

iSeries

Printer Device Programming

Version 5

SC41-5713-06





@server

iSeries

Printer Device Programming

Version 5

SC41-5713-06

Note

Before using this information and the product it supports, be sure to read the information in "Notices" on page 313.

Seventh Edition (April 2004)

| This edition applies to version 5, release 3, modification 0 of IBM Operating System/400 (product number 5722-SS1)
| and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not
| run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

This edition replaces SC41-5713-05.

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About Printer Device Programming (SC41-5713)

This book provides information about printing elements of OS/400, printer file and spooling support for printing operation, Advanced Function Presentation™ (AFP™), as well as printing in a network environment.

Who should read this book

This book is intended for the application programmer and system programmer. Some system operators may also find this book helpful in understanding printer fields and spooling support. To use this book, you should be familiar with the different types of printers your business uses, as well as job and queue management.

Conventions and terminology used in this book

The commands, parameters, and displays shown in this book reflect the intermediate assistance level (*INTERMED). The level of assistance (ASTLVL) is specified in the user profile. The following is a list of values for the assistance levels:

- *SYSVAL
- *BASIC
- *INTERMED
- *ADVANCED

Prerequisite and related information

Use the iSeries Information Center as your starting point for looking up iSeries technical information.

You can access the Information Center two ways:

- | • From the following Web site:
| <http://www.ibm.com/eserver/iseries/infocenter>
- | • From the *iSeries Information Center*, SK3T-4091-04 CD-ROM. This CD-ROM ships with your new iSeries
| hardware or IBM Operating System/400 software upgrade order. You can also order the CD-ROM from
| the IBM® Publications Center:
| <http://www.ibm.com/shop/publications/order>

| The iSeries Information Center contains new and updated iSeries information such as software and
| hardware installation, Linux, WebSphere®, Java™, high availability, database, logical partitions, CL
| commands, and system application programming interfaces (APIs). In addition, it provides advisors and
| finders to assist in planning, troubleshooting, and configuring your iSeries hardware and software.

With every new hardware order, you receive the *iSeries Setup and Operations CD-ROM*, SK3T-4098-02. This CD-ROM contains IBM @server IBM e(logo)server iSeries Access for Windows and the EZ-Setup wizard. iSeries Access Family offers a powerful set of client and server capabilities for connecting PCs to iSeries™ servers. The EZ-Setup wizard automates many of the iSeries setup tasks.

For other related information, see the “Bibliography” on page 317.

Using Print Services Facility™ for OS/400® (PSF/400)

Beginning with OS/400 V3R1, the Advanced Function Presentation (AFP) function is a separately orderable feature of OS/400 called Print Services Facility for OS/400 (PSF/400).

The OS/400 printing function continues to support line printers and a subset of IBM IPDS™ printers and print functions when PSF/400 is not installed.

Full support for all Intelligent Printer Data Stream™ IPDS printers is provided by the integrated AFP printing function. The printing function used to process application output is determined by the device description of the target printer. Only printers defined as DEVTYPE(*IPDS) and AFP(*YES) (both specified in the printer device description) are controlled by the AFP printing function.

When is PSF/400 Required?

The PSF/400 feature is required when:

- Any of the following IBM printers are used:
 - IBM 3820 Page Printer
 - IBM 3825 Page Printer
 - IBM 3827 Page Printer
 - IBM 3828 Advanced Function MICR Printer
 - IBM 3829 Advanced Function Printer :
 - IBM 3831 Page Printer (in 3835 emulation mode; available only in Japan)
 - IBM 3835-001 Page Printer
 - IBM 3835-002 Advanced Function Printer
 - IBM 3900 Advanced Function Printer
 - IBM 3130 Advanced Function Page Printer
 - IBM 3160 Advanced Function Page Printer
 - IBM 3935 Advanced Function Page Printer
 - IBM Infoprint® 60
 - IBM Infoprint 62
 - IBM Infoprint 70
 - IBM Infoprint 2000
 - IBM Infoprint 3300
 - IBM Infoprint 4000
- Any printer that has the DEVTYPE parameter specified as *IPDS and the AFP parameter specified as *YES.
- The Advanced Function Printing™ Utilities/400 licensed program is to be used.

