command

Example: &%Z35,1 Inserts the left margin before the CPT command.

REFERENCE NO. 42: EBCDIC HEX DUMP

After receiving a start command the I-O Print Server, starting with the next buffer received, sends all host data directly to the printer as hexadecimal printing until the print server is powered off.

VALUE	DESCRIPTION
1	Start EBCDIC hex dump

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

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

Example: &%Z42,1 This Host Download command starts buffer hex dump printing.

REFERENCE NO. 43: ASCII HEX DUMP

After receiving a start command the I-O Print Server, starting with the next buffer received, translates all host data into ASCII (from EBCDIC) and then causes the ASCII data to print in hexadecimal form. The ASCII hex dump is performed until the print server is powered OFF or until Host Download command Z43,0 is received.

VALUE	DESCRIPTION
*0	Stop ASCII Hex Dump
1	Start ASCII Hex Dump

Example: &%Z43,1 This Host Download command starts ASCII hex dump printing.

REFERENCE NO. 44: DEFAULT COMMAND PASS-THRU

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

VALUE	DESCRIPTION
0*	CPT disabled
1	CPT enabled

Example: &%Z44,1 Enables the default Command Pass-Thru

Note: Command Z44,0 disables all subsequent host download commands and treats any string of text received with &% as printable characters and passes them on to the printer. This may be desired when certain text strings need to be passed to a printer equipped with MICR capability or other functionality. Be aware that Commands 1 and 2 allow the selection of alternate CPT start and end characters that may affect this command's use.

REFERENCE NO. 84: 6 LPI STRING

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 Print Server receives a 6 LPI command from the host, it sends the string specified through this configuration option.

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

* Only characters from 01 to FF are recognized (alphabetic characters must be in upper case). Errors in the hex string will cause the print server to ignore the command and printing will resume at the point the error occurred.

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

Note: If 6 LPI string is specified, the interface will ignore all 6 LPI requests from the host.

REFERENCE NO. 85: 8 LPI STRING

Used when the Generic printer driver and IBM 5224 or 5225 emulation is selected to define the 8 LPI string. See Reference 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 Host Download command stores the 8 LPI command for an Epson LQ-2500 printer (hex value 1B 30) in the interface's memory.

REFERENCE NO. 86: 10 CPI STRING

Used with the Generic printer driver to define the 10 CPI string. See *Reference 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 the interface's memory.

REFERENCE NO. 87: 15 CPI STRING

Used when the Generic printer driver and IBM 5224 or 5225 emulation is selected to define the 15 CPI string. See *Reference 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 the interface's memory.

REFERENCE NO. 88: 12 CPI STRING

Used when the Generic printer driver and IBM 5224 or 5225 emulation is selected to define the 12 CPI string. See *Reference 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 the interface's memory.

REFERENCE NO. 89: 17.1 CPI STRING

Used when the Generic printer driver and IBM 5224 or 5225 emulation is selected to define the 17.1 CPI string. See *Reference 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 the interface's memory.

REFERENCE NO. 98: RESTORE DEFAULTS OR PRINT CONFIGURATION

See Section 9 for information on how to print self-test pages showing the configuration settings and on how to restore factory defaults.

REFERENCE NO. 99: SAVE ALL CURRENT SETTINGS

Permanently saves all current settings specified through Host Download commands parameters set through the I-O Print Control utility are automatically stored permanently.

VALUE	DESCRIPTION
0	Save all current settings

Example: &%Z99,0 This Host Download command saves all current settings to permanent memory

7.5 Laser Printer Operation

The I-O Print Server allows you to operate an ASCII laser printer just as you would an IBM 3812 printer. The following section describes how to access the many features of I-O's emulation of the IBM 3812 printer.

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

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

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

7.5.1 Changing Typestyles

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

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

Refer to the 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.

7.5.2 Font Change Commands

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

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

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

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

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

> Quality ¬Q88saves¬Q85 you time and money.

Here's how the print will look:

> Quality saves you time and money.

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

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

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

Here's how the print will look:

> Quality **saves** you time and money.

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

To print fonts that are not already supported through your I-O Print Server, refer to the Description of Configuration Options section. Reference No. 21 Font Strings.

7.5.3 Paper Output Bin Selection

The I-O Print Server 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:

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

7.5.4 Print Orientation

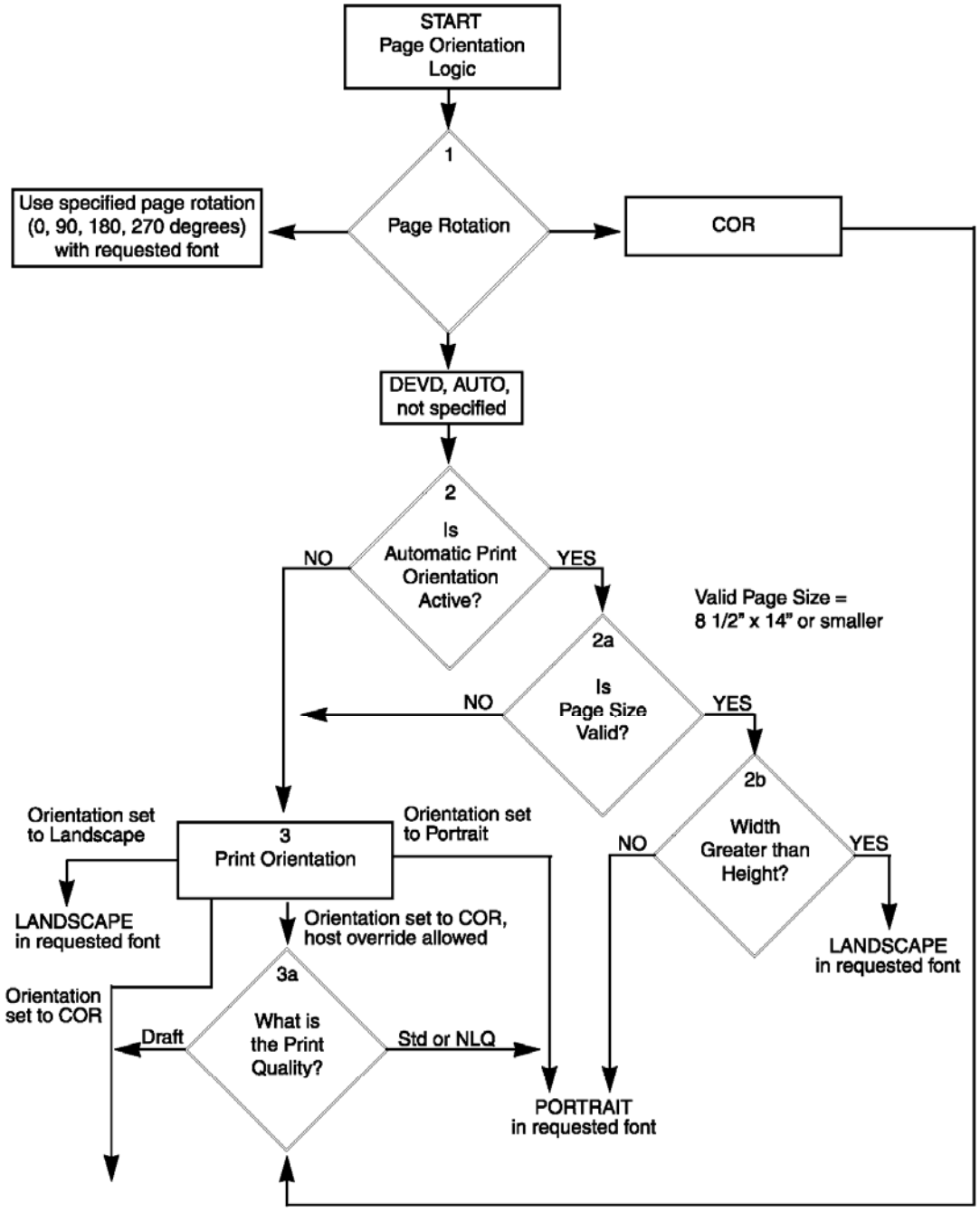
When operating the I-O Print Server in IBM 3812-1 emulation mode, the print orientation of the host document or report is determined by a variety of factors. These factors are in order of their impact on the final print orientation:

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

2. Automatic Print Orientation (APO) setting on the I-O Print Server.

3. Print Orientation setting on I-O Print Server.

As you read the explanation in the next three sections, refer to the diagram on the next page for an illustration of the print orientation logic.



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

7.5.4.1 Page Rotation (Block 1)

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

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

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

c. With the DEVD and AUTO settings the host does not influence the print orientation. Rather, the print orientation is determined by the settings on the I-O Print Server.

7.5.4.2 Automatic Print Orientation (Block 2)

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

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

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

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

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

7.5.4.3 Print Orientation Settings (Block 3)

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

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

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

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

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

The following tables show what page rotation settings can be manipulated through print quality settings and how the combination of page rotation and print quality affects the final print orientation.

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

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

Host CPI	Reduced to:
10	13.3
12	15
15	20

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

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

		Printer Interface Setting for	
Result	**Host Setting**	**APO**	**Print Orientation**
Data processing: Print reports with a width of 80 columns or less (at 10 CPI) in portrait AND print reports with a width of 132 (at 10 CPI) or 198 (at 15 CPI) columns in landscape with reduced font (COR) **Word processing**: Print documents of up to 8.5 x 14 in portrait, 14 x 8.5 in landscape, and anything larger in landscape with reduced font (COR)	Degree of Page Rotation .... *AUTO Rotate Paper.....=1 (Automatic) ait	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	Portr

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

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

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

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

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

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

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

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

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

To override the print file:

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

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

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

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

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

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

7.5.5 Envelope Printing

To print envelopes, set the I-O Print Server 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 following envelope sizes are supported by the I-O Print Server:

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

7.5.6 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, **Goto**, and type in **rf** for **Resetting Format**. Press ENTER. Select option 4 on the Alternate Format screen, **Begin Alternate Format**. Press ENTER.

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

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

7.5.7 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 Print Server 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 (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 Print Server can also be set to duplexing mode through the I-O Print Control utility 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 print server to duplex printing. To return to simplex printing, type and print &%Z33,0.

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

7.5.8 Other Printer Commands

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

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

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

Check the printer's manual or any optional technical manual for a description of the feature and the escape commands needed to access the feature. For example, ¬E(s3B would begin bold printing on an HP LaserJet printer.

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

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

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

7.6 Matrix Printer Operation

7.6.1 IBM Matrix Printer Emulations

The I-O Print Server offers the following IBM matrix printer emulations in addition to the IBM 4214 emulation which is used as the default.

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

These IBM matrix printer emulations can be selected through the I-O Print Control Utility. The I-O Print Server allows access to all the capabilities of the emulated IBM printer. The IBM 4214 printer offers 5,10,12,15, 16.7, and 20 CPI; 3,4,6, and 8 LPI; and print qualities of draft, fast draft, or NLQ.

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

The I-O Print Server offers the following printer drivers for matrix and specialty printers. Choose the one that most closely fits the attached printer.:

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

7.6.2 Graphics Printing

The I-O Print Server will print the same Advanced Printer Functions (APF) and Business Graphics Utility (BGU) graphics as the IBM 4214, 5224, and 5225 printers using All Points Available (APA) bit image graphics. This method is for printing continuous patterns such as bar codes and logos that come from the AS/400 host. This is the method of graphic printing that IBM used before IPDS was developed. This capability is supported by 5224, 5225 printers in spacing of 10 and 15 CPI and 4214 printers in spacing of 10, 12, and 15 CPI.

The interface implements the LAC command by taking the dot pattern received from the 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 4214/5224/5225 printers.

7.6.3 Generic Mode

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

In Generic mode, the I-O print server 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, see Reference Nos. 84-87).

For example, assume the printer protocol the printer requires is not available on the I-O Print Server. 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 interface receives a request for 10 CPI from the host, it will send the value 1B 50 to the printer and thereby set it to 10 CPI.

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

The I-O Print Server stores commands for the following CPI and LPI values:

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

7.7 Advanced Features

7.7.1 Command Pass-Thru

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

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

2. Convert the printer command to hexadecimal (ASCII).

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

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

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

For example:

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

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

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

to print on the printer as:

This is an underlined word.

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

Command Pass-Thru may invalidate horizontal spacing.

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

Avoid sending codes that would move the print position during Command Pass-Thru. Since the I-O Print Server 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.

7.7.2 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 Print Server 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 or IBM Proprinter or PPDS mode and emulate an IBM 4214 or 5224/25/56 printer.

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

Using the I-O bar code feature, the following bar codes can be easily printed: To print any of these bar codes, use the following format:

Type	Bar Code
1	Code 3 of 9
2	Code 128
3	Interleaved 2 of 5
4	POSTNET
5	UPC A
3	EAN 8
7	EAN 13
8	UPC A w/number system characters

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

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

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

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

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

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

<width> — Specifies the width of a bar code module. A module is defined as a specific combination of bars and spaces used to represent a human readable character. By changing the width parameter, you can determine the width of the module and the thickness of the bars and spaces.
Width parameters can range from 1 to 9.

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

Note: Be aware that the table gives rounded values only.

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

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

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

Module Width in mm (inches) - PCL Laser

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

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

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

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

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

0 = Do not print human readables.

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

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

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

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

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

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

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

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

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

Notes:

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

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

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

   ¬B2,6,6,3,0,0,code128¬B

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

   ,0,0,code128

   This helps quickly identify where the mistake occurred.

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

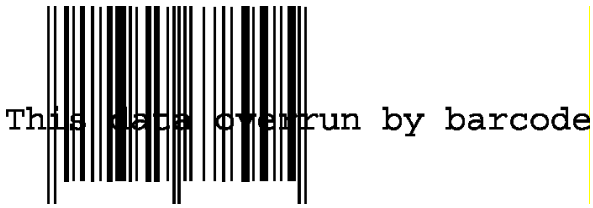
4. If invalid data (either too many characters or the wrong type of characters) is entered, the interface will print the error message: ** Invalid Data **

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

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

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

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



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

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

7. When using the UPC-A with Number System Character, the first data character is to be the designator of the number system.

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

Code 128

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

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

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

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

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

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

To show how multiple character sets are used, study the following data string. Height, width and other parameters were omitted in this example to focus your attention on the data string. Please note that this example is for illustration purposes only, and is not a recommended way of bar coding. The following data string is a fairly complex way of bar coding 10PrintBoxes10 .

¬B2,...,A1716~6PrintBoxes~510¬B

A:	selects code set A
17:	selects the number 1 from code set A
16:	selects the number 0 from code set A
~6:	switches from code set A to code set B
PrintBoxes:	selects the characters PrintBoxes from code set B

~5: switches from code set B to code set C
10: selects the number 10 from code set C

Symbol Character Value	Code A	Data Character 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

Symbol Character Value	Code A	Data Character Code B	Code C
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

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

Symbol Character Value	Code A	Data Character Code B	Code C
~0	RS	~	94
~1	US	DEL	95
~2	FNC3	FNC3	96
~3	FNC2	FNC2	97
~4	SHIFT	SHIFT	98
~5	CODE C	CODE C	99
~6	CODE B	FNC4	CODE B
~7	FNC4	CODE A	CODE A
~8	FNC1	FNC1	

7.7.3 I-O Graphics Language™

I-O Print Servers are equipped with I-O Graphics Language (IOGL). This language allows the user to enhance printed outputs from their IBM host with such graphical 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.

7.7.3.1 I-O Graphics Language™ Overview

The following table is a listing of the IOGL command strings and a brief description of the parameters used in the IOGL string.

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

Parameter	Description	Units of Measurement	Valid Values
'text'	text to be rotated or to be included in the IOGL program as a comment	N/A	any printable character
% shading	percentage of shading	percentage	0-100, integers
# of segments	number of segments to be printed in pie chart	each	1 to 9, integers
# of entries	number of values to be printed in bar or run (line) chart	each	1 to 12, integers
angle of rotation	angle of rotation of arc or text 0 to 100	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	