When is PSF/400 Optional?

When the following IPDS printers or IPDS printer models are installed, PSF/400 is optional. These printers can be driven by the original OS/400 printing subsystem. However, PSF/400 is required if the functions provided by the AFP subsystem are to be used.

- IBM 3112 and 3116 Page Printers
- IBM 3812 and 3816 Page Printers
- IBM 3912 and 3916 Page Printers
- IBM 3930 Page Printer
- IBM LaserPrinter 4028
- IBM 4224 and 4234 Printers
- IBM 4230 Print
- IBM 4247 Printer
- IBM Network Printers (4312, 4317, and 4324)

- IBM 6408 Printer 1
- IBM 6412 Printer
- IBM Infoprint 20
- IBM Infoprint 32
- IBM Infoprint 21
- IBM Infoprint 40
- IBM 4400
- IBM 6400

Printer File Parameter Keywords Requiring PSF/400

The following shows printer file parameters and DDS keywords that affect print formatting and handling. When used to print on IPDS printers, they require PSF/400.

Printer File Parameters

- AFP characters (AFPCHARS)
- Back margin (BACKMGN)
- Back overlay (BACKOVL)
- Coded font (CDEFNT)
- Corner staple (CORNERSTPL)
- Device type (*AFPDS, *LINE, *AFPDSLIN)
- Edge stitch (EDGESTITCH)
- Font character set (FNTCHRSET)
- Font resolution (FNTRSL)
- Front margin (FRONTMGN)
- Form definition (FORMDF)
- Front overlay (FRONTOVL)
- IPDS pass through (IPDSPASTHR(*YES | *NO))
- Multi-up (MULTIUP REDUCE(*NONE))
- Output bin (OUTBIN)
- Page definition (PAGDFN)
- Saddle stitch (SADLSTITCH)
- Table reference characters (TBLREFCHR)
- User-defined data (USRDFNDDTA (AFPRESPOOL(*PRINT | *NOPRINT)))
- User-defined data (USRDFNDDTA (IPDSPASTHR(*YES | *NO)))
- User-defined data (USRDFNDDTA(USRRCSLIBL (lib1 lib2 lib3 lib4)))
- User resource library list (USRRSCLLIBL)

DDS Keywords

- AFP Resource (AFPRSC)
- Box (BOX)
- Coded font (CDEFNT)
- Data Stream Command (DTASTMCMD)
- Document Index Tag (DOCIDXTAG)
- Duplex (DUPLEX)
- End Page (ENDPAGE)

- End Page Group (ENDPAGGRP)
- Font character set (FNTCHRSET)
- Force (FORCE)
- Graphic data file (GDF)
- Invoke medium map (INVMMAP)
- Line (LINE)
- Outbin (OUTBIN)
- Overlay (OVERLAY)
- Page segment (PAGSEG)
- Position (POSITION)
- Start Page Group (STRPAGGRP)
- Text rotate (TXTRTT)
- Unicode Text Layout (UNISCRIPRT)
- Z fold (ZFOLD)

PrintManager/400

PrintManager/400 remains part of the OS/400 operating system. Print Services Facility for OS/400 is required if you use PrintManager/400 to place data on AS/400[®] spool or select page and form definition resources (AFP print objects as used on System/390[®] and RS/6000[®]).

How to send your comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this book or any other iSeries documentation, fill out the readers' comment form at the back of this book.

- If you prefer to send comments by mail, use the readers' comment form with the address that is printed on the back. If you are mailing a readers' comment form from a country other than the United States, you can give the form to the local IBM branch office or IBM representative for postage-paid mailing.
- If you prefer to send comments by FAX, use either of the following numbers:
 - United States, Canada, and Puerto Rico: 1-800-937-3430
 - Other countries or regions: 1-507-253-5192
- If you prefer to send comments electronically, use one of these e-mail addresses:
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- The name of the book or iSeries Information Center topic.
- The publication number of a book.
- The page number or topic of a book to which your comment applies.

Summary of Changes

A vertical line (|) to the left of the text indicates a change or addition.

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Chapter 1. Understanding printing elements of the iSeries server

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Chapter 4. Remote System Printing

| The information in this chapter has been moved to the iSeries Information Center under the Printing
| topic.

Chapter 5. Working with the OS/400 Network Print Server

This chapter discusses the OS/400 network print server. The network print server is the host or print server for print clients.

The network print server provides client access to OS/400 print objects and resources. Following are the network print server objects and the actions that can be requested to be performed on these objects:

Objects

Actions

Spooled file

Create, seek, open, read, write, close, hold, release, delete, move, send, call exit program, change attributes, retrieve message, answer message, retrieve attributes, and list.

Writer job

Start, end, and list

Printer device

Retrieve attributes and list

Output queue

Hold, release, purge, list, and retrieve attributes

Library

List

Printer file

Retrieve attributes, change attributes, and list

Network print server

Change attributes and retrieve attributes.

How is the network print server accessed?

Before a client can communicate with the network print server, a communications session must be established. A communications session is a logical connection between two systems through which a client program on a local system can communicate with a server program on a remote system.

After a communications session has been established, the client can start the network print server by sending a special record, called a Program Start Request (PSR), to the iSeries server. The communications session you use can utilize different protocols. Refer to the appropriate manual for that communications type for information on using program start requests (PSRs).

After the network print server program has been started using a PSR, a communications transaction has been started. A communications transaction is a logical connection between two programs on a communications session. After this communications transaction starts, data can be exchanged between the client and the network print server.

Prestart Jobs and the Network Print Server

Prestart jobs provide increased performance between a program start request (PSR) initiated by a client and the network print server. Prestart jobs are defined within a subsystem. Prestart jobs become active when that subsystem is started or they can be controlled with the Start Prestart Job (STRPJ) and End Prestart Job (ENDPJ) commands.

The program name contained in the PSR from the client must be defined in the prestart job entry. This is how the PSR attaches itself to a prestart job and therefore achieves better performance.

The network print server has prestart jobs defined in the QBASE and QCMN subsystems. The number of prestart jobs that automatically start to support the network print server is small and thus saves system resources.

Monitoring Prestart Jobs for the Network Print Server

Monitoring prestart jobs for the network print server in the QBASE or QCMN subsystems can be done using the Display Active Prestart Jobs (DSPACTPJ) command. For the network print server, you need to know the subsystem your prestart jobs are in (QBASE or QCMN) and the program the prestart jobs are started for (QNPSERVER).

This command provides the following information:

- Prestart jobs:
 - Current number
 - Average number
 - Peak number
- Prestart jobs in use:
 - Current number
 - Average number
 - Peak number
- Program start requests:
 - Current number waiting
 - Average number waiting
 - Peak number waiting
 - Average wait time
 - Number accepted
 - Number rejected

Note: The network print server never rejects a PSR. All PSRs are handled, or they are queued and use the next available prestart job.

Changing Prestart Job Entries

The information presented for an active prestart job can be refreshed by pressing the F13 key while on the DSPACTPJ display. Of particular interest is the information about PSRs. This information can indicate to you whether or not you need to modify the available number of prestart jobs. If you have information indicating PSRs are waiting for an available prestart job, you can modify prestart jobs using the Change Prestart Job Entry (CHGPJE) command.

Following is an example of a prestart job entry in the QBASE subsystem for the network print server.

```
SBSD(QSYS/QBASE) +
PGM(QSYS/QNPSERVER) +
USER(QUSER) +
STRJOBS(*YES) +
INLJOBS(1) +
THRESHOLD(1) +
ADLJOBS(3) +
MAXJOBS(*NOMAX) +
JOB(*PGM) +
JOB(*USRPRF) +
MAXUSE(200) +
WAIT(*YES) +
POOLID(1) +
CLS(QGPL/QCASERVER *CALC *NONE *CALC)
```

If the PSRs were not being acted upon fast enough you could:

- Increase the Initial number of jobs (INLJOBS) parameter value.
- Increase the Additional number of jobs (ADLJOBS) parameter value.

Then, when the Threshold (THRESHOLD) parameter value is reached, the additional number of jobs are prestarted.

The key is to match the number of prestart jobs to the number of PSRs that are being sent. Keeping this association as close to 1-to-1 ensures peak system performance.

Additional prestart jobs can be started if the number of program start requests to the network print server exceed the number of available prestart jobs.