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

7.7.3.1.1 Helpful Hints

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

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

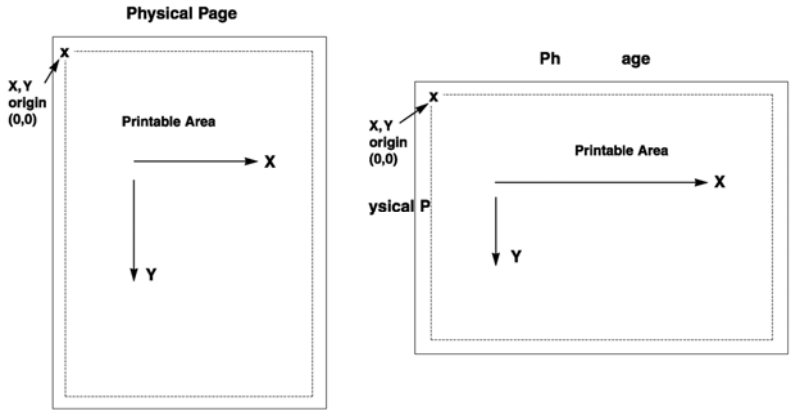


Figure 1

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

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

   ¬GL30;A;1;1;600

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

   A;1;1;600

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

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

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

7.7.3.1.2 Basic Description

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

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

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

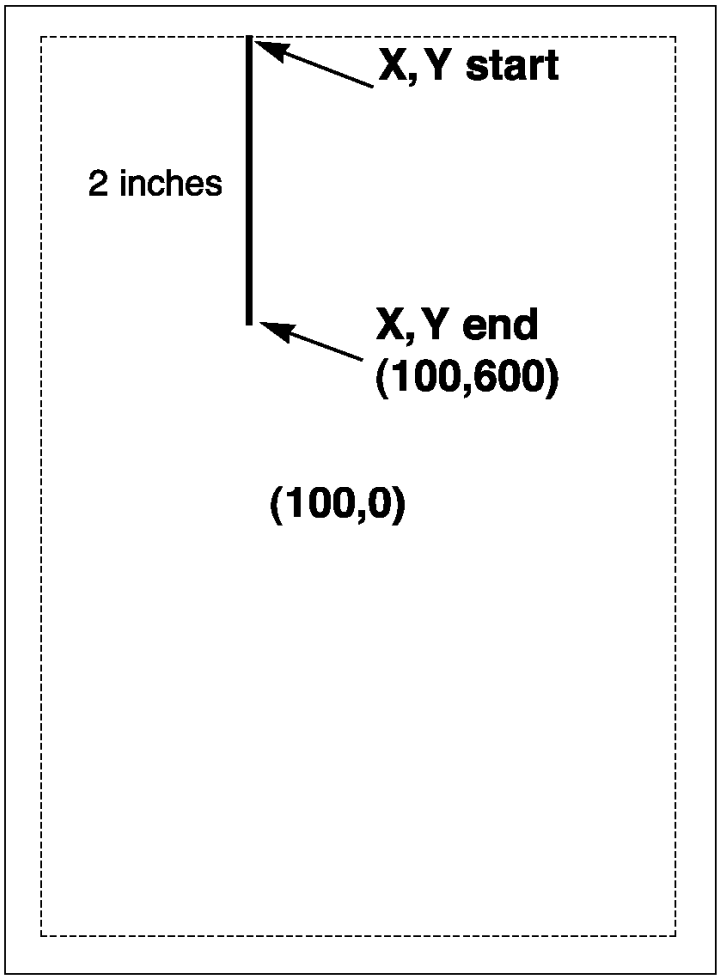


Figure 2

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

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

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

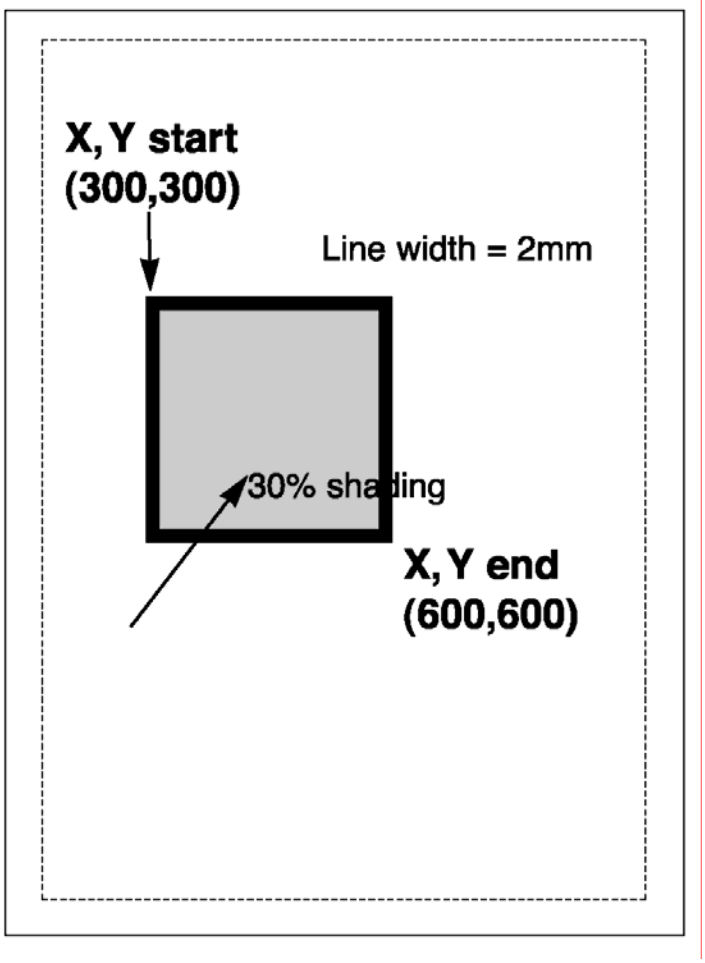


Figure 3

Circle - ¬GC<line width>;<x center>;<y center>;<radius>;<% shading>

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

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

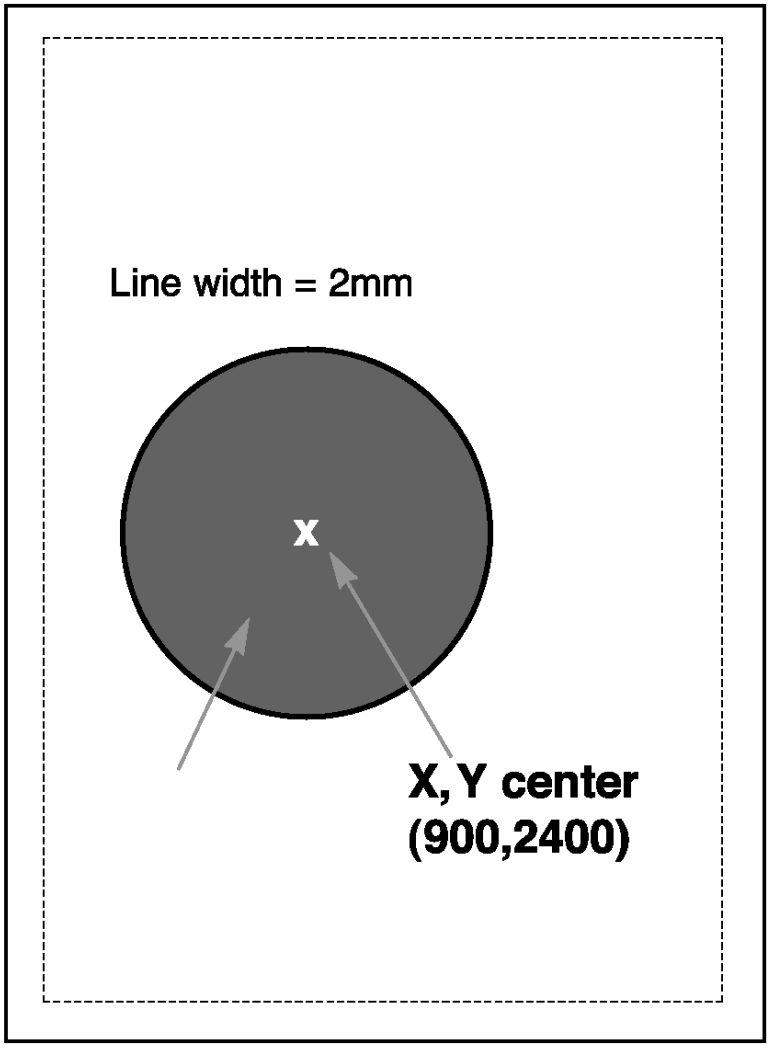


Figure 4

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

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

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

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

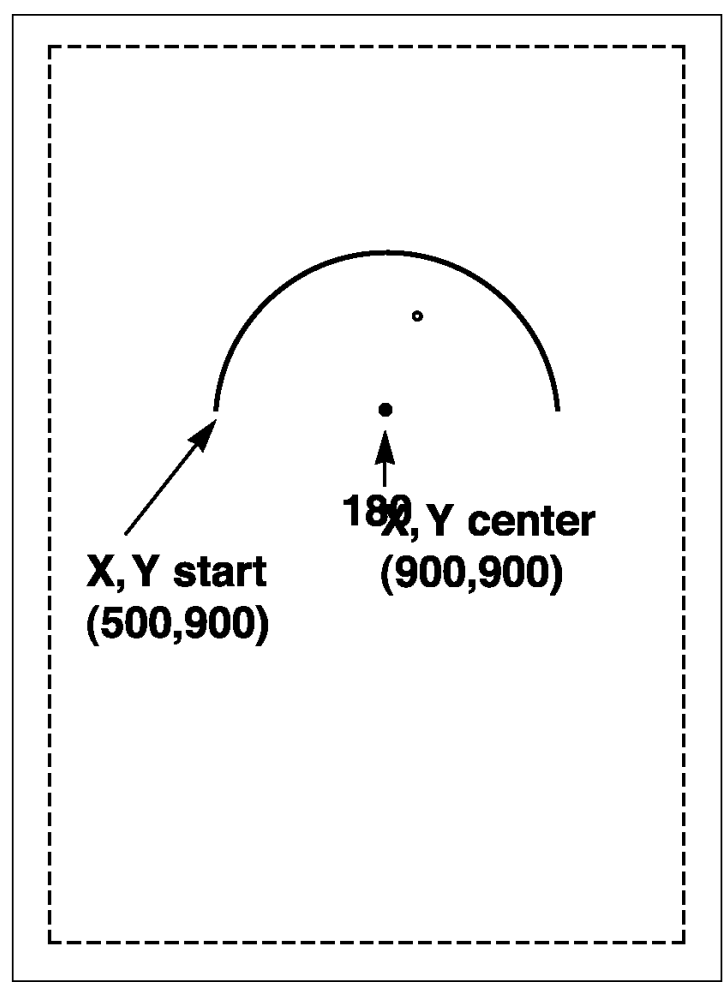


Figure 5

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

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

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

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

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

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

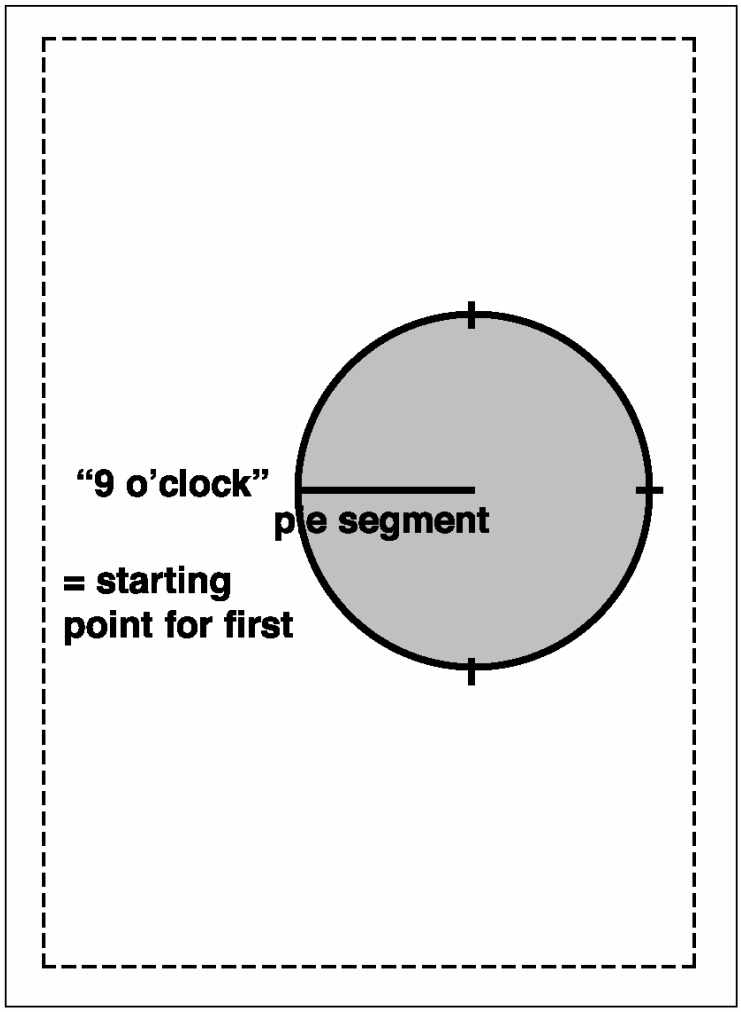


Figure 6a

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

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

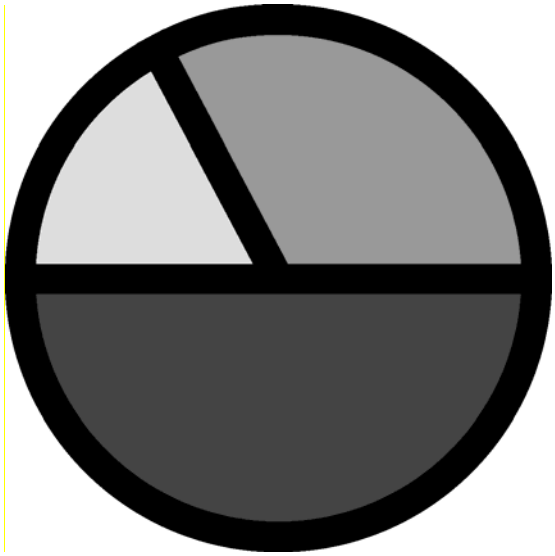


Figure 6b

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

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

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

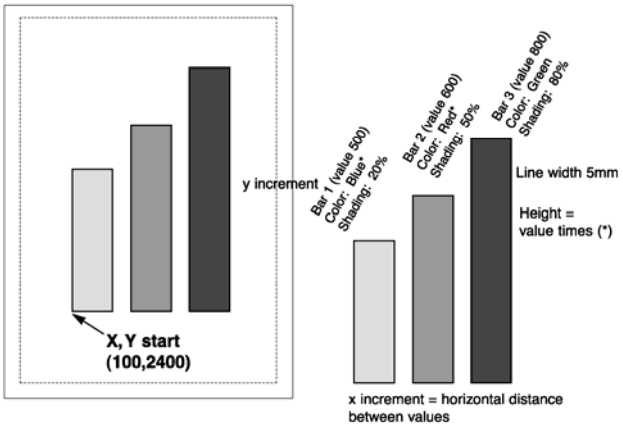


Figure 7

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

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

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

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

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

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

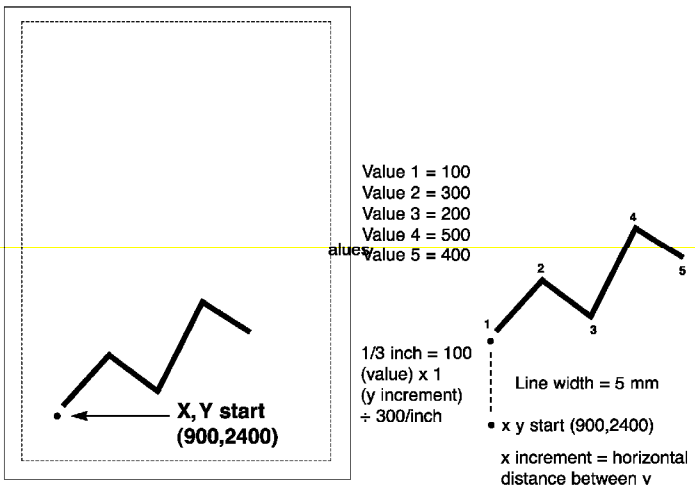


Figure 8

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

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

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

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

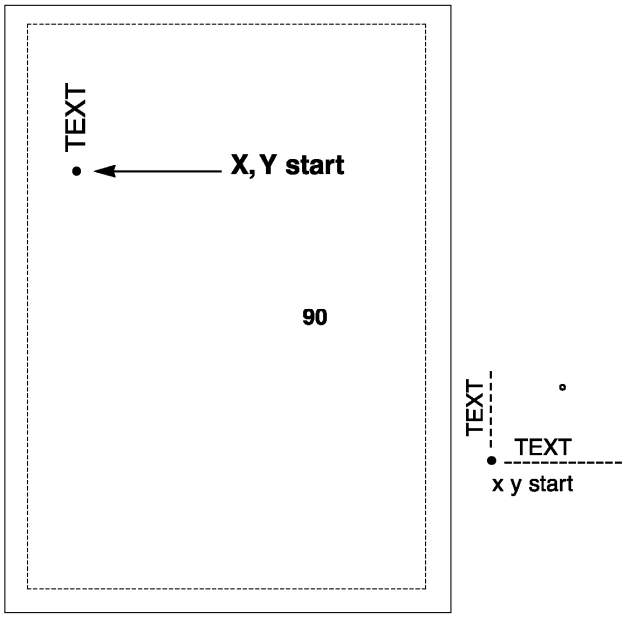


Figure 9

Comments - ¬GX<'text'>

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

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

7.7.3.2 I-O Graphic Language (IOGL) in Action

7.7.3.2.1 General Steps

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

7.7.3.2.2 Tutorial

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

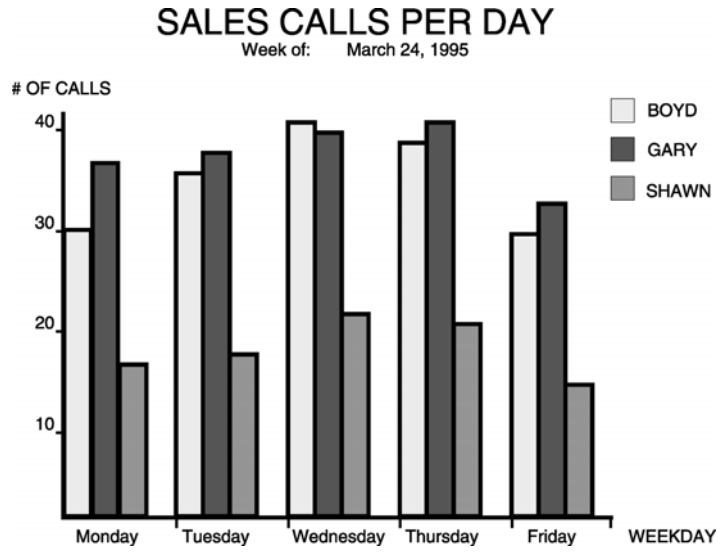


Figure 10

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

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

3. Determine where the chart should be placed (always in relation to the top left-hand corner of the printable area). In the example, the bar chart is on the bottom half of a letter size page. The origin of the chart is one inch away from the left margin and 10 inches away from the top margin (Figure 11).

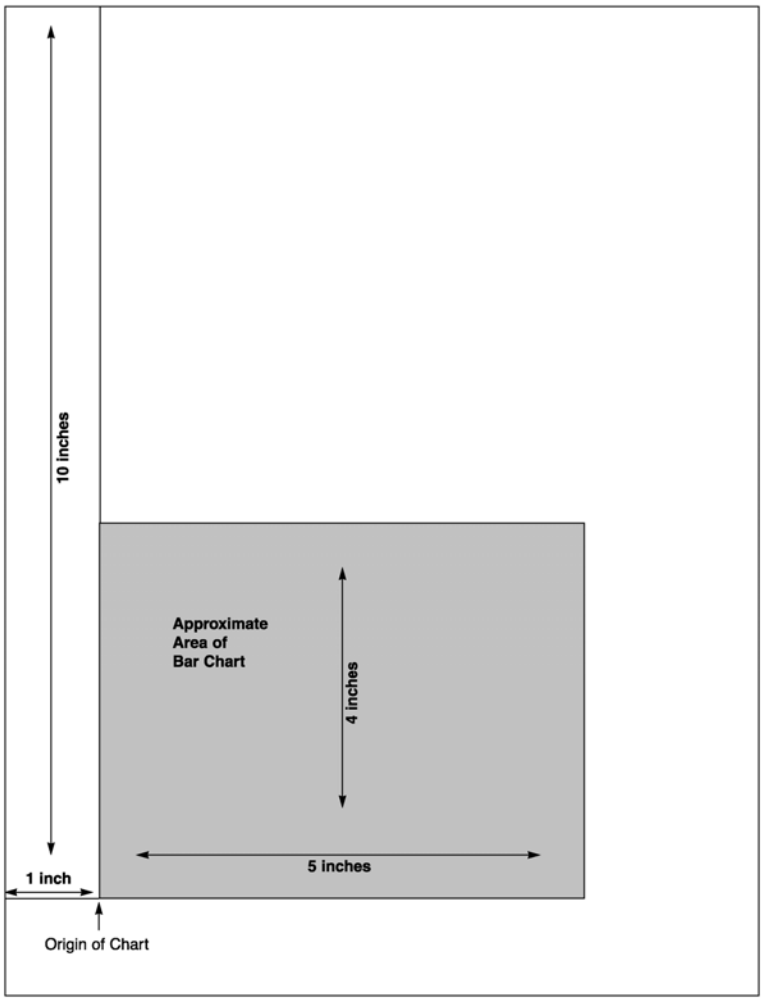


Figure 11

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

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

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

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

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

The bar chart was created using the following parameters:

Bar Chart Boyd

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

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

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

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

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

Bar Chart Gary

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

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

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

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

Bar Chart Shawn

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

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

The parameters are:

```
¬GX'bar chart Shawn'
¬GS5;04;50;04;50;04;50;04;50;04;50
```

7.7.3.2.3 X and Y-Axes

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

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

¬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
```

7.7.3.2.4 Labels/Title/Subtitle/Legend

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

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

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

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

¬GX;Font Change Command' ¬Q4813
¬GX'Title'
```

¬GT500;1500;0;'SALES CALLS PER DAY'

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

7.7.3.3 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.

7.7.3.4 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.

7.7.4 Color Printing

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

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

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

This prints ¬C02red¬C00 in red.

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

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

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

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

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

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

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

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

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

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

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

Example:

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

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

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

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

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

7.8 Specialty Bar Code Printer Support

Bar code printing can be done in two ways with I-O Print Servers. All I-O Print Servers support an advanced printing feature developed by I-O that uses a "Logical-Not (¬)"B command. On certain I-O Print Servers, such as the I-O 5431 BarCode Print Server, I-O has built in support for specialty bar code printers such as Zebra, Datamax, Sato, Tec, Intermec, Microcom, Avery Dennison/Novexx, Ring/Autonics, Eltron, UBI, Axiohm, Monarch and C.ITOH. This specialized software also enables the I-O 5450 BarCode Print Server to print its self-tests and diagnostic outputs such as hex dumps on the bar code's standard label making trouble-shooting much easier.

Setting up a specialty bar code printer is done in the same method as any other printer - by using the I-O PrintControl utility to select the appropriate print driver. If the specialty bar code printer uses a serial connection, you will also use the I-O PrintControl utility to configure the serial port.

1. From the PrintControl utility's main window, select the appropriate I-O BarCode Print Server such as an I-O 5431.

2. Click the **Configure** button, or double-click on the desired I-O Print Server.

3. After performing the necessary protocol configurations, click on the **Printer Ports/Emulations** button.

4. Click on the **SCS1** button.

5. From the **IBM Printer Emulation** drop down menu, select "5256".

6. From the **Print Driver** drop down menu, scroll down and pick the brand of bar code printer you are attaching. If the brand is not listed, select the brand the printer emulates.

7. Click on the **Printer Ports/Emulations** button again.

8. Click on the appropriate **LPT1 or COM1** button on which the printer is attached. The baud rate, parity and stop bits must match those at the printer.

   If using a parallel printer, select the port speed. Most printers work with the default "Standard" setting. However, some printers are not able to accept the high-speed data transfer of the standard setting. For these printers, choose the "Slow Output" selection.

   If using a serial printer, you must configure the serial communications parameters. The baud rate, parity and stop bits must match those at the printer.

   For serial connections, the I-O Print Server acts as the "DTE" device. On the I-O 5450 Print Server, the DB9 connector uses software and hardware flow control via X=On, X=Off and DSR. On the I-O 5431 BarCode Print Server, the DB25 connector uses hardware flow control via CTS. See Appendix C.

9. Click on the **Apply Changes** button and reset the Print Server to complete the process.

7.9 Digital Printer Finishing Features

Digital printers offer more functionality than line or laser printers in the form of "finishing features". Finishing features includes stapling, stitching, folding, inserting, punching and so on. Document management features (such as queuing, multiple copies, etc.) are also considered to be part of the finishing feature set.

7.9.1 Canon

Canon imageRUNNER models that are supported by I-O Print Servers are:

I-O 5435dp:	Models with a fully functional parallel port including: imageRUNNER 330, 400, 550, 600, 60, 2200, 3300, 3800, 5000, 6000
I-O 5755dp:	All imageRUNNER models
I-O 5435dp:	All imageRUNNER models

7.9.1.1 Configure the imageRUNNER

For models 330, 400, 550, 600 and 60, the following configuration settings must be made before using the I-O Print Server with the imageRUNNER:

Server Version:	2.0 or higher
Enable Parallel Port:	Yes
Port Timeout in Seconds:	30
Ignore EOF Character:	Yes
Parallel Connection:	Direct Connection
Font Source:	Internal

For models 2200, 3300, 3800, 5000, and 6000, make certain that the parallel port is enabled and the time out has been set at 30 seconds or longer.

Canon imageRUNNER printers connected to an IBM host via Ethernet and an I-O 5735dp or 5755dp IPDS/SCS Printer Gateway require a bi-directional setting to be activated.

To turn on the bidirectional setting at the imageRUNNER:
1. Press the Additional Functions button on the panel.
2. Select System Settings on the touch screen.
3. Select Network Settings.
4. Select TCP/IP Settings.
5. Select RAW Settings.
6. Within the Raw Settings screen, select ON.
7. With the RAW / Use Bidirectional screen, select ON.
8. Press OK.
9. Press DONE repeatedly until returned to the normal operating screen.

When the bi-directional setting is turned on, the imageRUNNER will report the following conditions to the I-O Print Server. The print server will in turn report the appropriate printer status to the IBM host:

- Power Off is reported as Device Not Ready
- Paper Jam is reported as Device Not Ready
- Cover Open is reported as Device Not Ready
- Paper Out is reported as Paper Out
- True Print Complete reporting via PCL Echo is available.

7.9.1.2 Using Logical-Not Commands

For SCS printing, finishing features are easily accessed using I-O's unique scripting language. The scripting language uses "logical-not O" (¬O) commands. This language structure enables users to imbed finishing features directly within the print job without having to redo or customize complicated Host applications.

Each finishing feature has a command reference (the actual name of the feature) and a parameter (the description of where or how a feature is placed). I-O's logical-not command structure follows the same pattern except instead of spelling out each word in the command; I-O uses a shortened reference code for each command. Following the ¬O is a "C" (to signify Canon). The third character represents the command and the fourth character represents the parameter.

To successfully execute finishing features, the logical-not commands must always come at the beginning of a print job. These logical-not commands may be embedded in host programs, procedures, word processing documents, etc. In a word processing document, these commands start in line one, column one. Logical-not O commands may be strung together so that a number of finishing features may be used.

Once an SCS job, with logical-not commands, is sent to the I-O Print Server, they will be converted into the appropriate Canon PJL finishing instructions and sent onto the printer.

The following table shows the finishing features available on the imageRUNNER.

Finishing Command	Finishing Parameters	I-O Finishing Command Code
BOOKLET	OFF	B0
	ON	B1
COPIES	1 … 99 COPIES	C1 … C99
ENGINE SPOOL	OFF	E0
	ON	E1
FORM FILE	OFF	F0
	ON	F1
INTERLEAVE	OFF	I0
	BLANK	I1
	PRINT	I2
MAIL BOX*	ACTIVE	V1
MAIL BOX NUMBER*	0...99	M0 … M99
PROOF COPY	OFF	O0
	ON	O1
PUNCH	OFF	P0
	TOP	P1
	BOTTOM	P2
	RIGHT	P3
	LEFT	P4

SLIP SHEET	OFF	A0
	ON	A1
SORTER MODE	OFF	S0
	COLLATE	S1
	GROUP	S2
	CROSS COLLATE	S3
	CROSS GROUP	S4
STAPLE	OFF	T0
	ONE UPPER LEFT	T1
	ONE UPPER RIGHT	T2
	ONE LOWER LEFT	T3
	DOUBLE TOP	T4
	DOUBLE LOW	T5
	DOUBLE LEFT	T6
	SADDLE STITCH	T7
ZFOLD	OFF	Z0
	ON	Z1

* Mail box and the Mail box number must be used together.

Example: ¬OCT2 ¬OCP4

This example illustrates a print job that will sort each group, insert a cover sheet onto each, and staple every group on the top-left corner. The "¬O" is the beginning of the command. The "C" indicates that a Canon imageRUNNER 550 or 600 printer is the target printer. The "T" indicates that the stapling finishing feature will be applied to the print job, and the "2" tells the Canon to put the staple in the upper right-hand corner. The "¬OP4" command tells the Canon printer to punch on the left side of the stapled document. Any number of commands may be entered in this manner.

¬OCV1¬OCM7

In this example "¬OCV1" sends the print job to the mailbox, and "¬OCM7" identifies mailbox # 7.

7.9.1.3 Operational Notes

Not all finishing options listed in the previous section are available on every imageRUNNER model.

Cross-Group & Cross-Sort: These options are only available on the 550, 600, and 60 models. Many newer imageRUNNER printers can be setup to offset through the printer's front panel.

Booklets: When printing and 8 ½ x 11" booklet using 11 x 17" paper, in the PrintControl utility paper handling section, you will need to map the printer's 11 x 17" paper tray as 8 ½ x 11". Then when printing from the IBM host, send the input paper bin that coordinates with this new tray mapping. The printer will recognize that it is receiving 8 ½ x 11" pages, but will be using 11x 17" paper.