Exit Points and the Network Print Server

An exit point is a specific point in a system function or program where control may be passed to an installation specified program or programs. These programs are called exit programs because they are providing an exit from the normal processing of the system function or program. The exit programs are usually programs created by users.

Table 1 contains the IBM-registered exit points that can be used with the network print server.

Table 1. Network Print Server Registered Exit Points

Type of Support	Exit Point Name	Exit Point Format
Entry	QIBM_QNPS_ENTRY	ENTR0100
Spooled file	QIBM_QNPS_SPLF	SPLF0100

The functions provided by these exit points are:

- QIBM_QNPS_ENTRY

This exit point is used by exit programs that want to control which users can access the network print server.

- QIBM_QNPS_SPLF

This exit point is used by exit programs that process spooled files.

Exit programs must be registered with the OS/400 Registration Facility. Registration allows all users to associate exit programs with the exit points.

OS/400 Registration Facility and the Network Print Server

The registration facility provides storage and retrieval service for both OS/400 and non-OS/400 exit points and exit programs.

The network print server exit points are already registered with the OS/400 Registration Facility. To use these exit points, you have to register your exit programs with the OS/400 Registration Facility.

Exit programs are registered and de-registered using the following APIs:

- Add Exit Program (QUSADDEP) API

Adds an exit program entry for a specific exit point.

Note: The network print server exit points do not define exit program data. When you register your exit program you can provide exit program data. However, the data is not used by the network print server.

- Remove Exit Program (QUSRMVEP) API

Removes an exit program entry for a specific exit point.

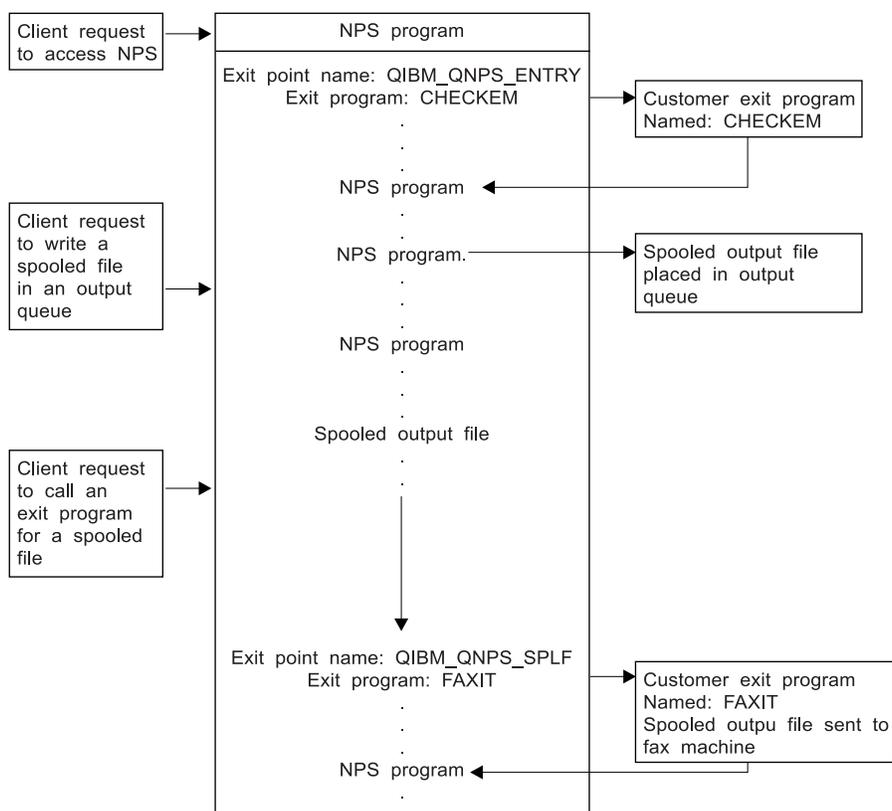
For information and examples on how to register exit programs and exit points, see the API Reference topic in the iSeries Information Center.

Verifying Exit Point and Exit Program Registration

The Work With Registration Information (WRKREGINF) command displays information about exit points and exit programs. The command does not add, delete, or change exit points or exit programs within the registration facility. The APIs listed above must be used to initiate change.