7.9.2 Kyocera

Kyocera models that are supported by I-O Print Servers are:

9120, 4530 ????

7.9.1.1 Configure the Kyocera

???

7.9.1.2 Using Logical-Not Commands

For SCS printing, finishing features are easily accessed using I-O's unique scripting language. The scripting language uses "logical-not O" (¬O) commands. This language structure enables users to imbed finishing features directly within the print job without having to redo or customize complicated Host applications.

Each finishing feature has a command reference (the actual name of the feature) and a parameter (the description of where or how a feature is placed). I-O's logical-not command structure follows the same pattern except instead of spelling out each word in the command; I-O uses a shortened reference code for each command. Following the ¬O is a "K" (to signify Kyocera). The third character represents the command and the fourth character represents the parameter.

To successfully execute finishing features, the logical-not commands must always come at the beginning of a print job. These logical-not commands may be embedded in host programs, procedures, word processing documents, etc. In a word processing document, these commands start in line one, column one. Logical-not O commands may be strung together so that a number of finishing features may be used.

Once an SCS job, with logical-not commands, is sent to the I-O Print Server, they will be converted into the appropriate Kyocera finishing instructions and sent onto the printer.

The following table shows the finishing features available. Depending upon the model and the physical configuration of the printer, not all finishing operations listed here are available on every printer.

Finishing Command	**Finishing Function**	**I-O Finishing Command Code**
BOOKLET	Left Bind	B1
	Right Bind	B2
FOLD	Center Fold with Staple	F1
OPTIONAL OUTPUT	Default Finishing	O1
	Option Bin 1	O2
	Option Bin 2	O3
	Option Bin 3	O4
	Option Bin 4	O5
	Option Bin 5	O6
	Optional Sorter	O7
	Optional Stacker	O8

PUNCH	Left Main	P1
	Right Main	P2
	Top Main	P3
	Left Sub	P4
	Right Sub	P5
	Top Sub	P6
STAPLE	Upper Left	T1
	2 Left	T2
	2 Up	T3
	Upper Right	T4
	2 Right	T5

Example: ¬OKT1 ¬OKP1

This example illustrates a print job that will place a staple on the top-left corner and punch the job on the left side. The "¬O" is the beginning of the command. The "K" indicates that a Kyocera printer is the target printer. The "T" indicates that the stapling finishing feature will be applied to the print job, and the "1" tells the printer to put the staple in the upper left-hand corner. The "¬OKP1" command tells the printer to punch on the left side of the stapled document. Any number of commands may be entered in this manner.

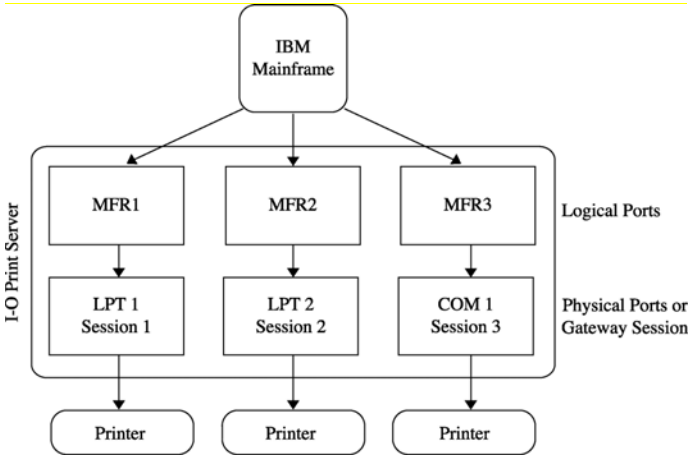
8 IBM MAINFRAME SCS/DSC PRINTING

I-O Enterprise Print Servers (such as the I-O 5450e) support for SCS and DSC (LU1 and LU3) printing from a IBM 3270 type mainframe.

After setting up the I-O Print Server (see Chapters 1, 2, and 3), the I-O Print Server is ready to operate in most 3270 environments. The factory default configuration settings will be satisfactory for many programs and applications. The I-O Print Server also can be configured to meet the special needs of an application program using host download commands.

The I-O Print Server allows you to turn every attached printer into a unique, individually configurable 3270 printer. For instance, if you are operating an I-O 5450e Print Server, you will be able to run up to three different 3270 printer sessions.

To assure trouble-free operation, 3270 SCS/DSC data streams are sent to “logical ports.’’ Logical ports act as filters. They convert incoming EBCDIC data according to a pre-determined 3270 printer profile before sending the data to the associated physical port or Gateway session and from there to the ASCII printer. The following diagram illustrates how logical ports, physical ports and attached printers relate to each other.



Follow the instructions below to configure the I-O Print Server's 3270 printer emulations.

8.1 Configuration Using I-O PrintControl

The instructions in this chapter refer to the older I-O PrintControl Utility. Even though the processes are similar for the I-O Configuration Utility, you may want to refer to the I-O Configuration Utility | Help menu option for specific information on using the configuration utility.

After starting the I-O PrintControl utility, select the desired I-O print server from the displayed list. The I-O print servers are identified through their serial number and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

Open the configuration dialog box by double clicking on the desired print server or by highlighting the desired print server and then pressing the **Configure** button displayed in the tool bar. Follow these simple steps to configure the IBM 3270 logical ports.

1. Click on the **Print Ports/Emulations** button.

2. From the table below select the appropriate **IBM Mainframe** port by clicking on the respective button.

If your printer is attached to this physical port or Gateway Session of the I-O Print Server	Click on this logical port button
LPT1 or Session 1	MFR1
LPT2 or Session 2	MFR2
COM1 or Session 3	MFR3

   a. Select the IBM **Printer Emulation** that best fits your needs from the pop-up list.

   b. From the available pop-up list select the **Printer Driver** that best matches the attached printers personality.

3. If you need to configure more 3270 printer emulation parameters, click on **Advanced**. Refer to 3270 *Configuration Options* (see section 8.3) for descriptions of the various parameters, or use the online help.

4. If you want to configure additional protocols, refer to the respective section. If your configuration of the I-O Print Server is complete, click on the **Apply Changes** button on the bottom of the configuration window. Then **Exit** the utility.

8.2 Configuration Using Host Download Commands

Host Download commands are an alternative to the I-O PrintControl utility for configuring the I-O Print Server. Host Download commands are sent from the IBM 3270 mainframe to the I-O Print Server. All configuration parameters pertaining to the IBM printer emulation can be modified using Host Download commands. For a description of the Host Download commands see *Description of 3270 Configuration Options*. The text below explains how to use Host Download commands.

Host Download commands are placed in a Host document or on the screen. The document or screen print is then sent to one of the MFR logical ports of the I-O Print Server. As part of the 3270 data stream processing, the I-O Print Server monitors the data stream and filters out Host Download commands. These commands will not print, but will be used to configure the I-O Print Server.

Host Download commands sent to the I-O Print Server take effect immediately and stay only in the print server's active memory. To save the changed configuration beyond a power off, Host Download command &%Z99,0 must be sent.

Take the following steps to enter a host download command.

1. Type the Command Pass-Thru (CPT) delimiter **&%** (or the alternate CPT start delimiter) in the document 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. &%Z**05**,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 Print Server 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 characters per inch, line spacing, and form length (commands 3, 4, and 5) in one command string, place **&%Z3,15/Z4,2/Z5,70** followed by a space, in the document. This selects 15 CPI, double spacing, and 70 lines.

8.3 3270 Host Download Command Overview

The following table lists the host download commands used to configure the I-O Print Server to fit your application needs. These commands can be sent to the I-O Print Server from the 3270 host in a document or through a screen print. A description of each command and how it is used is located directly after the table.

Configuration Option	Ref. No.	Host Download	Found in I-O PrintControl Section
3270 Host Initialization String	57	Yes	User-Defined Strings
Alternate Paper Tray Orientation	63	Yes	Laser Printing
Auto Print Tray Orientation	61	Yes	Laser Printing
Automatic Function at End of Job	20	Yes	LU3 Option
Character Set Selection	65	Yes	3270 Setup
Characters Per Inch	03	Yes	Page Setup
Command ID Character	41	Yes	3270 Setup
CPT Ending Delimiter Characters	39	Yes	3270 Setup
CPT Start Delimiter Characters	40	Yes	3270 Setup
CR at MPP+1	15	Yes	LU3 Option
Custom User Strings	55	Yes	User-Defined Strings
FF After Timeout	27	Yes	Print Setup
FF Valid Location	19	Yes	LU3 Option
Form Feed After Local Screen Copy	13	Yes	LU3 Option
Form Feed Before Local Screen Copy	12	Yes	LU3 Option
Form Feed Usage	25	Yes	Print Setup
Form Length	05	Yes	Page Setup
Intervention Required (IR) Timeout	34	Yes	Print Setup
Line Spacing	04	Yes	Page Setup
Lines Per Inch	02	Yes	Page Setup
LU1 Language	08	Yes	3270 Setup
LU3 Print Image (Non-SCS Mode)	14	Yes	LU3 Option
Manual Feed Tray Orientation	64	Yes	Laser Printing
Maximum Print Position	06	Yes	Page Setup
NL at MPP+1	16	Yes	LU3 Option

Configuration Option	Ref. No.	Host Download	Found in I-O PrintControl Section
Override of Formatting Commands	30	Yes	Print Setup
Overwrite DSC (LU3) Translation Table	71	Yes	Translation Tables
Overwrite EBCDIC (SCS/LU1) Translation Table	70	Yes	Translation Tables
Paper Path	11	Yes	Page Setup
Paper Size	32	Yes	Laser Printing
Primary Paper Tray Orientation	62	Yes	Laser Printing
Print Case	07	Yes	LU3 Options
Restore Defaults or Print Configuration	98	Yes	Restore Factory Def.
SCS TRN Translate	45	Yes	Print Setup
Start and Stop EBCDIC Hex Dump	42	Yes	Troubleshooting
Store Configuration in Permanent Memory	99	Yes	n/a
Suppress Empty Forms	26	Yes	Print Setup
Suppress IBM Control Codes	36	Yes	Print Setup
True LPI Spacing	38	Yes	Laser Printing
Truncate/Wrap Select	31	Yes	Dot-Matrix
Valid FF at End of Print Buffer	18	Yes	LU3 Options
Valid FF Followed by Data	17	Yes	LU3 Options
Vertical Channel Select (VCS)	37	Yes	Print Setup

8.4 Description of 3270 Configuration Options

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

COMMAND 2: LINES PER INCH

Selects default LPI.

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

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

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

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

COMMAND 3: CHARACTERS PER INCH

Selects default CPI

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

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

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

COMMAND 4: LINE SPACING

Selects default Line Spacing

VALUE	DESCRIPTION
*1	Single Space
2	Double Space

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

COMMAND 5: FORM LENGTH

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

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

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

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

COMMAND 6: MAXIMUM PRINT POSITION

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

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

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

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

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

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

COMMAND 7: PRINT CASE

Selects default print case.

VALUE	DESCRIPTION
0	Mono case
*1	Dual case

Notes: This default only affects LU3 printing

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

COMMAND 8: LU1 LANGUAGE

Selects default LU1 language.

VALUE	DESCRIPTION
*01	English (U.S.) EBCDIC
03	Austrian/German
04	Belgian
05	Brazilian
06	Canadian (French)
07	Danish/Norwegian
08	Danish/Norwegian (alt.)
09	Finnish/Swedish
10	Finnish/Swedish (alt.)
11	French
12 (same as 11)	French (alt.)
13	Austrian/German (alt.)
14	International Set 5
15	Italian
16	Japanese (English)
19	Spanish
20	Spanish (alt.)
21	Spanish Speaking
22	English (U.K.)
23 (same as 07)	Norwegian
24 (same as 09)	Swedish
25 (same as 01)	EBCDIC (alt.)
26 (same as 08)	Norwegian (alt.)
27 (same as 10)	Swedish (alt.)
28	Portuguese
29 (same as 06)	Canadian (Bilingual)
30 (same as 11)	French AZERTY (105 character)
31 (same as 14)	Swiss German
32 (same as 14)	Swiss French

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

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

COMMAND 11: PAPER PATH

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

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

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

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

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

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

COMMAND 12: FORM FEED BEFORE LOCAL SCREEN PRINT

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

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

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

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

COMMAND 13: FORM FEED AFTER LOCAL SCREEN COPY

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

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

Notes: To use this function, the RPQ should be:
IBM 3268 RPQ SC9508
IBM 3287 RPQ MC3750
IBM 4214 OPT 20=3
This command only affects the local screen copy, not the host-initiated local copy printing, and functions only in LU3 (non-SCS) operations

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

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

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

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

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

Available only in LU3 (non-SCS) operations

0 and 1 are only functional from CUT terminals.

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

COMMAND 15: CR at MPP + 1

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

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

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

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

COMMAND 16: NL at MPP + 1

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

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

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

Available only in LU3 (non-SCS) operation.

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

COMMAND 17: VALID FF FOLLOWED BY DATA

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

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

Notes: For the Value 1 selection, the RPQ would be:

IBM 3268 RPQ SC9503
IBM 3287 RPQ N/A
IBM 4214 OPT 16=2
Available only in LU3 (non-SCS) operation.

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

COMMAND 18: VALID FF AT END OF PRINT BUFFER

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

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

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

Available only in LU3 (non-SCS) operation.

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

COMMAND 19: FF VALID LOCATION

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

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

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

Available only in LU3 (non-SCS) operation.

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

COMMAND 20: AUTOMATIC FUNCTION AT END OF JOB

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

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

(unless a FF was last in the buffer).

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

Available only in LU3 (non-SCS) operation.

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

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

COMMAND 25: FORM FEED USAGE

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

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

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

COMMAND 26: SUPPRESS EMPTY FORMS

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

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

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

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

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

COMMAND 27: FF AFTER TIMEOUT

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

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

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

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

COMMAND 30: OVERRIDE OF FORMATTING COMMANDS

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

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

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

A reset command is sent to the printer before a 3270 print job in order to restore the printer's front panel default selections.

This command has no effect on the special features Command Pass-Thru, user strings, initialization strings and 3270 host RPQs.

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

COMMAND 31: TRUNCATE/WRAP SELECT

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

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

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

COMMAND 32: PAPER SIZE

Specifies the paper size used for printing

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

Example: &%Z32,1 Selects A4 paper

COMMAND 34: INTERVENTION REQUIRED (IR) TIMEOUT

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

VALUE	**DESCRIPTION**
000	Never send an IR
001 to 255	IR is sent (value *5) seconds after printer error occurs

*120	Default, send IR after ten minutes.

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

COMMAND 36: SUPPRESS IBM CONTROL CODES (Host Commands)

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

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

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

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

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

COMMAND 37: VERTICAL CHANNEL SELECT (VCS)

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

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

Example: &%Z37,0 Selects 3287 VCS emulation

COMMAND 38: TRUE LPI SPACING

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

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

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

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

COMMAND 39: CPT ENDING DELIMITER CHARACTERS

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

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

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

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

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

A hex code that starts with 00 is invalid.

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

COMMAND 40: CPT START DELIMITER CHARACTERS

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

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

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

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

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

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

A hex code that starts with 00 is invalid.

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

COMMAND 41: COMMAND ID CHARACTER

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

VALUE	DESCRIPTION
00	Deletes the previously selected character

ZZ	ZZ is the ASCII HEX value of the command ID character

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

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

COMMAND 42: START AND STOP EBCDIC HEX DUMP

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

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

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

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

COMMAND 43: START/STOP ASCII HEX DUMP

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

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

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

COMMAND 45: SCS TRN TRANSLATE

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

VALUE	DESCRIPTION
0	Binary Transparent
*1	Emulate IBM 3287 Printer

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

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

SCS code 36 functions the same as code 35.

Available in SCS (LU1) mode only.

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

COMMAND 55: CUSTOM USER STRINGS

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

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

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

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

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

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

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

COMMAND 57: 3270 HOST PORT INITIALIZATION STRING

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

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

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

The 3270 initialization string is only sent to the printer when you turn the printer on and after printing by the shared parallel port has occurred.

3270 Host SCS commands and download commands have priority over the initialization string instructions.

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

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

Example: &%Z57,1( ) Deletes from permanent memory any hex string that had been previously defined for the 3270 initialization string

COMMAND 61: AUTOMATIC PRINT ORIENTATION (APO)

Laser printers have the ability to automatically control page orientation if the user decides to activate Auto Print Orientation (APO). Refer to the 3270 page orientation logic chart in the Computer Output Reduction section of this manual.

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

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

Example: &%Z61,1 Disables APO

COMMAND 62: PRIMARY PAPER TRAY ORIENTATION

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

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

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

COMMAND 63: ALTERNATE PAPER TRAY ORIENTATION

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

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

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

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

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

COMMAND 64: MANUAL FEED TRAY ORIENTATION

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

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

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

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

COMMAND 65: CHARACTER SET SELECTION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

COMMAND 71: OVERWRITE DSC (LU3) TRANSLATION TABLE

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

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

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

COMMAND 98: RESTORE DEFAULTS OR PRINT CONFIGURATION

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

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

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

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

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

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

COMMAND 99: STORE CONFIGURATION IN PERMANENT MEMORY

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

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

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

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

8.5 3270 SCS/DSC Operation

8.5.1 3270 Host Printer Emulations

The I-O Print Server emulates a 3287, 3262, 3268, 3812-1, 4028, 4214 or 4224 (non-IPDS) printer on your 3270-type host system.

8.5.2 Selecting Fonts

You can select a printer resident font or a font from an optional font cartridge in the printer by entering a font change command in the document. The font change commands take the following format: &%[P or L][font ID]. The &% (or the alternate beginning delimiter selected with command 40) is the delimiter that signals the I-O Print Server that the information following is a command. The letter P (portrait) or L (landscape) controls the orientation of the printing. The font ID number (5 digits) selects the font to be used for printing. Refer to Appendix A for a list of fonts and their font IDs.

For example: &%L00086 selects Prestige 12 CPI font in landscape orientation. The font ID number must select a font available in the printer or in the installed cartridge. If the proper cartridge is not installed, or the font does not exist on the cartridge, then the printer will automatically select an alternate landscape font for printing. Multiple font changes can be made in a document as long as all fonts are in the same orientation. Changes in orientation (portrait or landscape) automatically eject the page. A font ID that changes the orientation from the previous page must be on the first line and first position of the page or a blank page will be ejected. A blank page at the first of a print job is often caused by a change in orientation.

8.5.3 Computer Output Reduction (COR)

Computer Output Reduction (COR) is an IBM printer feature that automatically rotates data processing reports to landscape orientation and compresses the text to fit 198 columns x 66 lines on the page. COR is enabled by doing the following:1. Select APO active with command 61 (value 0).2.

Select COR for the paper source with commands 62-64 (value 0). When COR is enabled, the following format changes are automatically made to data processing reports:

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

A combination of control codes in the printer data stream and the settings in the configuration are used to determine page orientation when processing SCS or DSC (LU1 or LU3) data streams. Some applications will not allow the user to insert the data stream commands required to achieve orientation and format selection. Where the insertion of the required data stream commands is not possible, the user can select the orientation and format desired by using the printer configuration settings. Use of the Write Control Character (WCC) in the DSC data streams for orientation and format selection is not recommended.

8.5.4 Automatic Print Orientation (APO)

When Automatic Print Orientation (APO) is activated (command 61, value 0), the I-O Print Server notes the format of the print image and calculates the required print dimensions. The following illustration shows how the page size determines the orientation for COR. If a calculated paper size is larger than 8 1/2" x 11", the paper tray orientation selection (commands 62-64) determines the orientation.

In DSC (LU3) mode, the values used in the calculations are specified by the I-O Print Server's active configuration selections. In SCS (LU1) mode, the values are specified in the data stream by the SCS controls. If a value has not been set in the SCS data stream, the I-O Print Server's active configuration is used instead.

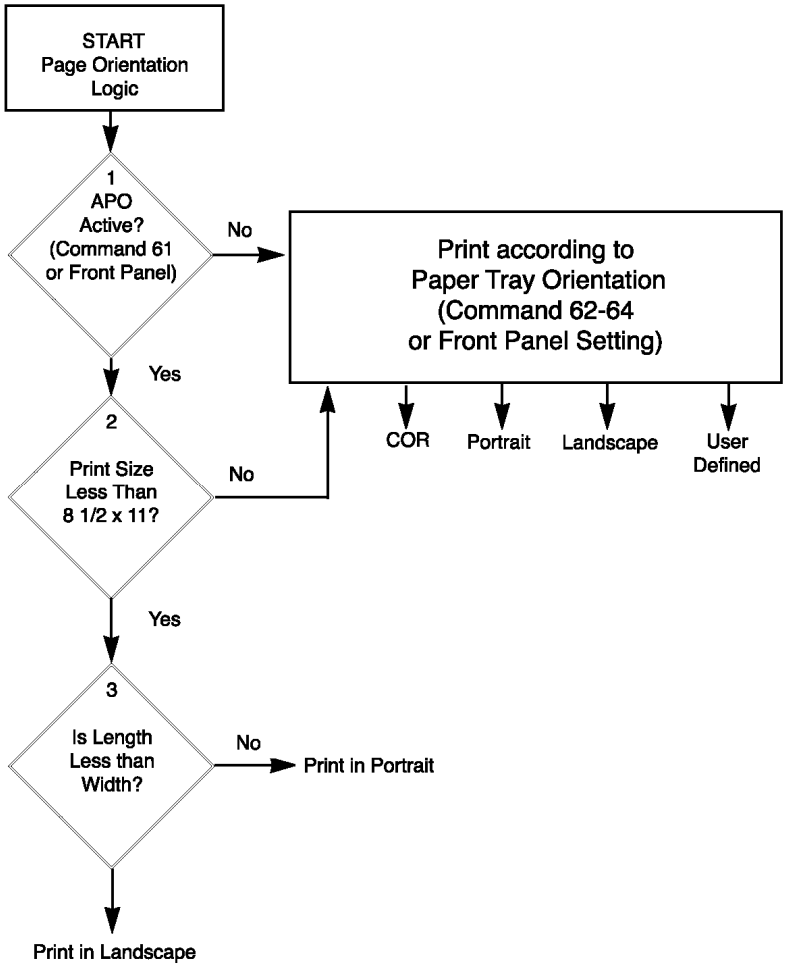
The APO feature also uses the calculated print width and length to determine the print orientation when the dimensions are less than 8 1/2" x 11". When the width is greater than the length and APO is active, the document prints in landscape, even if the font is specified as portrait.

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

1. If APO is not active (command 61, value 1), the I-O Print Server uses the paper source selections (commands 62-64) to control orientation in the active font. If APO is active, the report continues to block 2.

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

3. At block 3, the I-O Print Server checks the length and width. If the report is longer than it is wide, it prints in portrait. If the report is wider than it is long, the report prints in landscape.