Using the OS/400 Network Print Server Exit Points

The diagram below provides an example of several requests from a client to the network print server using the exit points provided by the network print server. Those requests are: access the network print server, call a user-written exit program to verify access, put a spooled output file on an output queue, and call a user-written exit program that faxes a spooled output file.



Exit Point QIBM_QNPS_ENTRY

Exit Point QIBM_QNPS_ENTRY is used by exit programs that want to control which users can access the network print server. The called exit program is passed two parameters. These parameters are pointers to structures in user domain storage. These structures, collectively, comprise format ENTR0100.

Required Parameters:

Required Parameter Group:

1	Return code	Output	CHAR(1)
2	Server information	Input	CHAR(32)

Required Parameter Group

Return code

OUTPUT; CHAR(1) The return code parameter is a pointer to a structure in user domain that contains the return code from the exit program. The return code is checked upon return from the call to the exit program.

A return code value of hexadecimal F1 indicates that the network print server allows access and continues processing.

Any other return code value indicates that the network print server rejects access and stops processing. The exit program being called must log any specific errors.

The structure of the return code is:

Offset		Type	Field
Dec	Hex		
0	0	CHAR(1)	Return code

Server information

INPUT; CHAR(32) The server information structure contains the user profile name, server identifier, format name, and server function identifier.

The structure of the server information is:

Offset		Type	Field
Dec	Hex		
0	0	CHAR(10)	User profile name
10	A	CHAR(10)	Server identifier
20	14	CHAR(8)	Format name
28	1C	BINARY(4)	Function identifier

Exit Point QIBM_QNPS_SPLF

Exit Point QIBM_QNPS_SPLF is used by exit programs that process spooled files. The called exit program is passed four parameters. These parameters are pointers to structures in user domain storage. These structures, collectively, comprise format SPLF0100.

Required Parameters:

Required Parameter Group:

1	Return code	Output	CHAR(1)
2	Server information	Input	CHAR(32)
3	Spooled file ID	Input	CHAR(40)
4	Spooled file exit program data	Input	CHAR(*)

Required Parameter Group

Return code

OUTPUT; CHAR(1) The return code is a pointer to a structure in user domain that contains the return code from the exit program. The return code is checked upon return from the call to the exit program.

Any non-zero code indicates an error with the exit program. The exit program being called must log any specific errors. Processing by the network print server continues.

Offset		Type	Field
Dec	Hex		
0	0	CHAR(1)	Return code

Server information

INPUT; CHAR(32) The server information structure contains the user profile name, server identifier, format name, and server function identifier.

The structure of server information is:

Offset		Type	Field
Dec	Hex		
0	0	CHAR(10)	User profile name
10	A	CHAR(10)	Server identifier
20	14	CHAR(8)	Format name
28	1C	BINARY(4)	Function identifier

Spooled file ID

INPUT; CHAR(40) The spooled file ID structure contains the job name, user name, job number, spooled file name, and spooled file number. This information uniquely identifies a spooled file on the OS/400.

The structure of a spooled file ID is:

Offset		Type	Field
Dec	Hex		
0	0	CHAR(10)	Job name
10	A	CHAR(10)	User name
20	14	CHAR(6)	Job number
26	1A	CHAR(10)	Spooled file name
36	24	BINARY(4)	Spooled file number

Spooled file exit program data

INPUT; CHAR(*) The spooled file exit program data information structure contains a four byte length and the spooled file exit program data. The contents of the spooled file exit program data is not known to the network print server. The receiving exit program knows the structure of the spooled file exit program data. For example, if the exit program was going to fax the spooled file specified by the spooled file ID. The spooled file exit program data could consist of a name, phone number, building number, and office location.

The structure of the spooled file exit program data is:

Offset		Type	Field
Dec	Hex		
0	0	BINARY(4)	Length of the spooled file exit program data

Offset		Type	Field
Dec	Hex		
4	4	CHAR(*)	Spooled file exit program data

Parameter Field Descriptions

Format name. Name of the format being used.

For the network print server, two formats are supported:

- For spooled file support the value is SPLF0100.
- For entry support the value is ENTR0100.