8.5.5 Print Position and Page Length

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

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

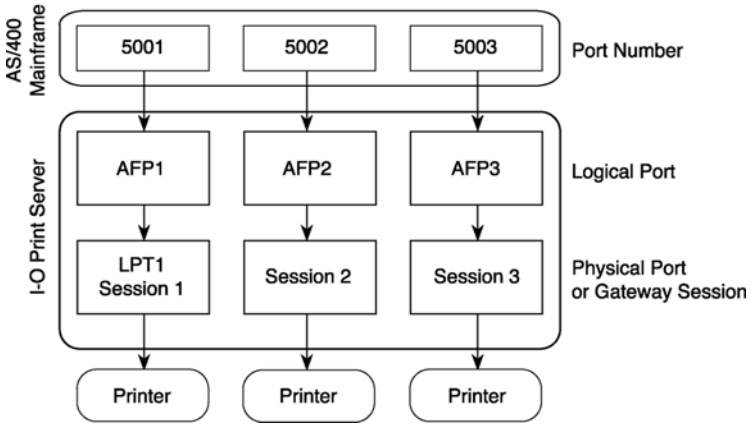
9 IBM IPDS PRINTING

I-O Print Servers equipped with IPDS capability (such as the I-O 5435 AFP/IPDS Printer Server) allow you to turn every attached laser printer into a unique individually configurable AFP/IPDS printer. (The laser printer must support PCL 5e). In addition, you also have the capability to configure SCS printing sessions so that both SCS and IPDS logical printing sessions can share the same printer.

To assure trouble-free operation, AFP/IPDS data streams are sent to "logical ports". Logical ports act as filters. They convert to incoming EBCDIC character set and it's associated IPDS command structure into the ASCII character set and PCL 5e commands. The converted data then is sent to the associated physical port or gateway session and from there to the target ASCII printer.

An IPSD printer device must be configured on the IBM host for each print session, whether there be only one printer physically attached to an I-O 5435e, or up to three remotely LAN-attached printers when a I-O 5755e Gateway Print Server is used. The selection of which print session the output will be directed to is determined by the value entered in the "Port Number" ("Portno" or TCP/IP Socket) field of the IBM host's printer device description. Entering a Port Number of "5001" will cause the output to be directed to the Print Server's LPT1 port or the Gateway Print Server's session 1 printer, "5002" to session 2's printer, and "5003" to session 3's printer. Only Port Number values of "5001","5002" or "5003" are valid.

The following diagram illustrates how logical ports, physical ports, gateway sessions and printer related to each other.



In this chapter you will complete the configuration of the I-O Print Server as well as complete the configuration steps necessary on the IBM AS/400 and/or IBM mainframe system to obtain successful IPDS printing.

9.1 Configuring the AS/400 for IPDS Printing

The basic configuration of the I-O Print Server should already have been completed using instructions found in Chapter 3 TCP/IP Printing. Additional configuration options for the I-O Print Server can be set through either the I-O PrintControl Utility or by using host download commands. These functions are described later in this chapter.

Several steps are required to configure the AS/400 host system to enable IPDS printing to an I-O Print Server. These include ensuring that your AS/400 has the required PTFs installed and configured properly to support TCP/IP printing, verifying that line descriptions and host TCP/IP table entries are made, configuring printer devices for use with PSF/400, and configuring the data area that is used by AFP.

9.1.1 Requirements

PSF/400 must be installed and active on the AS/400.

Make sure that the AS/400 host is running a version of OS/400 that supports TCP/IP and that you have the most recent Cume Pack and PTFs are installed and configured.

The PTF information presented below may have been superseded with more recent releases. For versions not shown below, check with IBM for the appropriate PTF information. Additional information about PTFs to use can be obtained from IBM's AS/400 service Web site http://as400service.rochester.ibm.com

OS/400 V3R1

General	C6198310 Cumulative tape or later
	SF35164 TCP/IP for PSF/400 (order cover letter only)
	SF24140 IPDS pass through (order cover letter only)
Sockets	SF30018
WRKAFP2	SF40039
PSF/400	APAR SA44304

OS/400 V3R2

PSF/400	APAR SA44304

OS/400 V3R6

General	C5346360 Cumulative tape or later
	SF45620 TCP/IP for PSF/400 (order cover letter only)
	SF45624 IPDS pass through
Sockets	SF30508
WRKAFP2	SF31461
PSF/400	APAR SA44304

OS/400 V3R7

PSF/400	APAR SA44304

OS/400 V5R2 – The following PTFs may be required if IPDS printing issues occur:

Cume Pack	SF99520
General	Product 5722SS1
	PTFs SI10698, SI10041, SI10967, SI10700, SI10699, SI10872
Print Spool	PTFs SI16699, SI16310, SI14695, SI16368
PSF/400	PTFs SI16909, SI16411, SI16910, SI15920, SI15716
TCP/IP	PTFs SI15751,MF34138, SI14806, SI16829, MF34337, SI16381, SI16288

9.1.2 Creating a Line Description on the AS/400

If the I-O Print Server and the AS/400 host are not on the same LAN segment, have the system administrator verify that there is a route defined in the TCP/IP route List. If there is not a route defined, use the AS/400 **ADDTCPRTE** COMMAND to create a route definition.

Also, verify if a line description has been created for the line to which the I-O Print Server will be attached. If there is not a line description, have the system administrator use the AS/400 **CRTLINETH** to create an Ethernet line description.

9.1.3 Configuring a TCP/IP Host Table Entry

This step is optional – IBM suggests that a host entry may be created in the TCP/IP table. Have the system administrator use the AS/400 **CFGTCP** command to add the host name and TCP/IP address of the I-O Print Server.

9.1.4 Configuring V3R1 or V3R6

9.1.4.1 PSF/400 for V3R1 or V3R6

The following instructions are used to create a printer device description:

1. At the AS/400 command line, enter the command **CRTDEVPRT**.
2. Press the F11 key to display the keywords.
3. In the "Device Description" (**DEVD**) field, enter the name of the printer attached to the I-O Print Server. The name may comprise of the letters A-Z and numerals 0-9. It must begin with a letter, and a maximum of 10 characters is allowed.
4. In the "Device Class" (**DEVCLS**) field, enter ***RMT**.
5. In the "Device Type" (**TYPE**) field, enter ***IPDS**.
6. In the "Device Model" (**MODEL**) field, enter **0**.
7. In the "Advanced Function Printing" (**AFP**) field, enter ***YES**.
8. In the "AFP Attachment" (**AFPATTACH**) field, enter ***APPC**.
9. In the "Font" (**FONT**) field, enter an appropriate value such as **11**.
10. In the "Form Feed" (**FORMFEED**) field, enter ***AUTOCUT**.
11. In the "Remote Location" (**RMTLOCNAME**) field, enter **TCPIP**.

9.1.4.2 AFP for V3R1 or V3R6

The following instructions are used to create a data area that is used by PSF/400:

1. At the AS/400 command line, enter the command **WRKAFP2**.
2. Press the F11 key to display the keywords, then press F10 to display additional values.
3. In the "Printer Device Name (**DEVD**) field, enter the name of the printer attached to the I-O Print Server. This name must be identical to the name entered for the device name in the DEVD field in the CRTDEVPRT command.
4. In the "IPDS Pass Through" (**IPDSPASTHR**) field, enter ***NO**.

   You may set this value to *YES if you have applications that generate SCS or IPDS data streams that are printed on an AFP printer if the following uses apply: 1) An application like Business Graphics Utilities (BGU), GDDM,

or Virtual Print that does not support AFPDS is used; or 2) The SCS or IPDS application does not contain any reference to overlay page segments or host font character sets. Certain limitations and other configuration consideration are discussed in IBM's *Printer Device Programming Version 5 (SC41-5713-05)* publication.

5. In the "TCP/IP Support" (**TCPIP**) field, enter ***YES**.

6. In the "Remote System" (**RMTSYS**) field, enter the TCP/IP address of the I-O Print Server. You may also enter the host name if you used the optional CFGTCP command to create a TCP/IP Host Table entry.

7. In the "Port Number" (**PORT**) field, enter **5001, 5002,** or **5003** depending upon which physical port or gateway session on the I-O Print Server you want the output directed. For example, entering a Port Number of "5001" will cause the output to be directed to the Print Server's LPT1 port or the Gateway Print Server's session 1 printer, "5002" to gateway session 2's printer, and "5003" to gateway session 3's printer. Only Port Number values of "5001", "5002" or "5003" are valid.

8. In the "Activation Timer" (**ACTTMR**) field, enter ***NOMAX**. This will cause PSF/400 to wait indefinitely for a response to an activation request.

9. In the "Inactivity Timer" (**INACTTMR**) field for V3R1, or "Release Timer" (**RLSTMR**) field for V3R6, enter ***SEC15**. This parameter should be set to a value less than the timeout value on the printer. This is the time PSF/400 will maintain a session with the I-O Print Server while there are no spooled files with a status of RDY.

9.1.5 Configuring V3R2

9.1.5.1 PSF/400 for V3R2

The following instructions are used to create a printer device description:

1. At the AS/400 command line, enter the command **CRTDEVPRT**.

2. Press the F11 key to display the keywords.

3. In the "Device Description" (**DEVD**) field, enter the name of the printer attached to the I-O Print Server. The name may comprise of the letters A-Z and numerals 0-9. It must begin with a letter, and a maximum of 10 characters is allowed.

4. In the "Device Class" (**DEVCLS**) field, enter ***RMT**.

5. In the "Device Type" (**TYPE**) field, enter ***IPDS**.

6. In the "Device Model" (**MODEL**) field, enter **0**.

7. In the "Advanced Function Printing" (**AFP**) field, enter ***YES**.

8. In the "AFP Attachment" (**AFPATTACH**) field, enter ***APPC**.

9. In the "Font" (**FONT**) field, enter an appropriate value such as **11**.

10. In the "Form Feed" (**FORMFEED**) field, enter ***AUTOCUT**.

11. In the "Remote Location" (**RMTLOCNAME**) field, enter **TCPIP**.

9.1.5.2 AFP for V3R2

The following instructions are used to create a data area that is used by PSF/400:

1. At the AS/400 command line, enter the command **CRTPSFCFG**.

2. Press F11 to display the keywords, then press F10 to display additional values.

3. In the "PSF Configuration" (**PSFCFG**) field, enter the name of the printer attached to the I-O Print Server.

4. In the "Library" field, enter **QGPL**.

5. In the "IPDS Pass Through" (**IPDSPASTHR**) field, enter ***NO**.

   You may set this value to *YES if you have applications that generate SCS or IPDS data streams that are printed on an AFP printer if the following uses apply: 1) An application like Business Graphics Utilities (BGU), GDDM, or Virtual Print that does not support AFPDS is used; or 2) The SCS or IPDS application does not contain any reference to overlay page segments or host font character sets. Certain limitations and other configuration consideration are discussed in IBM's *Printer Device Programming Version 5 (SC41-5713-05)* publication.

6. In the "Activation Release Timer" (**ACTRLSTMR**) field, enter ***NORDYF**. This will cause PSF/400 to print all spooled files with a status of RDY before releasing the session (which does not terminate the writer).

7. In the "Release Timer" (**RLSTMR**) field, enter ***SEC15**. This parameter should be set to a value less than the timeout value on the printer. This is the time PSF/400 will maintain a session with the I-O Print Server while there are no spooled files with a status of RDY.

8. In the "Remote Location Name or Address" (**RMTLOCNAME**) field, enter the TCP/IP address of the I-O Print Server. You may also enter the host name if you used the optional CFGTCP command to create a TCP/IP Host Table entry.

9. In the "Port Number" (**PORT**) field, enter **5001, 5002,** or **5003** depending upon which physical port or gateway session on the I-O Print Server you want the output directed. For example, entering a Port Number of "5001" will cause the output to be directed to the Print Server's LPT1 port or the Gateway Print Server's session 1 printer, "5002" to gateway session 2's printer, and "5003" to gateway session 3's printer. Only Port Number values of "5001", "5002" or "5003" are valid.

10. In the "TCP/IP Activation Timer" (**ACTTMR**) field, enter ***NOMAX**. This will cause PSF/400 to wait indefinitely for a response to an activation request.

9.1.6 Configuring V3R7 or V4R1

Creating an IPDS printer device on the AS/400 requires two processes: 1) creating a PSF configuration object, and 2) creating the printer device.

The first process creates a PSF configuration object that combines some basic information pertaining to the AFP/IPDS printer devices. One PSF configuration object may be shared with many printer devices.

The second process creates the printer device. A separate printer device must be set up for each printer attached to the I-O Print Server. For example, if you were using an I-O Gateway Print Server to support three printers, you would create three different printer devices.

9.1.6.1 AFP for V3R7 or V4R1

1. At the AS/400 command line, enter the command **CRTPSFCFG**.

2. Press ENTER or F4 to display the keywords.

3. In the "PSF Configuration (**PSFCFG**) field, enter the name of this PSF configuration object that will be used internally by the AS/400 when referencing that I-O Print Server. Remember this name as it will also be entered in the user-defined object name (USRDFNOBJ) field in the printer device description that will be created in the next section.

4. In the "IPDS Pass Through" (**IPDSPASTHR**) field, enter *__NO__.

   You may set this value to *YES if you have applications that generate SCS or IPDS data streams that are printed on an AFP printer if the following uses apply: 1) An application like Business Graphics Utilities (BGU), GDDM, or Virtual Print that does not support AFPDS is used; or 2) The SCS or IPDS application does not contain any reference to overlay page segments or host font character sets. Certain limitations and other configuration consideration are discussed in IBM's *Printer Device Programming Version 5 (SC41-5713-05)* publication.

5. In the "Activation Release Timer" (**ACTRLSTMR**) field, enter *__NORDYF__. This will cause PSF/400 to print all spooled files with a status of RDY before releasing the session (which does not terminate the writer).

6. In the "Release Timer" (**RLSTMR**) field, enter *__SEC15__. (Press F10 if this field is not displayed.) This is parameter should be set to a value at least equal to the timeout value on the printer. This is the time PSF/400 will maintain a session with the I-O Print Server while there are no spooled files with a status of RDY.

9.1.6.2 PSF/400 for V3R7 or V4R1

The following instructions are used to create a printer device description:

1. At the AS/400 command line, enter the command **CRTDEVPRT**.

2. Press the F4 key to display the keywords.

3. In the "Device Description" (**DEVD**) field, enter the name of the printer attached to the I-O Print Server. The name may comprise of the letters A-Z and numerals 0-9, must begin with a letter, and a maximum of 10 characters is allowed.

4. In the "Device Class" (**DEVCLS**) field, enter *__LAN__.

5. In the "Device Type" (**TYPE**) field, enter *__IPDS__.

6. In the "Device Model" (**MODEL**) field, enter 0. Then press **F10**.

7. In the "LAN Attachment" **(LANATTACH**) field, enter ***IP**.

8. In the "**Advanced Function Printing**" field, enter *__YES.__

9. In the "Port Number" (**PORT**) field, enter **5001, 5002,** or **5003** depending upon which physical port or gateway session on the I-O Print Server you want the output directed. For example, entering a Port Number of "5001" will cause the output to be directed to the Print Server's LPT1 port or the Gateway Print Server's session 1 printer, "5002" to gateway session 2's printer, and "5003" to gateway session 3's printer. Only Port Number values of "5001", "5002" or "5003" are valid.

10. In the "Font" (**FONT**) field, enter an appropriate value such as **11**.

11. In the “Form Feed” (**FORMFEED**) field, enter ***AUTOCUT**.

12. In the “Activation Timer” (**ACTTMR**) field, enter ***NOMAX**. This will cause the AS/400 host to wait indefinitely for a response to an activation request.

13. In the “Remote Location” (**RMTLOCNAME**) field, enter the TCP/IP address of the I-O Print Server. You may also enter the host name if you used the optional CFGTCP command to create a TCP/IP Host Table entry. If using an I-O Gateway Print Server, this IP address (or host name) is the source for all gateway sessions.

14. In the “User-Defined Object” (**USRDFNOBJ**) field, enter the printer name that you entered in the PSF Configuration (PSFCFG) field when setting up AFP (section 9.1.6.1, step 3 above). This is the PSF configuration object that is used internally by the AS/400 when referring the I-O Print Server.
15. Leave the “Library” blank unless you know its name. Enter ***PSFCFG** as the “Object Type”.

9.1.7 Configuring V4R2 and Above

Creating an IPDS printer device on the AS/400 requires two processes: 1) creating a PSF configuration object, and 2) creating the printer device.

The first process creates a PSF configuration object that combines some basic information pertaining to the AFP/IPDS printer devices. One PSF configuration object may be shared with many printer devices.

The second process creates the printer device. A separate printer device must be set up for each printer attached to the I-O Print Server. For example, if you were using an I-O Gateway Print Server to support three printers, you would create three different printer devices.

9.1.7.1 AFP for V4R2 and Above

1. At the AS/400 command line, enter the command **CRTPSFCFG**.

2. Press ENTER or F4 to display the keywords.

3. In the “PSF Configuration (**PSFCFG**) field, enter the name of this PSF configuration object that will be used internally by the AS/400 when referencing that I-O Print Server. Remember this name as it will also be entered in the user-defined object name (USRDFNOBJ) field in the printer device description that will be created in the next section.

4. In the “IPDS Pass Through” (**IPDSPASTHR**) field, enter ***NO**.

   You may set this value to *YES if you have applications that generate SCS or IPDS data streams that are printed on an AFP printer if the following uses apply: 1) An application like Business Graphics Utilities (BGU), GDDM, or Virtual Print that does not support AFPDS is used; or 2) The SCS or IPDS application does not contain any reference to overlay page segments or host font character sets. Certain limitations and other configuration consideration are discussed in IBM’s *Printer Device Programming Version 5 (SC41-5713-05)* publication.

5. In the “Activation Release Timer” (**ACTRLSTMR**) field, enter ***NORDYF**. This will cause PSF/400 to print all spooled files with a status of RDY before releasing the session (which does not terminate the writer).

6. In the “Release Timer” (**RLSTMR**) field, enter ***SEC15**. (Press F10 if this field is not displayed.) This parameter should be set to a valve less than the timeout value on the printer. This is the time PSF/400 will maintain a session with the I-O Print Server while there are no spooled files with a status of RDY.

7. In the "**Automatic Session Recovery**" field, enter *__YES__. This causes the PSF/400 to automatically attempt to resume printing when a session has been unexpectedly ended.

8. In the "**Acknowledgement Frequency**" field, enter "**10**". This value is the frequency, in number of pages, that the AS/400 sends an acknowledgement request to the printer for status of pages printed. This value is used to determine where to restart printing after a connection has been lost and re-established. However, if acknowledgement frequency requests are made with great frequency, such as once per page, a performance degradation may be noticed.

9. Optional selection – In the "Page Size Control" field, enter *YES**.** This causes PSF/400 to set the page size (forms) in lieu of using the printer's default size. Generally this parameter is used when a 4028 printer emulation is selected.

10. Optional Selection – In the "Edge Orien", enter *YES**.** When the page rotation value of a spooled file is *COR or *AUTO and the system rotates the output, 90 degree rotation is normally used. When this parameter is *Yes, PSF/400 rotates the output 270 degrees instead of 90 degrees.

9.1.7.2 PSF/400 for V4R2 and Above

The following instructions are used to create a printer device description:

1. At the AS/400 command line, enter the command **CRTDEVPRT**.

2. Press the F4 key to display the keywords.

3. In the "Device Description" (**DEVD**) field, enter the name of the printer attached to the I-O Print Server. The name may comprise of the letters A-Z and numerals 0-9, must begin with a letter, and a maximum of 10 characters is allowed.

4. In the "Device Class" (**DEVCLS**) field, enter *__LAN__.

5. In the "Device Type" (**TYPE**) field, enter *__IPDS__.

6. In the "Device Model" (**MODEL**) field, enter 0. Then press F10.

7. In the "LAN Attachment" (**LANATTACH**) field, enter ***IP**.

8. In the "**Advanced Function Printing**" field, enter ***YES**.

9. In the "Port Number" (**PORT**) field, enter **5001, 5002,** or **5003** depending upon which physical port or gateway session on the I-O Print Server you want the output directed. For example, entering a Port Number of "5001" will cause the output to be directed to the Print Server's LPT1 port or the Gateway Print Server's session 1 printer, "5002" to gateway session 2's printer, and "5003" to gateway session 3's printer. Only Port Number values of "5001", "5002" or "5003" are valid.

10. In the "Font" (**FONT**) field, enter an appropriate value such as **11**.

11. In the "Form Feed" (**FORMFEED**) field, enter *__AUTOCUT__.

12. In the "Activation Timer" (**ACTTMR**) field, enter *__NOMAX__. This will cause the AS/400 host to wait indefinitely for a response to an activation request.

13. In the “Remote Location” (**RMTLOCNAME**) field, enter the TCP/IP address of the I-O Print Server. You may also enter the host name if you used the optional CFGTCP command to create a TCP/IP Host Table entry. If using an I-O Gateway Print Server, this IP address (or host name) is the source for all gateway sessions.

14. In the “User-Defined Object” (**USRDFNOBJ**) field, enter the name of the PSF configuration object that will be used internally by the AS/400 when referring the I-O Print Server. (You created this name in the previous section, 9.1.6.1)

15. Leave the “Library” blank unless you know its name. Enter ***PSFCFG** as the “Object Type”.

9.1.8 Verifying the IPDS Configuration on the AS/400

To test that the AS/400 and the I-O Print Server are connected and communicating, ping the print server from an AS/400 workstation with the following command:

PING ‘TCP/IP ADDRESS’ or PING HOST NAME

‘TCP/IP Address’ is the address of the I-O Print Server (be sure to include the single quote marks around the address). Host name is the optional name you may have defined for the printer attached to the I-O Print Server if you created an optional TCP/IP Host Table entry. If the pings are not successful, refer to Chapter 9 Troubleshooting. If the pings are successful, vary on the
I-O Print Server’s printer device description by typing this command (all on one line):

WRKCFGSTS *DEV PRINTSERVERNAME (press ENTER)
choose Option #1 “VARYON” device.

To use PSF/400 to send IPDS files to the I-O Print Server, start the writer by typing this command:

STRPRTWTR DEV(I-O Print Server printer device name)

9.2 Configuring the IBM Mainframe for IPDS Printing

The basic configuration of the I-O Print Server should already have been completed using instructions found in Chapter 3 TCP/IP Printing. Additional configuration options for the I-O Print Server can be set through either the I-O PrintControl Utility or by using host download commands. These functions are described later in this chapter.

Several steps are required to configure the MVS system to print AFP/IPDS files on the I-O Print Server via PPR/PPD (TCP/IP). These are:

1. Define the MVS communications control units to MVS.

2. Modify the TCP/IP profile on your MVS system.

3. Ping the printer.

4. Define the printer as a writer-controlled printer to JES.

5. Define the printer to PSF/MVS with PRINTDEV, including IP address.

Note: This section does not provide all the information you need to install and configure TCP/IP on your MVS system.

For more information, refer to IBM publications *TCP/IP for MVS: Customization and Administration Guide, or PSF V3R1.0 for OS/390 Customization, or PSF/MVS: System Programming Guide*.

9.2.1 Requirements

Make sure that you have at least the following or newer, installed and configured on your system:

- PSF/MVS Version 2.2.0 with APAR OW15599
- MVS Scheduler with APRA 0212236
- TCP/IP Version 3 Release 1 or higher, installed and configured on MVS

To obtain the PTFs associated with these APARs, contact the IBM Support Center.

9.2.2 Define the Communications Control Unit to MVS

If you have not already done so, define the communications control unit (such as a 3172) on the MVS system. Use either an MVS configuration program (MVSCP) or a hardware configuration definition (HCD), depending on the version of your MVS system:

- When using a version earlier than MVS 4.1.0, use an MVSCP.
- When using a version of MVS 4.1.0 or later, use an HCD or an MVSCP

For more information about using these methods, refer to the IBM publications *MVS/ESA Migration Planning: Dynamic I/O Configuration or MVS/ESA Hardware Configuration: Using the Dialog.*

9.2.3 Modify the TCP/IP Profile in MVS

The TCP/IP profile contains system configuration statements used to initialize the TCP/IP address space. Some statements require special considerations when you are printing from PSF/MVS. The following example shows the specific statements that require consideration shown in bold:

```
ACBPOOLSIZE                          1000
ADDRESSTRANSLATIONPOOLSIZE           1500
CCBPOOLSIZE                          150
DATABUFFERPOOLSIZE                   160     32768
ENVELOPEPOOLSIZE                     750
IPROUTEPOOLSIZE                      300
LARGEENVELOPEPOOLSIZE                50
RCBPOOLSIZE                          50
SCBPOOLSIZE                          256
SKCBPOOLSIZE                         256
SMALLDATABUFFERPOOLSIZE              256
TCBPOOLSIZE                          512
TINYDATABUFFERPOOLSIZE               256
UCBPOOLSIZE                          100
KEEALIVEOPTIONS INTERVAL 10 SENDGARBAGE FALSE ENDKEEPALIVEOPTIONS
GATEWAY
;   *    Network      First hop      Linkname    Packet Size  Subnet mask   Subnet value
    9                 =              BPCLAN      2000         0.255.255.0   0.99.12.0
    DEFAULTNET 9.99.12.254  BPCLAN   2000        0.255.255.0   0
```

The following is a description of each statement that needs special consideration, the application and the changes they make necessary. Be aware that if you change any of the values in the TCP/IP profile, you will need to restart TCP/IP in order for the changes to take place.

DATABUFFERPOOLSIZE - defines the number and size of the data buffers. It is recommended that you specify 160 data buffers and a buffer size of 32768.

SMALLDATABUFFERPOOLSIZE - defines the number of small data buffers. It is recommended that you specify at least 256 small data buffers.

TINYDATABUFFERPOOLSIZE - defines the number of tiny data buffers. It is recommended that you specify at least 256 tiny data buffers.

KEEPALIVEOPTIONS - PSF relies on TCP to detect when a connection with an I-O Print Server is no longer usable. When no data has been exchanged between PSF/MVS and the I-O Print Server, TCP periodically sends keep-alive probes to the I-O Print Server. These periodic probes, called keep-alive transmissions, enable TCP to discover when a connection is no longer usable, even if the I-O Print Server is abruptly powered off or is no longer accessible through the network.

The frequency of keep-alive transmissions is controlled by the INTERVAL parameter on the KEEPALIVEOPTIONS statement. The frequency applies to all TCP applications that direct TCP to send keep-alive transmissions. The default frequency is after about two hours of inactivity.

For printing on an I-O Print Server, it is recommended that you specify a shorter interval than the default, such as 10 minutes, for the interval between keep-alive transmissions. Also, if any target host requires that the keep-alive packet contain data, include the statement SENDGARBAGETRUE.

GATEWAY - The Packet_size parameter of the GATEWAY statement defines the maximum transmission unit (MTU) for the MVS host. For network printers, the MTU size is fixed at 1024 bytes. The value cannot be adjusted.

9.2.4 Verify the Printer Connection

9.2.4.1 Ping the I-O Print Server

To verify that the IBM MVS system can establish a connection with the I-O Print Server, ping the I-O Print Server from the MVS system.

- From a TSO session, enter the following: **TSO Ping ip_address**
- In JES2, enter the following command from the System Display and Search Facility (SDSF) menu 6: **ping ip_address**

The **ip_address** specifies the IP address of the NIC. The following shows examples of a successful ping and an unsuccessful ping.

Successful ping:

EZA04581 Ping V3R1: Pinging host 9.99.12.33
(Use ATTN to interrupt.)
EZA04631 PING: Ping #1 response took 0.084 seconds.
Successes so far = 1.

Unsuccessful ping:

EZA04581 Ping V3R1: Pinging host 9.99.12.33
(Use ATTN to interrupt.)
EZA04631 PING: Ping #1 timed out.

9.2.5 Handling MVS Connectivity Problems

If you encounter problems when pinging the I-O Print Server from MVS, here is how to resolve them:

9.2.5.1 Ping is not Successful

If the ping is not successful, verify the following:

- The I-O Print Server and printer both are powered on.
- The IP address is unique in the TCP/IP network. If the IP address of the MVS system is not unique, contact your system administrator.
- The Maximum Transmission Unit (MTU) size of the IP packet for the MVS system is equal to the MTU size of the network printer that is fixed at 1024. To change the MTU size for the MVS system, change the GATEWAY statement in the MVS TCP/IP profile and restart TCP/IP to activate the changes. If these items are in order, consult your system administrator about a possible network problem.

9.2.5.2 Ping is Successful

A successful ping usually indicates that the MVS system can communicate with the I-O Print Server, however, you might receive a successful ping even though the IP address of the I-O Print Server is a duplicate of another IP address. If PSF is unable to establish a network connection with the I-O Print Server or if PSF output for printer attached to the I-O Print Server prints elsewhere, follow these steps to determine whether the IP address of the printer is unique:

1. Turn off the printer.

2. Wait at least 5 minutes for TCP/IP to clear the Address Resolution Protocol (ARP) tables. (If your installation specified a longer interval on the ARPAGE configuration statement in the TCP/IP profile, you may need to wait longer. For information about the ARPAGE statement, refer to *the IBM TCP/IP MVS Customization and Administration Guide*.)

3. Enter the ping command again from the MVS system. If you receive a successful response to the ping command, there is a duplicate IP address. Consult your system administrator.

9.2.6 Define the Printer to JES

When an I-O Print Server is used with JES, it must be defined for deferred printing mode with JES.

- The JES2 printer definition initialization member, located in the system PARMLIB is shown below:
  FSS (FSS1), PROC=PSFPROC,HASPFSSM=HASPFSSM
  PRT1 FSS=FSS1,MODE=FSS,PRMODE= (LINE,PAGE,SOSI1),
  CLASS=C, UCS=0, SEP, NOSPEPDS, CKPTPAGE=100
  DRAIN, MARK, TRKCELL=YES

  The above example is correct for JES2 3.11 and above. For earlier versions of JES2, the statement is FSSDEF and would be stated as FSSDEF FSSNAME=FSS1.

  The value specified for the PROC parameter must match the name on the PSF/MVS startup procedure.

- The JES3 printer definition is shown below. This example is not executable, but is intended to help the JES3 systems programmer define the printer to the MVS host.

  FSSDEF, TYPE=WTR, FSSNAME=FSS1, PNAME=PSFPROC,
  SYSTEM=SYS1, TERM=NODEVICE, JNAME=PRT1,
  JUNIT=(,SYS1,,OFF), FSSNAME=FSS1,
  MODE=FSS, PM=(LINE,PAGE,SOSI1),CHARS=(YES,GT12),

  The value specified for the JNAME parameter must match the name of the printer in the PSF/MVS startup procedure.

  The value specified for the PNAME parameter must match the name on the PSF/MVS startup procedure.

9.2.7 Define the Printer to PSF/MVS

Each I-O Print Server must be defined to PSF with a PRINTDEV statement in the PSF/MVS startup procedure.

Currently, IBM does not supply a network printer-specific writer procedure. (Remember that the I-O Print Server appears to the IBM mainframe as a network printer.) However, the APSWPROT sample from the APAR medium (noted above in Section 9.2.1) can be copied and modified for network printers. Make sure that you specify 300-pel font libraries even though the printer attached to the I-O Print Server may higher resolutions. The following is a sample procedure (PSFPROC) that can be modified to suit your installation.

```
//PSFPROC PROC
                        NETWORK PRINTERS WRITER PROCEDURE
////*01*  MODULE-NAME = PSFPROC
//*//*01*  DESCRIPTIVE-NAME = START PROCEDURE FOR PSF:
//*                    TCP/IP ATTACHED NETWORK PRINTERS
//*//*01*  NOTES =  THE FULL NAME OF THE DEFAULT PAGEDEF IS
                          P1A06462.
                    THE FULL NAME OF THE DEFAULT FORMDEF IS
                          F1A10110.
                    THE FULL NAMES OF THE DEFAULT FONTS ARE
                          X0GF10, X0GS10, X0TU10, AND X0GU10.
                    THE FULL NAME OF THE SEPARATOR PAGE PAGEDEF IS
                          P1V06483.
                    THE FULL NAME OF THE SEPARATOR PAGE FONT IS
                          X0GT15.
//*
//*
//*01*  CHANGE ACTIVITY :
//*//****  END OF SPECIFICATIONS ***/
//STEP01      EXEC PGM=APSPPIEP,REGION=4096K
//JOBHDR  OUTPUT  PAGEDEF=V06483,                 /*  JOB SEPARATOR  PAGEDEF      */
//           FORMDEF=A10110,CHARS-GT15            /*  JOB SEPARATOR  FORMDEF      */
//JOBLTR   OUTPUT  PAGEDEF=V06483,                /*  JOB SEPARATOR  PAGEDEF      */
//           FORMDEF=A10110,CHARS-GT15            /*  JOB SEPARATOR  FORMDEF      */
//DSHDR   OUTPUT PAGEDEF=V06483,                  /*  DS   SEPARATOR  PAGEDEF     */
//           FORMDEF=A10110,CHARS=GT15            /*  DS   SEPARATOR  FORMDEF     */
//MSGDS   OUTPUT PAGEDEF=A06462,                  /*  MESSAGE DATASET  PAGEDEF    */
//           FORMDEF=A1011 0                      /*  MESSAGE DATASET  FORMDEF    */
//FONT300   DD    DSN=SYS1.FONT300,               /*  SYSTEM FONTS - 300 PEL      */
//           DISP=SHR
//PSEG01    DD    DSN-SYS1.PSEGLIB,               /*  SYSTEM PAGE SEGMENTS        */
           DISP=SHR
//OLAY01    DD    DSN=SYS1.OVERLIB,               /*  SYSTEM MEDIUM OVERLAYS      */
//           DISP=SHR                             /*                              */
//PDEF01    DD    DSN=SYS1.PDEFLIB,               /*  SYSTEM PAGEDEFS             */
//           DISP=SHR
//FDEF01    DD    DSN=SYS1.FDEFLIB,               /*  SYSTEM FORMDEFS             */
//           DISP=SHR
//*  ************************************************************************************************************ */
//*                    PRINTDEV                                                                                    */
//*  ************************************************************************************************************ */
//PRT1     CNTL
//PRT1       PRINTDEV FONTDD=*.FONT300,/*  300 PEL FONT LIBRARY DD                                                  */
//           OVLYDD=*.OLAY01,              */  OVERLAY  LIBRARY DD                                                  */
//           PSEGDD=*PSEG01,               */  SEGMENT  LIBRARY DD                                                  */
//           PDEFDD=*.PDEF01,              */  PAGEDEF  LIBRARY DD                                                  */
//           FDEFDD=*.FDEF01,              */  FORMDEF  LIBRARY DD                                                  */
//           JOBHDR=*.JOBHDR,              */  JOB HEADER SEPARATOR                                                 */
//*                                        */     OUTPUT                                                            */
//           JOBTRLR=*.JOBTLR,             */  JOB TRAILER SEPARATOR                                                */
//*                                        */     OUTPUT                                                            */
//           DSHDR=*.DSHDR,                */  DATA SET HEADER                                                      */
//*                                        */     SEPARATOR                                                         */
//           MESSAGE=*.MSGDS,              */  MESSAGE DATA SET OUTPUT                                              */
//           BUFNO=5,                      */  NUMBER OF WRITE DATA BUFFERS                                         */
//           PAGEDEF=A06462,               */  DEVICE PAGEDEF DEFAULT                                               */
//           FORMDEF=A10110,               */  DEVICE FORMDEF DEFAULT                                               */
//           CHARS=(GF10,                  */  DEVICE                                                               */
//           GS10, TU10, GU10),            */  DEFAULT FONT SET                                                     */
           PIMSG=YES,                    */  ACCUMULATE DATA SET                                                  */
//*                                        */     MESSAGES                                                          */
//           DATACK=BLOCK,                 */  REPORT ALL DATA-CHECK                                                */
//*                                        */     ERRORS                                                            */
//           TRACE=NO,                     */  CREATE INTERNAL TRACE                                                */
//           FAILURE=WCONNECT,             */  PSF ACTION ON PRINTER                                                */
//*                                        */     FAILURE                                                           */
//           TIMEOUT=REDRIVE,              */  PSF ACTION ON TIMEOUT                                                */
//           MGMTMODE=OUTAVAIL,            */  PRINTER MANAGEMENT MODE                                              */
//           DISCINTV=15,                  */  DISCONNECT INTERVAL IN                                               */
//                                        */     SECONDS                                                           */
//           IPADDR='xxx.xxx.xxx.xxx'      */  IP ADDRESS FOR I-O PRINT SERVER                                      */
//           PORTNO=5001,                  */  TCPIP SOCKET                                                         */
//PRT1       ENDCNTL
```

The following is a description of the statements to be used in the PSF Startup Proc:

FAILURE – Specifies the action PFS/MVS to take after a printing failure or a TCP/IP network failure. If FAILURE=WCONNECT and the I-O Print Server is connected to another host when PSF/MVS attempts to establish a connection on TCP/IP, PSF/MVS continuously retries (up to the limit specified in CONNINTV) until the I-O Print Server becomes available. FAILURE=STOP stops the attempt to connect the I-O Print Server.

TIMEOUT – Specifies the action that PSF/MVS takes after a timeout when on output is available on JES. The DISCINTV parameter specifies the timeout interval. TIMEOUT=REDRIVE requests that PSF/MVS redrive the printer

FSA using the value of the MGMTMODE parameter. TIMEOUT=STOP requests that PSF/MSV stop the printer FSA, which can then be restarted only by an operator command.

MGMTMODE – Set this parameter to OUTAVAIL. OUTAVAIL requests that PSF start a communications session with the I-O Print Server only when output is available on the JES spool.

DISCINTV – Specifies the disconnect interval in seconds. The value can range from zero to 86,400. It is suggested that the setting be 15. When no output is available from JES for this time period, PSF/MSV ends the session with the I-O Print Server. If the value is set to zero, PSF/MSV does not end the session because there is no output.

IPADDR – Specifies the IP address of the I-O Print Server. Replace the xxx.xxx.xxx.xxx with the IP address you defined using the PrintControl utility (see Section 3.1 *Configuring the I-O Print Server*).

PORTNO – Specifies the TCP/IP socket that is used for AFP/IPDS printing. This parameter may be 5001, 5002, or 5003 depending upon which physical port or gateway session on the I-O Print Server you want the output directed. For example, entering a Port Number of "5001" will cause the output to be directed to the Print Server's LPT1 port or the Gateway Print Server's session 1 printer, "5002" to gateway session 2's printer, and "5003" to gateway session 3's printer. Only Port Number values of "5001", "5002" or "5003" are valid.

For more information on the PRINTDEV statement, see the IBM publication *PSF/MSV System Programming Guide*.

9.2.8 Using the I-O Print Server with MVS

In normal operation, a session with the I-O Print Server is maintained while there is output on the JES spool and the I-O Print Server is available. When there is no more output on the spool and the disconnect interval expires, PSF/MVS ends the session with the I-O Print Server. PSF/MVS attempts to restart the session when there is more work on the spool for the I-O Print Server. After the session is restarted, PSF/MVS must reload the resources required for the print jobs.

To use an I-O Print Server with your MVS system, you use the following JES operator commands

9.2.8.1 Starting an I-O Print Server on MVS

To start an I-O Print Server on MVS, do the following:

1. Start TCP/IP.
2. Power on the printer.
3. Start the printer FSA.

    - For JES2:
      $Sprinter-name

    - For JES3:
      VARY printer-name, ON

9.2.8.2 Stopping an I-O Print Server on MVS

You can stop an I-O Print Server on MVS in the following ways:

The preferred method is to first stop the PSF FSA for the I-O Print Server by entering the following command from the MVS console:

- For JES2:
  $Sprinter-name

- For JES3:
  VARY printer-name, OFF
  CANCEL printer-name
  where printer-name specifies the name of the printer FSA. The I-O Print Server and printer can then be turned off.

- To end the PSF FSA for the printer, use the JES commands. If you are unable to purge or cancel the printer using the JES commands, enter the following command:

  MODIFY FFSname, FORCE, printer-name

9.3 Configuring the I-O Print Server

9.3.1 Configuring Using PrintControl

The instructions in this chapter refer to the older I-O PrintControl Utility. Even though the processes are similar for the I-O Configuration Utility, you may want to refer to the I-O Configuration Utility | Help menu option for specific information on using the configuration utility.

You can change many configuration parameters that affect IPDS printing through the use of either I-O's PrintControl utility or I-O's Host Download Commands. The PrintControl utility is described in this section while the use of host download commands follow in the next section.

Using I-O's PrintControl utility, you can select whether the printer attached to an IPDS enabled I-O Print Server (such as the I-O 5435 AFP/IPDS Print Server) can print both SCS and IPDS jobs. The PrintControl utility allows you to select and control such functions as the type of IPDS emulation, page setup features such as text compression, paper handling support, initiating trouble shooting features such as EDCDIC and ASCII dumps, and entering customized initialization and font strings.

To use the I-O PrintControl utility to configure the I-O Print Server, follow these steps (use the on-line Help for more specific instructions on these options):

1. After starting the I-O PrintControl utility, select the desired I-O print Server from the displayed list. I-O Print Servers are identified through their serial numeric and network address. Both of these are unique to the specific print server and can be found on the bottom of the I-O Print Server as well as on the self-test print out.

2. Open the configuration dialog box by double clicking on the desired I-O Print Server or by highlighting the desired I-O Print Server and then pressing the Configure button displayed on the tool bar.

3. If the I-O Print Server already has an IP address, proceed directly with the next step. Otherwise, go back to Chapter 3 TCP/IP Printing and enter the TCP/IP address, default router and sub-net mask.

4. Click on the **Printer Ports/Emulations** box on the left side of the Print Server Information Screen to bring up various options for the printer ports.

5. Click on the LPT1 (LPT2 or COM1 if applicable) button to change settings pertaining to the port that the printer is physically attached. Use the on-line Help button for specific instructions.

6. Click on the TCP1 (thru TCP3 if applicable) button to change settings pertaining to TCP/IP printing functions such as initialization strings, banner pages, etc. Use the on-line Help button for specific instructions.

7. Click on the SCS1 (thru SCS3 if applicable) button to select SCS printer emulations and the associated print driver settings for the printer attached. Use the on-line Help button for specific instructions.

8. Click on the **AFP1** (thru AFP3 if applicable) button to configure the I-O Print Server for IPDS options.

9. Click on the **IPDS** Setup button to configure the following:

    a. IBM Emulation – select one of the IBM IPDS printers to emulate (3812/16 or 4028/43XX).
    b. Store Overlay in Printer Memory – "No" keeps the overlay in the I-O Print Server's memory, and protects it from loss if the attached printer is turned off. "Yes" stores the overlay as a macro in the printer's memory and increases the speed of printing.
    c. True Print Compete – gives a response to the AS/400 when the last page is dropped into the output bin.
    d. Default font – select the font by FGID that you wish to be the font used if the AS/400 only requests the printer's default font be used.
    e. Font Mapping – Selecting "Best Fit" allows the I-O Print Server to match the desired font closely with what is actually available in the attached printer. Selecting "Emulate 4028/43XX" or "Emulate 3812/16" fonts maps the IPDS font like an IBM 4028, 43XX, 3812 or 3816 printer would (including substitutions).
    f. Code Page Version – selects which code page version will be used, if available.
    g. Default Code Page – selects the default EBCDIC code page that is used in the EBCDIC to ASCII conversion.

10. Click on **Page Setup** to configure the following:

    a. Text Compression – determines the direction of compression of host text data (vertical only, or vertical and horizontal). Care should be used when choosing text compression because graphic elements and bar codes are not compressed. This could cause mis-alignment of the various text and graphical elements on a page.
    b. Compression Ratio – specifies the percent of text compression.
    c. Horizontal Margin Offset – Selects the horizontal offset of the logical page on the physical page in 1/60 of an inch.
    d. Vertical Margin Offset – Selects the vertical offset or the logical page on the physical page in 1/60 of an inch.

11. Click on **Paper Handling Support** to configure the following:

    a. Input Tray Mapping - The I-O Print Server currently supports 10 input trays. The IBM drawer IDs, their associated PCL tray IDs and paper sizes are selected here. Print Servers with firmware earlier than V1.40 only support 4 input trays.
    b. Output Tray Mapping – The I-O Print Server will allow you to select which printer output tray you would like to direct the printed pages by matching the IBM printer output tray ID to the PCL ID for the desired output tray in the printer. After you make each of your output tray selections, Click on the **Save Displayed Mapping** button to save that specific output tray selection.

12. Click on **Troubleshooting** to select whether you would like a print job to be printed in a "hex dump" format. Selecting EBCDIC will generate a listing of the commands just as they are received from the AS/400. Selecting ASCII will generate a listing of the commands that the I-O Print Server sends to the attached printer.

13. Click on **User-Defined Strings** to configure the following:

    a. Host Initialization – allows you enter a printer initialization string that you would like sent to the printer each time a print job is received from the AS/400. Formatting instructions sent with the host data generally override this setting.
    b. Fonts – allows you to call fonts in the printer that are unknown to the AS/400. For each of the 10 font strings, you select a valid host font number (FGID number) and then enter the font command calling that specific printer's font.

14. If you would like to return all IPDS settings to their original default settings, click on the **Return Factory Defaults**.

15. After you have completed making all your desired configuration settings, click on the **Return** button.

16. Click on the **Apply Changes** button to save your settings, and then exit the PrintControl utility.

For more detailed instructions on these configuration options, use the **HELP** button to access the I-O PrintControl utility's on-line help. You may also want to refer to the more detailed descriptions of these IPDS configuration options by referring to the respective command in the following host download command section.

9.3.2 Configuring Using Host Download Commands

By sending download commands from the AS/400 host to an IPDS enabled I-O Print Server (such as the I-O 5435 AFP/IPDS Print Server), you can also change the configuration parameters.

Most host download commands are placed in a host document, on command line of the AS/400 screen, or contained within the data stream being sent from a host program. Regardless of whether the incoming print job is a screen print, a report, or a word-processing document created on the AS/400 host, the I-O Print Server will recognize the host download command.

The command itself will not be printed if it was entered correctly. If any part of the command is printed, the I-O Print Server did not recognize the command because of a problem in the format. Check the syntax of the command and send the command again. No spaces are allowed. A space or invalid character in a command causes the I-O Print Server to ignore the command and resume printing from the point the error occurred.

Most host download commands sent to the I-O Print Server take effect immediately but stay only in the I-O Print Server's active memory. To save the changed configuration, the host download command I99,0 must be sent.

Take the following steps to enter a host download command.

1. Type the Command Pass-Thru delimiter **&%** in the document at the point where the command is to take effect.

2. Type an upper case "I".

3. Type the command number for the command to be used, as shown in the table. Always use two digits for the command number (i.e. &%I05)

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 Print Server to ignore the command and resume printing from the point the error occurred.

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

7. Multiple commands can be chained together by using a slash (/) or backslash (\ ) to separate the commands (no spaces allowed). For example, to set the True Print Complete (Command 25) to ON (Value 1), and the Default Code Page (Command 30) to Canadian/French (Value 0260), and save the command, type:

   &%I25,1/30,0260/99,0

9.3.2.1 Alphabetical Listing of Host Download Commands

The following table shows the host download commands for the IPDS enabled I-O Print Server and corresponding command numbers in alphabetical order:

Description	Command Number
Compression Ratio	41
Code Page Version	30
Default Code Page (Host Language)	30

Default Font	32
Font Mapping	34
Font Strings	33
Horizontal Margin Offset	42
Host Port Initialization String	04
Input Tray Mapping	50
Output Tray Mapping	52
Overlay Stored in Printer Memory	24
Paper Size	51
Print Self-Test	98
Restore Factory Defaults	98
Restore Previous Settings	98
Text Compression	40
True Print Complete	25

9.3.2.2 Description of Host Download Commands

- An asterisk (*) identifies a factory default setting.
- Invalid commands will be ignored, i.e. the last valid setting will be unchanged.

COMMAND 04: HOST PORT INITIALIZATION STRING

Stores a twinax port initialization string (up to 25 hex pairs) in the I-O Print Server's permanent memory. This string will be sent to the printer every time a twinax job is printed. The string will be sent AFTER the print server has reconfigured the printer for host printing. However, formatting instructions sent with the host data generally override this setting.

VALUE	DESCRIPTION
(ab cd..)	up to 25 ASCII hex bytes defining the string embedded in ()
( )	deletes unit string

Example: &%I04,(1B 26 6C 38 44) sets LPI to 8LPI

COMMAND 24: STORE OVERLAY IN PRINTER MEMORY

The I-O Print Server will store overlays in its own memory. When an IPDS command is received that activates that overlay, the overlay is converted to PCL commands and sent on to the printer to be printed with the accompanying text that the AS/400 sends. This method sends the overlay down to the printer for each page printed.

You may also convert the overlay to a PCL macro which is stored in the printer's memory. When an IPDS command is received that activates that overlay, the I-O Print Server passes a start macro command on to the printer. This method is faster because that I-O Print Server needs to send one command at the beginning of the print job to activate the macro.

Note: There is a possibility that another print job coming from the shared printer port could delete or replace the overlay's macro. If this is the case, you may want to keep the overlay stored in the I-O Print Server.

VALUE	DESCRIPTION
0*	The overlay is stored and activated from the I-O Print Server.
1	The overlay is sent to the printer for storage and activated there.

Example: &%I24,1 causes the I-O Print Server to convert the overlay to a PCL macro and sends it on to the printer for storage. When an IPDS command is received to activate the overlay, the I-O Print Server sends on a macro start command to the printer for that specific overlay.

COMMAND 25: TRUE PRINT COMPLETE

Determines if the I-O Print Server reports a print complete to the host after a page has actually been printed, or if the print complete message is sent as soon as the printer has started processing the page of the host print job. Setting True Print Complete to ON will cause the printing process to slow down.

VALUE	DESCRIPTION
0*	True Print Complete is OFF.
1	True Print Complete is ON

Example: &%I25,1 causes the I-O Print Server to post a "print complete" message to the host when the page is actually printed.

COMMAND 30: DEFAULT CODE PAGE (HOST LANGUAGE)

Selects the default code page (EBCDIC) used in the EBCDIC - ASCII conversion. These code pages are resident in the print server:

VALUE	DESCRIPTION
0275	Brazilian
0276	Canadian French
0277	Danish/Norwegian
0278	Finnish/Swedish
0280	Italian
0281	Japanese/English
0282	Portuguese
0284	Spanish/Spanish Speaking
0285	English (UK)
0286	Austrian/German (alt)
0287	Danish/Norwegian (alt)
0288	Finnish/Swedish (alt)
0289	Spanish (alt)
0290	Japanese/Katakana
0297	French
0500	Int'l Set 5, Swiss Bilingual

Example: &%I30,0500 selects Code Page 500, Int'l Set5, to be the default code page for EBCDIC-ASCII conversion.

COMMAND 31: CODE PAGE VERSION

Selects which code page version will be used if more than one is available.

VALUE	DESCRIPTION
0*	Version 0
1	Version 1

Example: &%I31,1 Selects version 1

COMMAND 32: DEFAULT FONT

Selects which font will be loaded/mapped by the I-O Print Server when the host requests the "default font". The default font can be any font from the list in *Appendix E* or any other downloadable font supported by the AS/400. Some of the

IPDS fonts reside directly on the print server and are downloaded to the attached printer when requested. Other IPDS fonts are mapped to printer resident fonts. Refer to *Appendix E* for more information. Also check Command 33 for related information.

VALUE	DESCRIPTION
XXXXX	FGID number of fonts listed in Appendix E or downloadable font.

Example: &%I32,00019 selects OCR-A (FGID#00019) to be the default font.

COMMAND 33: FONT STRINGS

Assigns a valid 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 *Appendix E* for a list of supported/valid font numbers. Refer to the printer's user's guide or the documentation accompanying the font cartridge/SIMM/DIMM/Softfont 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: &%I33,3,751(<(12U<(s0p12h10v1s3b6T)

This Host Download command selects the third font string to be font #751 and selects for an HP LaserJet or Lexmark Laser Printer:

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

COMMAND 34: FONT MAPPING

Selects how IPDS font commands from the host are mapped to printer resident PCL fonts. Refer to *Appendix E* for a detailed list of font mappings. "Best Fit" maps the IPDS font to a printer resident font that most closely resembles the original IPDS font. "4028/43XX Compatible" maps the IPDS font like an IBM 4028/43XX series printer would (i.e. including font substitutions). "3812/16 Compatible" maps the IPDS font like an IBM 3812/16 printer would.

Note: After changing the font mapping, you need to power OFF the I-O Print Server and then ON again to activate the new selection.

VALUE	DESCRIPTION
0	Best Fit
1*	4028/43XX Compatible
2	3812/16 Compatible

Example: &%I34,1 Configures the IPDS I-O Print Server to map IPDS fonts to PCL fonts that most closely represent fonts an IBM 4028/43XX printer would have printed.

For example, when the IBM host requests font 204 (IPDS: Matrix Gothic 13 CPI), "Best Fit" would have mapped FGID 204 to a Letter Gothic 16 CPI with adjusted spacing to most closely resemble the requested Matrix Gothic 13 font.

An IBM 4028/43XX printer, however, would have substituted this font with a Courier 15 CPI font. By selecting "4028/43XX Compatible", the I-O Print Server will also map the requested FGID 204 to a Courier 15 CPI font.

COMMAND 40: TEXT COMPRESSION

Determines the direction of compression of host text data to fit the logical page into the printable area of the physical page. The compression ratio is set through Command 41: Compression Ratio. Note: Compressing AFP/IPDS documents containing images, graphics or bar codes in addition to text may cause alignment problems, since only text is compressed.

VALUE	DESCRIPTION
0*	No Compression
1	Compress LPI (vertical compression)
2	Compress LPI and CPI (vertical and horizontal compression)

Example: &%I40,1 causes the I-O Print Server to compress all text data coming from the host vertically (LPI).

COMMAND 41: COMPRESSION RATIO

Determines the percentage of compression of host text data to fit the logical page into the printable area of the physical page. This command only takes affect if Command 41: Text Compression is set to 1 (Compress LPI) or 2 (Compress LPI&CPI).

VALUE	DESCRIPTION
00 to 99	0 to 99%
05*	5% (default)

Example: &%I41,50 causes the I-O Print Server to compress all text data coming from the host by 50% in the direction specified through Command 40.

COMMAND 42: HORIZONTAL MARGIN OFFSET

Selects the horizontal offset of the logical page on the physical page in 1/60 of an inch. If parts of the logical page containing data are moved off the physical page, this data will not print!

Note: The default values of Command 42 and 43 align the logical page with the top left-hand corner of the physical page. Since laser printers generally have a non-printable area of approx. 1/4 inch around the outside of the physical page, host data that falls within this 1/4 inch area would be lost. To remedy this, you may want to adjust the margin offsets by the value 15 (15/60=1/4): &%I42,15/I43,15.

VALUE	DESCRIPTION
-127 to 127	-127 to 127 /60 of inch
0*	no offset (default)

Example: &%I42,-60 causes the I-O Print Server to move the logical page 1 (60/60) inch to the left.

COMMAND 43: VERTICAL MARGIN OFFSET

Selects the vertical offset of the logical page on the physical page in 1/60 of an inch. If parts of the logical page containing data are moved off the physical page, this data will not print!

Please also read the NOTE in Command 42 above.

VALUE	DESCRIPTION
-127 to 127	-127 to 127 /60 of inch
0*	no offset (default)

Example: &%I43,-60 causes the I-O Print Server to move the logical page 1 (60/60) inch towards the tope of the page.

COMMAND 50: INPUT TRAY MAPPING

The I-O Print Server currently supports 4 input trays. The IBM drawer IDs and the default PCL command IDs are shown below.

Typical IBM AS/400 Drawer Assignments			I-O Ref #	PCL Input Tray ID*
IBM Drawer ID	**or**	OfficeVision/400	(XX)	(YY)
01		Paper Drawer 1	01	01
02		Paper Drawer 2	04	04
65		Envelope Feed	03	03
100		Manual Feed	02	02

VALUE	DESCRIPTION
xx, yy	xx is the I-O reference number for the IBM drawer ID; yy is the numeric value representing the PCL printer's input tray ID (00 to 99).

Example: &%I50,01,02 causes the I-O Print Server to pull a sheet of paper from the printer's manual feed tray when it receives an IBM drawer ID of 2.

Note: *The PCL input tray IDs shown above are the defaults for the I-O Print Server. These PCL input tray IDs will vary based upon the model of PCL printer. See your printer's reference manual for the proper input tray ID to be remapped.

Note: If using a Canon imageRUNNER, it may be desirable to have the printer automatically switch from one paper tray to another of the same page size when the first tray is emptied. Do this by selecting "00" for this command.

COMMAND 51: PAPER SIZE

Make sure to turn the I-O Print Server OFF and ON again after sending this command. Selects the paper size used in each supported tray. A paper size cannot be assigned to the envelope feeder.

VALUE	DESCRIPTION
xx,yy	xx is the number representing the IBM paper drawer ID (see CMD 50; yy identifies the selected paper size according to the table below; default mappings are: Tray00-Letter, Tray01-Letter, Tray 99-Letter;

yy-value	Description
00	US-Letter
01	US-Legal

02	A4
03	US-11x17
04	A4

Example: &%I51,00,02 causes the printer to recognize that A4 paper will be used when an IBM drawer ID of 00 is received.

COMMAND 52: OUTPUT TRAY MAPPING

The I-O Print Server will allow you to select which printer output tray you would like to direct the printed pages. This is done by matching the IBM printer output tray ID to the PCL ID for the desired output tray in the printer..

VALUE	DESCRIPTION
aa,bb	aa is the number of the IBM output paper tray ID (01 to 10); bb is the numeric value representing the printer's output tray (00 to 99).

Example: &%I52,03,02 causes the I-O Print Server to direct the printer to send the printed pages to the printer's ID 02 output tray when the I-O Print Server receives an IBM output printer tray ID 03 instruction.

Note: The I-O Print Server will send the same ID number to the printer that it receives from the AS/400 unless the IBM output paper tray ID has been remapped using this command. Only IBM output trays 01 to 10 can be remapped. The other remaining output tray IDs (11 to 256) will be passed on as received.

COMMAND 98: RESTORE DEFAULTS OR PRINT SELF-TEST

Restores the factory default configuration selections (except for settings set through the DIP switches and the Default Code Page (Command 30)). Also prints out a copy of the active configuration selections, or restores the most recent permanently saved configuration selections.

VALUE	DESCRIPTION
0	Restores factory defaults
1	Prints out active configuration selections (This is also a self test of the I-O Print Server.)
2	Restores most recent permanently saved configuration settings

Example: &%I98,1 prints out the active setup selections.

COMMAND 99: SAVE ALL CURRENT SETTINGS

Saves all current settings specified through host download commands into the permanent memory of the I-O Print Server.

VALUE	DESCRIPTION
0	Saves all current settings.

Example: &%I99,0 saves all current settings

9.4 Digital Printer Finishing Features

Digital printers offer more functionality than line or laser printers in the form of "finishing features". Finishing features includes stapling, stitching, folding, inserting, punching and so on. Document management features (such as queuing, multiple copies, etc.) are also considered to be part of the finishing feature set.

Finishing features can be accessed through two different methods - through issuance of native IPDS commands or through I-O's Configuration Utility.

9.4.1 Canon

Canon imageRUNNER models that are supported by I-O Print Servers are:

I-O 5435dp:	Models with a fully functional parallel port including: imageRUNNER 330, 400, 550, 600, 60, 2200, 3300, 3800, 5000, 6000
I-O 5755dp:	All imageRUNNER models with output speeds of 22 ppm to 105 ppm
I-O 5435dp:	All imageRUNNER models with output speeds of 22 ppm to 105 ppm

9.4.1.1 Configure the imageRUNNER

For models 330, 400, 550, 600 and 60, the following configuration settings must be made before using the I-O Print Server with the imageRUNNER:

Server Version:	2.0 or higher
Enable Parallel Port:	Yes
Port Timeout in Seconds:	30
Ignore EOF Character:	Yes
Parallel Connection:	Direct Connection
Font Source:	Internal

For models 2200, 3300, 3800, 5000, and 6000, make certain that the parallel port is enabled and the time out has been set at 30 seconds or longer.

The following imageRUNNER models must be equipped with the latest firmware that supports the EFI Compatibility Mode. Also, make certain that the EFI Compatibility Mode has be activated. The minimum system firmware version must be:

imageRUNNER models 2200/2800/3300	Version 34.04
imageRUNNER models 5000/6000	Version 72.01
imageRUNNER models 7200/8500/105	Version 63.01

When using an I-O 5755dp or 5735dp gateway print server, the bi-directional setting in the imageRUNNER printer must be activated. To turn on the bidirectional setting at the imageRUNNER:

1. Press the Additional Functions button on the panel.
2. Select System Settings on the touch screen.
3. Select Network Settings.
4. Select TCP/IP Settings.
5. Select RAW Settings.
6. Within the Raw Settings screen, select ON.
7. With the RAW / Use Bidirectional screen, select ON.

8. Press OK.
9. Press DONE repeatedly until returned to the normal operating screen.

When the bi-directional setting is turned on, the imageRUNNER will report the following conditions to the I-O Print Server. The print server will in turn report the appropriate printer status to the IBM host:

- Power Off is reported as Device Not Ready
- Paper Jam is reported as Device Not Ready
- Cover Open is reported as Device Not Ready
- Paper Out is reported as Paper Out
- True Print Complete reporting via PCL Echo is available.

True Print Complete Note: When the bi-directional setting is turned on, the I-O Print Server's IPDS "true print complete" function will also be available to use. It should be noted that even though the I-O Print Server reports the page as being printed to the IBM Host, the actual page may still be in the imageRUNNER printer's spool awaiting printing.

9.4.1.2 Using Native IPDS Commands

When using native IPDS commands, the user enters the appropriate IPDS command in printer file or form definition file. The I-O IPDS Print Server converts those commands into Canon's PJL and passes them on to the Canon printer. This method allows document level control of finishing features (each document may have its own unique combination of finishing functions that are applied to it).

IBM's native IPDS finishing features that can be accessed in this manner include the following:

FINISHING FEATURE	OPTIONS
Staple	Top-Right Corner Top-Left Corner Bottom-Left Corner Two Up Two Low Two Left
Stitch	Saddle Edge
Cut	Separation Perforation
Fold	
Z-Fold	
Punch	

For more information, refer to the following IBM publications:

AS/400 Guide to AFP and PSF S544-5319
AS/400 Printer Device Programming SC41-3713
IBM AS/400 Printing IV GG24-4289
Print Services Facility/MVS: Application Programming Guide S544-3673

Print Services Facility/MVS: System Programming Guide S544-3672
IBM Page Printer Formatting Aid: User's Guide S544-5284

9.4.1.3 Using the I-O Configuration Utility

The second method of accessing the printer's finishing features uses I-O's Configuration Utility. This utility allows the user to create a “finishing profile” that is made up of different finishing functions to be applied to jobs that are being sent from the IBM host. Several finishing profiles can be setup and saved. Then when a particular print job needs a finishing profile applied to it, a simple instruction can be sent from the IBM host to activate the desired combination of finishing features.

From the host, the user selects an output bin or "drawer" as the target location for the printed job. The drawer can be selected in a printer file or form definition file. When the IPDS print job along with the drawer selection that is associated with a finishing profile are received by the I-O IPDS Print Server, they are converted into the appropriate Canon PJL commands and sent on to the Canon printer.

The following steps describe how to use the I-O Configuration Utility to access finishing features:

1. Open the I-O Configuration Utility.
2. From List of Devices screen, double click on an **5435dp, 5755dp or 5735dp** Gateway Print Server.
3. Select the **IPDS/AFP** tab.
4. Under the desired session (you may have up to three sessions), click the **Advanced** button.
5. Click on the **Finishing Profile** tab.
6. Check the **Enable Host Finishing Commands** box.
7. In the **IBM Drawer** field, select the IBM Host output drawer for which you want to setup finishing functions.
8. To choose a finishing function, check the box next to the option where the finishing function is either on or off. For those finishing functions where multiple options are available, click on the drop down box to select the desired option. Up to four different commands may be selected for each finishing profile.
9. Click **OK** when finished.
10. Make any other changes as appropriate, then reset the print server to save the settings.

This method allows the user to define different combinations of finishing functions that can be called at any time by simply sending to the I-O Print Server an IPDS print job that includes an output drawer selection that will trigger the appropriate finishing functions.

9.4.1.4 PCL Tray Assignment for Input Trays

The following table has been included to aid in mapping IBM Drawers to the imageRUNNER printer’s input trays. This is done through the I-O Configuration Utility by associating the IBM Drawer number with the appropriate Canon input tray using that tray’s PCL reference number. Please refer to the printer’s user’s guide for models not included.

Models 330/400	**Models 550/600**	**Models 2200/2800/3300 Models 2220/2820/3320/4520 Models 2270/2870/3570/4570 Models C3100/C3200/C6800**
8- Paper Cassette 1	8- Drawer 1	1- Paper Cassette 1
4- Paper Cassette 2	4- Drawer 2	4- Paper Cassette 2
5- Paper Cassette 3	5- Drawer 3	5- Paper Cassette 3
20-Paper Cassette 4	20-Drawer 4	20-Paper Cassette 4
21-Paper Cassette 5		
22-Paper Cassette 6		
2- Manual Feed / Stack Bypass	2- Main Feed/ Stack Bypass	2- Multipurpose Tray
23-Side Pack Deck	23-Side Paper Deck	21-Side Paper Deck
	3- Manual Envelope	
	6- Envelope Feeder	6- Envelope Feeder
	7- Auto Select	
1- Main Paper Source (defined in copier setup)	1- Main Paper Source (defined in copier setup)	

Models 5000/6000	**Models 7200/8500/105**
5- Right Deck (1)	1- Right Deck (1)
1- Left Deck (2)	4- Left Deck (2)
4- Upper Cassette (3)	5- Upper Cassette (3)
6- Lower Cassette (4)	20-Lower Cassette (4)
2- Multipurpose Tray	2- Multipurpose Tray
8- Paper Deck	21-Side Paper Deck
	7- Auto Select (undocumented)

The main paper source can be any tray as defined in the printer's setup.

9.4.1.5 Operational Notes

Not all finishing options listed in the previous section are available on every imageRUNNER model.

Booklets: When printing and 8 ½ x 11" booklet using 11 x 17" paper, in the Configuration Utility's paper handling section, you will need to map the printer's 11 x 17" paper tray as 8 ½ x 11". Then when printing from the IBM host, send the input paper bin that coordinates with this new tray mapping. The printer will recognize that it is receiving 8 ½ x 11" pages, but will be using 11x 17" paper. The stapling option of Saddlestitch must also be selected to cause the imageRUNNER to fold and staple booklet.

Do not use the finishing profile's option for number of pages when using booklet. The number of copies must be specified at the IBM host.

Auto Roll of Paper Trays: It may be desirable to have the printer automatically switch from one paper tray to another of the same page size when the first tray is emptied. This can be accomplished by select "0" as the PCL tray ID in the

Configuration Utility's paper handling section. The paper size must be specified. For example, if the high capacity tray, trays 1 and 2 all contained 8 ½ x 11" paper and you wanted the printer to automatically roll from one tray to the next when a tray becomes empty, you would use this option.

Proof Copy: This option must be used in conjunction with the Mailbox option. The entire job will be stored in the mail box and the first five pages will be printed for the user's review.

Sorter Mode: This option must be used in conjunction with the Copies option. Selecting Off will cause multiple copy jobs to be grouped and offset in the out put tray. Selecting collate will cause the job to be printed in sequence, with each copy offset in the out put tray. Selecting Group will cause all copies of page 1 to be printed, then offset for page 2, and so on. Note that when multiple copies are selected at the IBM host, these sorter mode options are not in effect.

Interleave: This option will cause the output to go to the top tray.

Number of Copies: Use this option to print multiple copies of a job that does not require any other finishing operations. Do not use this option in conjunction with any other finishing operation. For example, if multiple copies were desired of a booklet, set this option to 1 and at the IBM host, set the host to print the number of copies desired

9.4.2 Kyocera

Kyocera models that are supported by I-O Print Servers are:

- KM1650
- KM4530
- FS9120DN
- FS3820N

9.4.2.1 Configure the Printer

No special configuration is required for the printer.

9.4.2.2 Using Native IPDS Commands

When using native IPDS commands, the user enters the appropriate IPDS command in printer file or form definition file. The I-O IPDS Print Server converts those commands into Kyocera's commands and passes them on to the printer. This method allows document level control of finishing features (each document may have its own unique combination of finishing functions that are applied to it).

IBM's native IPDS finishing features that can be accessed in this manner include the following:

FINISHING FEATURE	OPTIONS
Staple	Top-Right Corner Top-Left Corner Bottom-Left Corner Two Up Two Low Two Left
Stitch	Saddle Edge
Fold	
Punch	

For more information, refer to the following IBM publications:

AS/400 Guide to AFP and PSF S544-5319
AS/400 Printer Device Programming SC41-3713
IBM AS/400 Printing IV GG24-4289
Print Services Facility/MVS: Application Programming Guide S544-3673
Print Services Facility/MVS: System Programming Guide S544-3672
IBM Page Printer Formatting Aid: User's Guide S544-5284

9.4.2.3 Using the I-O Configuration Utility

The second method of accessing the printer's finishing features uses I-O's Configuration Utility. This utility allows the user to create a “finishing profile” that is made up of different finishing functions to be applied to jobs that are being sent from the IBM host. Several finishing profiles can be setup and saved. Then when a particular print job needs a finishing profile applied to it, a simple instruction can be sent from the IBM host to activate the desired combination of finishing features.

From the host, the user selects an output bin or "drawer" as the target location for the printed job. The drawer can be selected in a printer file or form definition file. When the IPDS print job along with the drawer selection that is associated with a finishing profile are received by the I-O IPDS Print Server, they are converted into the appropriate commands and sent on to the printer.

The following steps describe how to use the I-O Configuration Utility to access finishing features:

1. Open the I-O Configuration Utility.
2. From List of Devices screen, double click on an **5755km or 5735km** Gateway Print Server.
3. Select the **IPDS/AFP** tab.
4. Under the desired session (you may have up to three sessions), click the **Advanced** button.
5. Click on the **Finishing Profile** tab.
6. Check the **Enable Host Finishing Commands** box.
7. In the **IBM Drawer** field, select the IBM Host output drawer for which you want to setup finishing functions.
8. To choose a finishing function, check the box next to the option where the finishing function is either on or off. For those finishing functions where multiple options are available, click on the drop down box to select the desired option. Up to four different commands may be selected for each finishing profile.
9. Click **OK** when finished.
10. Make any other changes as appropriate, then reset the print server to save the settings.

This method allows the user to define different combinations of finishing functions that can be called at any time by simply sending to the I-O Print Server an IPDS print job that includes an output drawer selection that will trigger the appropriate finishing functions.

9.4.2.4 PCL Tray Assignment for Input Trays

The following table has been included to aid in mapping IBM Drawers to the Kyocera printer’s input trays. This is done through the I-O Configuration Utility by associating the IBM Drawer number with the appropriate Kyocera input tray using that tray’s PCL reference number.

PCL Command Number	Input Tray
1	Paper Cassette 1
4	Paper Cassette 2
5	Paper Cassette 3
20	Paper Cassette 4
21	Paper Cassette 5
22	Paper Cassette 6
2	Multi-Purpose Tray
6	Envelope Feeder
7	Auto Select

9.4.2.5 Operational Notes

Finishing Options: Not all finishing options listed in the previous section are available on every Kyocera printer model.

Bi-directional Communications: the Kyocera printer will report the following conditions to the I-O Print Server. The print server will in turn report the appropriate printer status to the IBM host:

- Power Off is reported as Device Not Ready
- Paper Jam is reported as Device Not Ready
- Cover Open is reported as Device Not Ready
- Paper Out is reported as Paper Out
- True Print Complete reporting via PCL Echo is available.

True Print Complete: Because of the printer's spooling capability, it should be noted that even though the I-O Print Server reports the page as being printed to the IBM Host, the actual page may still be in the printer's spool awaiting printing.

Booklet Printing: The IBM host must be set to duplex when using the booklet option in the finishing profile. Do not use the finishing profile's option for number of pages when using booklet. The number of copies must be specified at the IBM host.

Number of Copies: Use this option to print multiple copies of a job that does not require any other finishing operations. Do not use this option in conjunction with any other finishing operation. For example, if multiple copies were desired of a booklet, set this option to 1 and at the IBM host, set the host to print the number of copies desired

10 TROUBLESHOOTING

This chapter provides instructions for troubleshooting of printing problems you may encounter when operating the I-O Print Server.

The instructions in this chapter refer to the older I-O PrintControl Utility. Even though the processes are similar for the I-O Configuration Utility, you may want to refer to the I-O Configuration Utility | Help menu option for specific information on using the configuration utility.

10.1 Software/Firmware Updates

The latest versions of the I-O Print Server's boot code and operating firmware as well as the latest version of the PrintControl utility are posted on the I-O FTP site.

1. From your internet browser, select the following URL:

   ftp://ftp.iocorp.com/ftp/

2. Select the appropriate print server directory (5450, 5430, etc.).

3. The new software/firmware is available in the following files:

Filename	Description
F5450xxx.exe	Operating Firmware for the I-O 5450 Print Server
B5450xxx.exe	Boot code for the I-O 5450 Print Server
PCUxxx.exe	PrintControl setup utility

   For other I-O Print Servers, the file names are similar (i.e. the firmware for the I-O 5430 Print Server is F5430xxx.exe and so on).

4. Follow the instructions of the readme.txt file located in the I-O Print Server directory to download the files you need from the FTP site and install them on your PC (the PrintControl file) or on the I-O Print Server (the boot code and firmware files).

10.2 I-O Print Server Self-Test

The I-O Print Server will automatically generate a one-page self-test print out every time it is powered up or reset. By default the I-O Print Server will print this self-test page on the printer attached to LPT1. However, this can be overridden by selecting a different port through the I-O PrintControl utility (see below).

10.2.1 Printing a Self-Test Using I-O PrintControl

Selecting a Printer to Print the Configuration Report (i.e. Self-Test)

1. If you haven't already done so, start the I-O PrintControl utility.
2. Double-click on the target I-O print server from the displayed list.
3. Click on the **Physical Port** you want the self-test page to print to.
4. Check the **Configuration Report** box.
5. Click on the **Apply Changes** button.

10.2.2 Printing a Self-Test Using the I-O Print Server Mode Button

A more detailed self-test showing the various 5250 printer emulation parameters can be printed by pressing the I-O Print Server's Mode button.

1. Press the I-O Print Server's **Mode** button once. The right orange LED will go ON. After the comprehensive self-test prints the LED will go OFF.

10.3 EBCDIC Hex Dump

An EBCDIC Hex Dump or Buffer Dump can be useful to diagnose problems when printing native (EBCDIC) AS/400 data.

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

The EBCDIC Hex Dump can be started for all print sessions through the I-O Print Server's Mode button or for only one IBM printer session through the I-O PrintControl utility or Host Download Command 42.

Notes: To ensure that all relevant data from the AS/400 is captured, you should end and restart the Writer on your AS/400 before sending the print job.

For laser printers and some bar code printers, the hex data may not fill up the last page. Press the form feed button on the laser printer's front panel to complete the print. Bar code printers do not usually have a form feed button, however, you can press the "mode" button on the I-O Print Server which will change the mode back to normal operations. This will function as a form feed button and the bar code printer will print the remaining page of the hex dump.

10.3.1 Starting EBCDIC Hex Dump through the Mode Button

1. Press the I-O Print Server's **Mode** button twice. The left orange LED will go ON. After about 3 seconds the I-O Print Server is in EBCDIC Hex Dump mode.

To end the hex dump, push the **Mode** button two more times to return it into the **Operating** position (i.e. both LEDs are OFF).

10.3.2 Starting EBCDIC Hex Dump through the I-O PrintControl Utility

1. If you haven't already done so, start the I-O PrintControl utility.

2. Double-click on the target I-O print server from the displayed list.

3. Click on the **SCS** port associated with the printer you want to print the hex dump on. Remember, on the I-O Print Server, SCS ports are linked to physical ports in the following manner:

To configure the printer attached to the I-O Print Server's physical port	select this SCS logical port:
LPT1	SCS1
LPT2	SCS2
COM1	SCS3

4. In the right column titled "Object Information", click on **Advanced**.

5. In the left column, click on **Troubleshooting**.

6. In the right column, set EBCDIC Hex Dump to **Start**.

7. Press **Return**.

8. Press **Apply Changes**.

To end the hex dump, simply reset the I-O Print Server (click on the Reset button in the PrintControl tool bar), or repeat steps 1 through 8 selecting Stop in step 6.

10.3.3 Starting EBCDIC Hex Dump through Host Download Command

1. On the AS/400 command prompt, or from within an AS/400 document or report, type the following:

   &%Z42,1

   where &% represent the active Command Pass-Thru delimiters,

   Z is the Command Identifier,
   42 is the Host Download or Reference number,
   1 is the value that causes hex printing to start.

2. Send the screen, document or report containing the above command to the target printer.

To end the hex dump, simply reset the I-O Print Server (click on the Reset button in the PrintControl tool bar) or power OFF the I-O Print Server.

10.4 ASCII Hex Dump

An ASCII Hex Dump can be useful to diagnose problems when printing native (EBCDIC) AS/400 data. The I-O Print Server first converts incoming EBCDIC data into ASCII and then causes the data to be printed as ASCII hex.

The ASCII Hex Dump can be started for all print sessions through the I-O Print Server's Mode button or for only one IBM printer session through the I-O PrintControl utility or through Host Download Command 43.

Notes: To ensure that all relevant data from the AS/400 is captured, you should end and restart the Writer on your AS/400 before sending the print job.

For laser printers and some bar code printers, the hex data may not fill up the last page. Press the form feed button on the laser printer's front panel to complete the print. Bar code printers do not usually have a form feed button, however, you can press the "mode" button on the I-O Print Server which will change the mode back to normal operations. This will function as a form feed button and the bar code printer will print the remaining page of the hex dump.

10.4.1 Starting ASCII Hex Dump through the Mode Button

1. Press the I-O Print Server's **Mode** button three times. Both orange LEDs will go ON. After about 3 seconds the I-O Print Server is in ASCII Hex Dump mode.

To end the Hex Dump, push the **Mode** button once more to return it into the **Operating** position (i.e. both LEDs are OFF).

10.4.2 Starting ASCII Hex Dump through the I-O PrintControl Utility

1. If you haven't already done so, start the I-O PrintControl utility.
2. Double-click on the target I-O print server from the displayed list.
3. Click on the **SCS** port associated with the printer you want to print the hex dump on. Remember, on the I-O Print Server, SCS ports are linked to physical ports in the following manner:

To configure the printer attached to the I-O Print Server's physical port	select this SCS logical port:
LPT1	SCS1
LPT2	SCS2
COM1	SCS3

4. In the right column titled "Object Information", click on **Advanced**.
5. In the left column, click on **Troubleshooting**.
6. In the right column, set ASCII Hex Dump to **Start**.

7. Press **Return**.

8. Press **Apply Changes**.

To end the hex dump, simply reset the I-O Print Server (click on the Reset button in the PrintControl tool bar), or repeat steps 1 through 8 selecting **Stop** in step 6.

10.4.3 Starting ASCII Hex Dump through Host Download Command

1. On the AS/400 command prompt, or from within an AS/400 document or report, type the following:

   &%Z43,1
   where
   &% represent the active Command Pass-Thru delimiters,
   Z is the Command Identifier,
   43 is the Host Download or Reference number,
   1 is the value that causes hex printing to **start**.

2. Send the screen, document or report containing the above command to the target printer. To end the hex dump, send the command &%Z43,0 to the target printer, reset the I-O Print Server (click on the Reset button in the PrintControl tool bar), or power OFF the I-O Print Server.

10.5 Troubleshooting Guide

10.5.1 SNA (APPC) Printing

Problem: I-O Print Server does not auto configure to the AS/400.

Possible Resolutions:

1. Double check that you have entered the correct parameters into the PrintControl screen (see chapter 6 of the User's Guide).

2. Verify that the AS/400 is set to auto configure. Use the WRKSYSVAL command to change settings.

    A. On the AS/400 command line type; DSPSYSVAL SYSVAL (QAUTOCFG), then press <ENTER>. The **Auto Configure device** parameter should be set to **1=ON**.

    B. On the AS/400 command line type; DSPSYSVAL SYSVAL(QAUTORMT), then press <ENTER>. The **Auto Configure Remote** Controller parameter should be set to **1=ON**.

    C. On the AS/400 command line type; DSPSYSVAL SYSVAL(QAUTORMT), then press <ENTER>. The **Number of devices to auto configure** should be large enough to account for all virtual (APPC) devices on your network. If you are unsure, you may want to increase this number.

    D. On the AS/400 command line type; WRKLIND, then press <ENTER>. Enter a **5** to display, or **2** to change in front of the line that the I-O LAN RPC is attached to. Press <ENTER> several times until **Autocreate controller** is displayed in the lower section of the menu options. Verify that the **Autocreate controller** parameter is set to ***Yes**.

3. Display the QSYSOPR messages for additional information. On the AS/400 command line, type DSPMSG QSYSOPR, then press <ENTER>

Problem: When resetting the I-O Print Server while an AnyNet session is (even just partially) established, the RMT and/or PRT devices generally do not come back into VARY ON mode.

Resolution: Follow this procedure when resetting the I-O Print Server in an AnyNet environment:

1. End the Writer on the AS/400 command line, type ENDWTR <printer name>, then press <ENTER>.

2. VARY OFF the PRT and RMT device (WRKDEVD <printer name>, 8, 2 (for PRT device) and 2 (for RMT device), <ENTER>).

3. End all TCP/IP sessions associated with the Print Server(WRKTCPSTS, 3, scroll to where the Print Server TCP/IP address is displayed (at least once!), select 4, <ENTER>)

4. VARY ON the RMT and then the PRT devices (WRKDVD <printer name>, 8, 1 (for PRT device) and 1 (for RMT device), <ENTER>).

5. The RMT and PRT device are now in VARY ON PENDING mode.

6. Reset the I-O Print Server through the PrintControl utility (R button on first screen) or by cycling power on the I-O Print Server.

10.5.2 TCP/IP Printing

Problem: Print jobs are preceded by a banner (header) page and/or followed by a trailer page and/or a blank page.

Possible Resolution A:

Follow this procedure to select/deselect banner and/or trailer page options on the I-O Print Server:

1. Start the I-O PrintControl utility and open the device configuration window for the desired I-O Print Server print server.

2. Click on the button associated with the TCP/IP logical port specified in the host's remote output queue (TCP1 for LPT1, TCP2 for LPT2, TCP3 for COM1).

3. From the available options check one or more of the following:

   - No banner (header) page - if you want to turn off the automatic printing of banner or header pages at the beginning of every TCP/IP print job.

   - No trailer page - if you want to turn off the automatic printing of trailer pages at the end of every TCP/IP print job.

   - No blank page - if your printer sends a blank page at the end of every TCP/IP print job and you want to suppress this.

Possible Resolution B:

Add one of the following appendices to the Remote Output Queue and/or to the "Name of printer on that machine/server" in Windows NT (see section 3.8) specified on your TCP/IP host. Note: These appendices can be added to TCP/IP logical ports (TCP1, TCP2, or TCP3) as well as physical ports (LPT1, LPT2, and COM1) specified as the Remote Output Queue.

_nb - if you want to turn off the automatic printing of banner or header pages at the beginning of every TCP/IP print job.

_nt - if you want to turn off the automatic printing of trailer pages at the end of every TCP/IP print job.

_nff - if your printer sends a blank page at the end of every TCP/IP print job and you want to suppress this.

Example: Specifying a Remote Output Queue (also: "Name of printer on that machine/server" in Windows NT) of:

LPT2_nb_nt_nff

would cause the banner (header) page, the trailer page and a blank page to be suppressed when printing from this TCP/IP host to a printer attached to the Print Server’s LPT2 port.

Problem: When printing from a Windows 2000 PC, a blank page is ejected at the end of each print job.

Solution: Enable the LPR Byte counting option in the LPR Settings section on the Port Setting tab. (Start | Setting | Printers, right click the printer, select Properties, click the Ports tab, click the Configure port...)

10.5.3 AnyNet Printing

Problem: AnyNet print devices no longer communicate with the AS/400.

Solution: Occasionally the AS/400's AnyNet subsystem needs to be reset. Do this by performing the following steps:

1. At the AS/400's command prompt, enter "**CHGNETA ALWANYNET** (*NO)".
2. Wait approximately 2 to 3 minutes.
3. At the AS/400's command prompt, enter "**CHGNETA ALWANYNET** (*yes)".

Problem: AnyNet print device is not working.

Solution: If your AnyNet created device is not working it is likely because the TARGET and/or SOURCE created on the AS/400 are not present. The Remote Workstation Controller may also be missing.

- To verify that the Remove Workstation Controller has been created, executed WRKMODD. If QRMTWSC does not exist, then create it using CRTMOOD. You may need to increase the number of maximum sessions and conversations.

- On your AS/400 command line, enter the following command: WRKCFGSTS *CTL ANYNET (substitute your controller name for ANYNET). Locate the *APPC controller. It will be located under your ANYNET controller (in this example it is called 5450xx). It should be followed by something similar to the example below:

ANYNET	ACTIVE
5450xx	ACTIVE
QRMTWSC	ACTIVE/TARGET

  Verify that either the TARGET and/or SOURCE are not present (in this example there is no SOURCE).

  The most likely cause of this condition is that when name the Device/Print Server a 'Unique' name was not chosen. (See step #3 of the AnyNet Worksheet.) In other words, the prime cause is that a name with the same first four characters already exists on the AS/400.

If this is the case, you will need to do the following; (If there are no like-named device on the system, go to step #8):

1. Delete any/all pending jobs to the print device.

2. End the printer writer.

3. Vary off the printer and *APPC controller.

4. Delete the printer device and the *APPC device that were created.

5. You will need to go to the Host Table Entry screen and modify the entry with a 'Unique Name'. (See step #3 of the AnyNet worksheet.)

6. Then go to the Configuration List CHGCFGL *APPNRMT and change the old name to the new 'Unique Name'.

7. Then go to the I-O Print Control Utility and change the old name to the new 'Unique Name', apply changes and reset the print server. After a short time you should see the newly created devices (xxPRTxx and *APPC) it will take a few minutes for the TARGET and SOURCE to become present and you should be able to proceed.

8. If there are no like-named devices on the system, it is likely that either the TARGET or SOURCE just failed to start and the AS/400 needs assistance to get them going. To attempt to restart them do the following:

   a. On the command line type NETSTAT, take option #3.

b. Page down and look for all entries that have the IP address of your I-O Print Server and choose an option #4 for all of these entries.

c. Press the F5 key to refresh your screen until all instances of this IP address have been removed.

d. Reset the I-O Print Server from within the I-O Print Control Utility. The TARGET and SOURCE should appear after a few minutes. If they do not it is recommended that you choose another name and/or recheck the steps outlined in the AnyNet configuration section.

10.5.4 TN5250e Printing

Problem: The AS/400 assigns a 3812 printer device with a name of QPADEVnnnn (where nnnn is a 4-digit number).

Possible Resolutions:

If the printer name is left blank when configuring the TN5250e object in the I-O PrintControl utility, 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 print server 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.

Problem: The AS/400 assigns a VT100 display device with a name of QPADEVnnnn (where nnnn is a 4-digit number).

Possible Resolutions:

The AS/400's Telnet server is not up to the most current version and does not support TN5250e printing. Install the proper PTFs (See Appendix D). Also make certain to have installed the most recent version of Client Access (Client Access for Windows 95/NT V3R1M3 or newer, or Client Access Enhanced for Windows 3.1 V3R1).

Problem: 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.

Solution:

1. End the writer.
2. Vary off the device.
3. Reset the I-O LAN Print Server. This will re-establish the connection and printing will resume.

Problem: The printer device is in *Vary On* pending state.

Solution:

1. End the Telnet session by using the AS/400's TCPADM command. At the command line, type GO TCPADM, take selection "7", then "3", find the IP address for the I-O Print Server, then execute option "4" - End of Session.

2. Restart the TN5250e session on the I-O Print Server by using either one of the following alternatives:

   a. Ping the I-O Printer Server, or
   b. Cycle power on the I-O Print Server.

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 printer device on the I-O Print Server. 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.

Problem: The I-O Print Server loses connection with the AS/400 host after a period of inactivity.

Solution: 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 Print Server 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.

10.5.4.1 TN5250e Connection Status Message

The I-O print server reports the success or failure of an attempt to communicate with the host by printing a brief connection status message on each attached printer. 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 message will show whether the connection succeeded or not, the name of the host AS/400 which this I-O print server 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 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:

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 configured on the I-O print server.
- The I-O print server 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 print server 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 I-O print server has been powered-off and then powered back on within a few minutes.

This code could also mean that a "reset" command has been sent from the PrintControl utility without ending the writer and varying off the printer first. When the I-O print server 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 print server restarts while the host shows the old printer sessions still active, requests for new sessions will be rejected with this code. You can recover by doing one of the following:

- Wait 10 minutes before powering the I-O print server back on.
- At the AS/400 manually terminate the old TCP/IP sessions.
- If the I-O print server is configured for automatic 5-minute session start retries (the default), just wait for a successful retry.
- If automatic retries are disabled, use one of the other available methods of initiating a session restart, after a suitable wait.
- Avoid the problem by allowing the I-O print server to end its TCP/IP sessions gracefully before powering it off. Do this by powering-off all attached printers 2 minutes or more before powering off the I-O print server 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. You should either update your operating system, or reconfigure your I-O print server for a non-Telnet mode of AS/400 communication. See Appendix C for listing of PTFs required for Telnet printing support.

I902 — Session successfully started

I904 — Source system at incompatible release

10.5.5 TN3270e Printing

The I-O print server reports the success or failure of an attempt to communicate with the host by printing a brief connection status message on each attached printer. The connection status message will look somewhat like:

> TN3270 Host Connection Status
> Connection attempt succeeded
> Host address 128.03.254
> Printer name TNETPRT2
> Status code I002-Session successfully started

The message will show whether the connection succeeded or not, the IP address of the host computer to which the I-O print server has connected, the printer name, and the session status.

The status code (I002) shown in the above example is the normal code indicating successful host communication. Possible values of the status code and suggested actions to take for each of those values are as follows:

0102 — Host rejected connect to Telnet port

This code simply means that the print server's attempt to start a Telnet session with the host failed. This message usually indicates one of the following:

- The host is down.
- No Telnet server is active on the host.
- Communication hardware (e.g. router) required for this connection is down.
- The host's IP address is incorrectly configured on the I-O print server.
- The I-O print server has not been correctly connected to the LAN

0111 — Host Telnet session lost

Usually means that the printer has been stopped on the host. Also appears if the host goes down or if there is a communication (e.g. router) failure while a Telnet session with the host is active.

E001 — No Telnet printer support at host

The operating system on the host computer supports only display (not printer) devices in Telnet sessions. Verify your operating system is at a release level that includes support for printing via Telnet sessions.

E003 — TN3270 session negotiation failed

Usually means that there is no printer defined on the host with the printer name that appears in the connection status message. This code will also appear if there is a printer with the desired name, but that printer is already active and therefore not available for use over this new connection. Verify that a printer with the desired name is defined on the host, and that the printer is available for use by this print server.

I002 — Session successfully started

10.5.6 IPDS Printing

Problem: The I-O Print Server will not respond to a Ping.

Possible Resolutions: If you have problems pinging the I-O Print Server:

- Verify the configuration of the AS/400, including the I-O Print Server and any intervening devices such as routers and bridges.

- Verify that the AS/400 line description is varied on, the I-O Print Server is turned on, and that the printer is also turned on and show a status of READY.

- Verify that the AS/400 TCP/IP interface is active.

Problem: If PSF/400 terminates when initialized

Possible Resolutions:

If PSF/400 terminates when you initialize if for IPDS printing and issues a message PQT3603, check for the following error codes:

"10" means in incorrect RMTSYS (V3R1 or V3R6) or RMTLOCNAME (V3R2, V3R7, or above) has been specified for the printer.

"15" means that PSF/400 timed out waiting for the printer's response. You should check the value you entered for Activation Timer when using WRKAFP2 (V3R1 or V3R6), CRTPSFCFG (V3R2), or CRTDEVPRT (V3R7 or above).

Codes "20-39" indicate a general communications failure. Make sure all of the components in your network are operational, such as routers.

Codes "40-59" indicate a logic error between PSF and the printer control unit. Contact IBM support.
Problem: Spooled print file remains in PND status

Possible Resolutions:

- Check the output queue with the command WRKOUTQ OUTQ (queuename)
- This typically indicates that PSF/400 is waiting for a response from the printer. This can be verified by displaying the QSPL subsystem. WRKACTJOB SBS(QSPL). If the status of the PDJ job for the printer is SELW, then PSF/400 is waiting for a response from the printer. Make sure that the printer is online and in READY status and that all network connections (for example, routers) between the AS/400 and the printer are active.

Problem: Spooled files disappear without printing

Possible Resolutions: To resolve this problem:

- Check that the correct printer queue name and correct IP address have been used.

- Ping the IP address. If the ping is successful, disconnect the network cable from the I-O Print Server, and ping the address again. If the ping is still successful, there is another printer with that IP address on the network.

Problem: Data is being clipped

Possible Resolution:

- To resolve this problem, you may want to set the PSC (Page Size Control) parameter to *YES in the WRKAFP2 (V3R1 and V3R6) command or in the CRTPSFCFG command (V3R2, V3R7 or above).

Problem: Euro symbol is not printing

*Possible Resolution: I*f you are not able to print the Euro symbol, check the following:

- Make certain that your PCL 5 laser printer has resident in it the most recent version of the Windows 3.1 Latin 1 character set that contains the Euro symbol.
- Make certain that your AS/400 has the latest PTFs installed that support the Euro symbol.
- Make certain that your AS/400 is sending out one of the following Euro Country Extended Code Pages:

Code Page	Description
1140	USA, Canada
1141	Austria, Germany
1142	Denmark, Norway
1143	Finland, Sweden
1144	Italy
1145	Spain, Latin America
1146	UK
1147	France
1148	International

When one of these code pages is sent by the AS/400, the I-O Print Server will automatically convert the AS/400's Euro Country Extended Code Page into the Windows 3.1 Latin 1 (Euro version) character set and send the instruction to the laser printer to print the Euro symbol. Of course, the laser will only print the Euro symbol if the printer has the Windows 3.1 Latin 1 Euro enable character set resident in it.

Problem: Older laser printers will not print IPDS properly.

Resolution: AFP/IPDS printing requires a laser printer that supports PCL 5e.

Problem: Some IPDS color commands are working correctly, while others are not.
Resolution: Color support for all IPDS text tower functions (text, line draw, etc.), for the IPDS image tower, and for the IDPS barcode tower are fully implemented into I-O's IPDS color support. The IPDS graphics tower is not supported at this time. The output printer must support PCL 5c.

10.5.7 Netware Printing

Problem: The print server does not connect to the Netware file server.
Resolution: Cycle power or reset the print server to cause the print server to automatically reconnect to the file server. The print server must be connected to the LAN while the file server is running. Then whenever the file server is brought down and the back up again, the print server will automatically reconnect.

Problem: After configuring the print server to use Novell, and performing a reset, the Power LED links for a long time, there is no self-test report printed, and the print server cannot be seen in the PrintControl utility's List of print Servers screen.

Resolution: The start up process has not been able to complete. If the print server is left alone for a long time with the power LED blinking, eventually the startup process will bypass the Novell login process and will then print the self-test. Most generally this occurs when there is an incorrect Novell password. On the list of print Servers screen, from the Protocol drop down menu, select "Novell". Click on the Scan for print Server button. (It is recommended that a password not be used.) It may be necessary to assign a new password at the Novell server as well as the print server.

Problem: Can not print from Netware 4.x or 5.x. The I-O Print Server self-test page indicates there are no Novell queues available, and/or a error page prints on the printer that states that the print server "Can Not Login as a Novell Print Server".

Resolution: NetWare's print service has lost its association of the NetWare printer object and the NetWare print server object.

1. Enter Novell NetWare Administer.
2. Locate the print server object, right click on the object, and select Details.
3. Choose Assignment, than click on the Add button.
4. From the list of printer objects, select the object that represents the I-O Print Server to be added.
5. Exit the NetWare Administrator.
6. Start the I-O PrintControl Utility.
7. From the list of Print Servers, highlight the designed print server.
8. Click on the "R" button to reset the print server.

NDPS Printing Notes:

NDPS (Novell Distributed Print Services) uses a completely different approach to printing. Central to NDPS printing is the Printer Agent. A Printer Agent represents a physical printer. Printers and Printer Agents are in a 1:1 relationship.

Printer Agents can be embedded in a printer or run on a server. I-O Print Servers utilize server-based Printer Agents.

Server-based Printer Agents run under the NDPS Manager. If not already running, the NDPS Manager will be automatically loaded when a Printer Agent is created through NetWare Administrator. Alternately it can be loaded from the server console. There is appears to be no limit to how many Printer Agent a NDPS Manager supports.

NDPS Gateways are software programs that handle the communication between NDPS Printer Agents and non-NDPS-aware printers (such as printers attached through an I-O Print Server).

The Broker provides network services used by NDPS and must be loaded prior to any NDPS printer configuration.

Under NDPS, printers can be configured as public access to controlled access printers. Public access printers are not associated with an NDS object and are available to anyone (who is running the NetWare 5 client). Controlled access printers are associated with an NDS object. They can be managed through NDS and access to them can be restricted.

Please refer to the following table.

NDPS (NetWare 5)	Controlled Access Printer		
Who Handles print server functions?	Netware Printer Agent		
Network Protocol	TCP/IP	IPX/SPX	IPX/SPX
I-O is configured as:	LPR/LPD	Remote Printer	Print Server
Configuration of...			
... Novell Server	Through the NW Administrator (Windows): Create NDPS printer; Create Printer Agent; Enter NDPS Manager name; Select Novell Printer Gateway; Select Printer Type; Select Connection Type "Remote LPR on IP"; Enter I-O's Print Server's IP address and Printer Name "TCP1/2/or3"; Select Printer Drivers	Through the NW Administrator (Windows): Create NDPS printer; Create Printer Agent; Enter NDPS Manager name; Select Novell Printer Gateway; Select Printer Type; Select Connection Type "Remote (rprinter on IPX); Select Port Type "Other"; Select Printer Number; Select Printer Drivers	Assume Print Server, Printer, Print Queue are already created; Through the NW Administrator (Windows); Create NDPS printer; Create Printer Agent; Enter NDPS Manager name; Select Novell Printer Gateway; Select Printer Type; Select Connection Type "Forward Job to a Queue"; Enter Queue Name and Queue User Name; Select Printer Drivers
... I-O Box	Assign IP address	Enter Name of NDPS Printer Agent; Enter Printer Name(s) or Printer Number(s)	Define Print Server name; Enter name of NDS Tree and NDS Context.
... Client Software	Windows 9x: Open Network Neighborhood; Open desired NW context; double-click NDPD printer; If desired change printer name		
Advantage	Industry standard network protocol; easy to configure	Easy to configure; little better print control (paper out status)	Great if print server box/card doesn't support LPR or remote printer mode
Disadvantage	Horrible print control (paper out status)		Too complex (too many NDS objects to manage)

10.5.8 Gateway Problem and Session Error Codes

Problem: How do I find the NetBIOS Print name or IP Address, NetBIOS Share Name, and WINS server IP Address used by a Canon imageRUNNER?

Possible Resolution:

Two different processes are required to find all the applicable information needed to setup a SMB connection in the PrintControl Utility.

Print the imageRUNNER printer's configuration page. On that page, under the Network Setup | Protocol Setup section, you will find the IP address for the imageRUNNER. Under the Network

Setup | Service Setup section, you will find the Server Name, Workgroup or Domain name, and WINS IP Address.

After obtaining this information from the configuration page, on a PC, enter Explorer. Open the Network Neighborhood. Navigate to the domain for the imageRUNNER and expand that domain. The imageRUNNER Server Name will be listed. Expand that entry. Several entries could appear. Look for the entry that references the printing function - it should be called "Print" or something similar. This is the NetBIOS Share Name.

Problem: Sometimes all three of the targeted printers will not start their jobs at the same time. One printer seems to lag behind the other printers.

Resolution: Some printers will start printing before another, regardless of whether they are attached to Session 1 or 3. The difference when simultaneous printing from the host is occurring is due to the printer's overhead. Some printers will begin printing immediately, others will wait for a minute or two spooling the date before starting to print.

10.5.8.1 SMB/CIFS Session Error Codes:

When a "Ses#?-Error" indicator is displayed in the Status column of the List of Print Servers screen for a Gateway Print Server, a brief description of the error can be displayed by clicking on the print server, then clicking on the "SessionError" menu item. A status screen will then display a brief status for each session.

101 (SMB) - Invalid IP address was specified for the printer.

- The IP address specified as the address of the printer when the Gateway Print Server was configured was formatted incorrectly. Redo the Gateway Print Server configuration, being sure to specify the correct IP address for the printer.

102 (SMB) — UDP transmit attempt failed.

- This is a Gateway Print Server internal error, and should rarely be seen. A Gateway Print Server firmware upgrade with a fix may be available.

103 (SMB) — TCP transmit attempt failed

- This is a Gateway Print Server internal error, and should never be seen. A Gateway Print Server firmware upgrade with a fix may be available.

104 (SMB) — Received no response to server node status request

- The printer is not powered-up. Verify that the printer is powered-up and operational.
- The Gateway Print Server was configured with the wrong IP address for the printer. Check the configuration of the Gateway Print Server to be sure that the IP address entered for the printer is correct.
- TCP/IP communication is not possible between the locations of the Gateway Print Server and the printer. Verify that IP communication is possible between the two locations on the network (such as pinging the printer from a location in the same subnet as the Gateway Print Server). Also check to see that network traffic from the Gateway Print Server's location to that of the printer is not excluded for NetBIOS (ports 137 & 139) by communication equipment such as a firewall or router. Take any steps required to make the path available.
- The device configured in gateway print server as the target printer is in fact not an SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.

105 (SMB) — Received negative response to server node status request

- The Gateway Print Server was configured with the wrong IP address for the printer. Check the configuration of the Gateway Print Server to be sure that the IP address entered for the printer is correct.

- The device configured in gateway print server as the target printer is in fact not an SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.
- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

106 (SMB) — Received invalid response to server node status request

- The Gateway Print Server was configured with the wrong IP address for the printer. Check the configuration of the Gateway Print Server to be sure that the IP address entered for the printer is correct.
- The device configured in gateway print server as the target printer is in fact not an SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.
- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

107 (SMB) — Received no response to server name query request

- The printer is not powered-up. Verify that the printer is powered-up and operational.
- The Gateway Print Server was configured with the wrong NetBIOS name for the printer. Check the configuration of the Gateway Print Server to be sure that the NetBIOS name entered for the printer is correct.
- TCP/IP communication is not possible between the locations of the Gateway Print Server and the printer. Verify that IP communication is possible between the two locations on the network (such as pinging the printer from a location in the same subnet as the Gateway Print Server). Also check to see that network traffic from the Gateway Print Server's location to that of the printer is not excluded for NetBIOS (ports 137 & 139) by communication equipment such as a firewall or router. Take any steps required to make the path available.
- The device configured in gateway print server as the target printer is in fact not an SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.

108 (SMB) — Received negative response to server name query request

- The Gateway Print Server was configured with the wrong NetBIOS name for the printer. Check the configuration of the Gateway Print Server to be sure that the NetBIOS name entered for the printer is correct.
- The device configured in gateway print server as the target printer is in fact not an SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.
- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

109 (SMB) — Received invalid response to server name query request

- The Gateway Print Server was configured with the wrong NetBIOS name for the printer. Check the configuration of the Gateway Print Server to be sure that the NetBIOS name entered for the printer is correct.
- The device configured in gateway print server as the target printer is in fact not an SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.
- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

110 (SMB) — Received no response to request to WINS server

- The WINS server is not powered-up. Verify that the WINS server is powered-up and operational.
- The Gateway Print Server was configured with the wrong IP address for the WINS server. Check the configuration of the Gateway Print Server to be sure that the IP address entered for the WINS server is correct.
- TCP/IP communication is not possible between the locations of the Gateway Print Server and the WINS server. Verify that IP communication is possible between the two locations on the network (such as pinging the printer from a location in the same subnet as the Gateway Print Server). Also check to see that network traffic from the Gateway Print Server's location to that of the printer is not excluded for NetBIOS (ports 137 & 139) by communication equipment such as a firewall or router. Take any steps required to make the path available.

- The device configured as the WINS server is in fact not a WINS server. Verify that the target WINS server does in fact provide WINS name resolution service.

111 (SMB) — Received negative response to request to WINS server

- The Gateway Print Server was configured with the wrong IP address for the WINS server. Check the configuration of the Gateway Print Server to be sure that the IP address entered for the printer is correct.
- The device configured as the WINS server is in fact not a WINS server. Verify that the target WINS server does in fact provide WINS name resolution service.
- The WINS server does not recognize the name given for the printer. Verify that the WINS server contains name and address information for the printer.
- The protocol implementation on the WINS server is incompatible with the implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

112 (SMB) — Received invalid response to request to WINS server

- The Gateway Print Server was configured with the wrong IP address for the WINS server. Check the configuration of the Gateway Print Server to be sure that the IP address entered for the printer is correct.
- The device configured as the WINS server is in fact not a WINS server. Verify that the target WINS server does in fact provide WINS name resolution service.
- The protocol implementation on the WINS server is incompatible with the implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

113 (SMB) — Received no response to NetBIOS session request

- The printer has lost power. Verify that the printer is powered-up and operational.
- The WINS server has provided the wrong IP address for the printer. If a WINS server provided the IP address for the printer, verify that the WINS server information for the printer is correct.
- TCP/IP communication is not possible between the locations of the Gateway Print Server and the WINS server. Verify that IP communication is possible between the two locations on the network (such as pinging the printer from a location in the same subnet as the Gateway Print Server). Also check to see that network traffic from the Gateway Print Server's location to that of the printer is not excluded for NetBIOS (ports 137 & 139) by communication equipment such as a firewall or router. Take any steps required to make the path available.
- The device configured in gateway print server as the target printer is in fact not a SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.

114 (SMB) — Received negative or invalid response to NetBIOS session request

- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

115 (SMB) — Received no response to SMB/CIFS negotiate request

- The printer lost power during session startup. Verify that the printer is powered-up and operational.
- The device configured in gateway print server as the target printer is in fact not a SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.

116 (SMB) — Received negative or invalid response to SMB/CIFS negotiate request

- The device configured in gateway print server as the target printer is in fact not a SMB/CIFS server. Verify that the target printer does in fact support SMB/CIFS printing.
- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

117 (SMB) — Received no response to SMB/CIFS setup request

- The printer lost power during session startup. Verify that the printer is powered-up and operational.

118 (SMB) — Received negative or invalid response to SMB/CIFS setup request

- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

119 (SMB) — Received no response to SMB/CIFS tree connect request

- The printer lost power during session startup. Verify that the printer is powered-up and operational.

120 (SMB) — Received negative or invalid response to SMB/CIFS tree connect request

- The NetBIOS (share) name specified for the printer on the printer was incorrect. Redo the Gateway Print Server configuration, being sure to specify the correct name for the printer on the printer.
- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

121 (SMB) — Received no response to SMB/CIFS open/write/close request

- The printer lost power during session startup. Verify that the printer is powered-up and operational.

122 (SMB) — Received negative or invalid response to SMB/CIFS open/write/close request

- The NetBIOS protocol implementation on the printer is incompatible with the NetBIOS implementation on the Gateway Print Server. A Gateway Print Server firmware upgrade with a fix may be available.

123 (SMB) — Error status, cause unknown

- This is a Gateway Print Server internal error, and should rarely be seen. A Gateway Print Server firmware upgrade with a fix may be available.

10.5.8.2 Port 9100 Session Error Codes:

When a "Ses#?-Error" indicator is displayed in the Status column of the List of Print Servers screen for a Gateway Print Server, a brief description of the error can be displayed by clicking on the print server, then clicking on the "SessionError" menu item. A status screen will then display a brief status for each session.

151 (Port 9100) — Can't start session - not enough info given in config

- No IP address was specified for the target printer when the Gateway Print Server was configured. Redo the Gateway Print Server configuration, being sure to specify the correct IP address for the target printer.

152 (Port 9100) — Invalid IP address was specified for the 9100 server

- The IP address specified as the address of the target printer (port 9100 server) when the Gateway Print Server was configured was formatted incorrectly. Redo the Gateway Print Server configuration, being sure to specify the correct IP address for the target printer.

153 (Port 9100) — TCP transmit attempt failed

- This is a Gateway Print Server internal error, and should rarely be seen. A Gateway Print Server firmware upgrade with a fix may be available.

154 (Port 9100) — Attempt to start TCP session failed

- The target printer is not powered-up. Verify that the target printer is powered-up and operational.
- The Gateway Print Server was configured with the wrong IP address for the target printer. Check the configuration of the Gateway Print Server to be sure that the IP address entered for the target printer is correct.
- TCP/IP communication is not possible between the locations of the Gateway Print Server and target printer. Verify that IP communication is possible between the two locations on the network (such as by pinging the target printer from a location in the same subnet as the Gateway Print Server). Also check to see that network traffic from the Gateway Print Server's location to that of the target printer is not excluded for port 9100 by communication equipment such as a firewall or router. Take any steps required to make the path available.
- The device at the address given for the target printer is in fact not a port 9100 server. Verify that the target printer does in fact support port 9100 printing.

155 (Port 9100)— Attempt to start TCP session was refused by server

- The target printer is busy printing jobs for other users, and is temporarily refusing to accept a job from the Gateway Print Server. If the target printer is expected to receive print jobs from more than a single source, this code may indicate that the target printer is temporarily unavailable. If the condition only occurs when the target printer is busy, the error code should be considered informational only, and no action is required. If this condition persists, or is reported when it is known that the targeted printer is not busy, then check for the error causes that follow.
- The Gateway Print Server was configured with the wrong IP address for the target printer. Check the configuration of the Gateway Print Server to be sure that the IP address entered for the port 9100 server is correct.
- The device at the address given as the target printer is in fact not a port 9100 server. Verify that the target printer does in fact support port 9100 printing.

156 (Port 9100) — Server reports printer is offline

- The target printer has been set offline; printing is suspended. Set the printer back online.

157 (Port 9100) — Server reports printer is unavailable (needs intervention)

- The target printer has an error condition, such as paper out; printing is suspended. Take steps to clear the error condition at the printer.

158 (Port 9100) — Error status, cause unknown

- This is a Gateway Print Server internal error, and should rarely be seen. A Gateway Print Server firmware upgrade with a fix may be available

10.5.9 Hardware Problems

Problem: The Line Link LED does not light.

Possible Resolution:

- Check the cabling and cable connectors.
- Restore factory defaults on printer server.
- Set the 10/100 Switch first to auto-sensing, then either the 10 or 100 selection, depending on the speed of the Ethernet cable attached.

Problem: The I-O Print Server does not appear in the PrintControl utility’s List of Print Servers screen.

Possible Resolution:

- Check the cabling and cable connectors.
- Restore factory defaults on printer server.
- Set the 10/100 Switch first to auto-sensing, then either the 10 or 100 selection, depending on the speed of the Ethernet cable attached.

Problem: Both mode lights come on during active use of the print server.

Possible Resolution:

- Power the print server off and then back on.
- Restore the factory defaults.

Problem: After configuring the print server to use Novell, and performing a reset, the Power LED blinks for a long time, there is no self-test report printed, and the print server cannot be seen in the PrintControl utility's List of Print Server screen.

Possible Resolution:

The start up process has not been able to complete. If the print server is left alone for a long time with the Power Led blinking, eventually the startup process will bypass the Novell login process and will then print the self-test. Most generally this occurs when there is an incorrect Novell password. On the List of Print Servers screen, from the Protocol drop down menu, select "Novell". Click on the scan for Print Server button. If the print server appears on the list, then an incorrect Novell password has been entered. Correct the password. (It is recommended that a password not be used.) It may be necessary to assign a new password at the Novell server as well as the print server.

10.5.10 General

Problem: A path error or document not found error occurs when opening one of the User's Guides or help manuals form with either the I-O Configuration Utility or form the older I-O Installation CD.

Possible Resolution:

Remove and reinstall Acrobat Reader. The Windows Registry has an incorrect or corrupted entry.

10.6 Restoring Factory Defaults

Factory defaults can be restored for all of the configuration options or selectively for individual 5250 printer session. To restore factory defaults refer to the corresponding section below.

10.6.1 Restoring Factory Defaults for the I-O Print Server Using I-O PrintControl

1. If you haven't already done so, start the I-O PrintControl software.
2. Select an I-O print server from the displayed list.
3. Click on the **Options** menu and select **Restore Factory Defaults**.
4. Answer the next question with **Yes**.

10.6.2 Restoring Factory Defaults for the I-O Print Server Using the Mode Button

1. Locate the **Mode** button in the bottom right hand corner of the I-O Print Server.
2. Hold down this button for about 20 seconds.
3. Factory Defaults were restored successfully when the orange indicator next to the mode button goes out.

10.6.3 Restoring Factory Defaults for a 5250 Printer Session

1. If you haven't already done so, start the I-O PrintControl software.
2. Double-click on the target I-O print server from the displayed list.
3. Click on the **SCS Logical Port** you want to restore to factory defaults.
4. Click on **Advanced**.
5. Click on the **Factory Defaults** button. The factory default parameters will be entered in the respective field for the select IBM printer emulation and printer driver.
6. Click on **Return**.
7. Click on **Apply Changes**. Factory defaults will now be restored.

10.7 AS/400 Communication Trace

It may be necessary to capture a complete communications trace of data being passed between the print server and the AS/400. This is done by starting, ending and printing a trace using IBM's commands at STRCMNTRC, ENDCMNTRC, and PRTCMNTRC. See your IBM manuals for specific instruction on using these commands.

WARRANTY INFORMATION

Manufacturer's One Year Limited Warranty (United States)

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

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

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

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

Customer On-Site Exchange Repair Policy

Terms, Conditions, and Limitations (United States)
Effective May 1, 1994[a]

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

Call Customer Support

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

Verify Product Failure

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

Replacement Units

- Replacement units are shipped from I-O's stock of refurbished units, subject to availability.
- Replacement units carry the same warranty as remaining on the original product.
- I-O's COE Repair Policy applies only to warranted product failures. Buyer guarantees payment for non-warranted product repairs or replacement.

Return Your Failed Unit

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

Install the Replacement Unit

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

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

Manufacturer's One Year Limited Warranty (International)

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

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

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

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

Return-to-Depot Repair Policy

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

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

Call Customer Support

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

Verify Product Failure

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

Select Your Preferred Repair Location

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

Return Your Failed Unit

- Return the failed product to the I-O authorized repair depot previously identified, enclosing the RMA transmittal form. When you return the failed product it must be shipped freight prepaid.
- I-O's RTD Repair Policy applies only to warranted product failures. Buyer guarantees payment for non-warranted product repairs.

Install Your Repaired Unit

- I-O's authorized repair depot will service the faulty unit and return it to you, freight prepaid.
- You are responsible for installing the returned unit.
- After receiving the repaired unit please call I-O Customer Support if any assistance is required.

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

Manufacturer's One Year Limited Warranty (European Area)

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

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

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

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

Customer On-Site Exchange Repair Policy

Terms, Conditions, and Limitations (European Area)
Effective June 1, 1997[a]

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

Call Customer Support

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

Verify Product Failure

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

I-O Ships Replacement Unit

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

Return Your Failed Unit

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

Install the Replacement Unit

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

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

EUROPEAN COMMUNITY COMPLIANCE STATEMENT:

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

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