Function identifier. Identifies, within a server, the function of the exit point. For the network print server, two function identifiers are supported:

- For spooled file support, the value is hexadecimal 010D.
- For entry support, the value is hexadecimal 0802.

Job name. The name of the job that created the spooled file.

Job number. The number of the job that created the spooled file.

Server identifier. Identifies the OS/400 server being called. The value for the network print server is QNPSEVR.

Spooled file exit program data. Spooled file exit program data consists of additional information used by the exit program that has registered for exit point QIBM_QNPS_SPLF. The client application provides the spooled file exit program data.

Spooled file name. The name of the spooled file being requested.

Spooled file number. The number of the spooled file being requested.

User profile name. The user, from IBM e(logo)server iSeries Access for Windows, that is making the call to the network print server.

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Chapter 6. What Is Advanced Function Presentation (AFP)?

Note: Regarding AFP and Print Services Facility/400 (PSF/400)

To use Advanced Function Presentation (AFP) support on the iSeries server, PSF/400 must be installed. However, if the ASCII data stream is converted through Host Print Transform function, you can use the AFP support without having to install the PSF/400.

See “Using Print Services Facility™ for OS/400® (PSF/400)” on page vii for information on when PSF/400 is required. If you have additional questions about PSF/400, contact your IBM representative.

Advanced Function Presentation (AFP) is set of licensed programs, together with user applications, that use the all-points-addressable concept to print data on a wide variety of printers or to display data on a variety of display devices. AFP includes creating, formatting, archiving, retrieving, viewing, distributing, and printing information.

Frequently used terms

Before using this part of the manual, familiarize yourself with these terms, which are used throughout the manual.

Term **Definition of Term**

AFCCU™

Advanced Function Common Control Unit

AFP Advanced Function Presentation (AFP)

A set of licensed programs, together with user applications, that use the all-points-addressable concept to print data on a wide variety of printers or to display data on a variety of display devices. AFP includes creating, formatting, archiving, retrieving, viewing, distributing, and printing information.

AFPDS

Advanced Function Presentation Data Stream (AFPDS)

In AFP support, the printer data stream used for printing Advanced Function Presentation data. The AFPDS includes composed text, page segments, electronic overlays, resources stored in the integrated file system, form definitions, page definitions, and fonts that are downloaded from the iSeries server to the printer.

APA all-points-addressable

In AFP support, pertaining to the capability to address, refer to, and position text, overlays, and images at any defined point on the printable area of the paper.

APPC/PC

Advanced Program-to-Program Communications/Personal Computer Program (APPC/PC)

A licensed program, installed on a personal computer system, that performs APPC functions for a transaction program running on the personal computer system.

IPDS Intelligent Printer Data Stream

PCL Printer Control Language

PPDS Personal Printer Data Stream

PSF Direct

Print Services Facility Direct (PSF Direct) is the function in PSF for AIX[®] that replaces the pass-through function of Remote PrintManager[™] (RPM) 2.0. It permits starting multiple printer writers from iSeries servers or other hosts to printers attached to PSF for AIX. Each printer writer has direct control of the printer to which it is attached. OS/400 spooled files are not stored on the PC's hard drive.

PSF for AIX

Print Services Facility for AIX (PSF for AIX) is an RS/6000-based print server that provides distributed printing in a network environment. Systems can be a host system (zSeries[®]) or several iSeries servers.

PSF/400

Print Services Facility/400

RPM Remote PrintManager (RPM).

In AFP support, a personal computer product that allows selected font data, overlays, and page segments that are present in Advanced Function Presentation Data Streams to be available to an attached IBM page printer.

Advanced Function Presentation Data Stream (AFPDS)

AFPDS files can be generated on the iSeries server as well as on a zSeries server. The ability of both systems to generate the AFPDS data stream means that they can send AFPDS files to each other for printing on AFP-configured printers.

On the iSeries server, AFPDS is generated by selecting *AFPDS as the value on the DEVTYPE parameter of the printer file being used.

What this part of the manual will do for you

Depending on your AFP environment, tasks to be completed could be: install hardware, configure printers, configure personal computer systems, and create configuration descriptions on the iSeries server using the following manuals:

- The iSeries server library manuals
- IBM personal computer manuals
- IBM token-ring manuals
- IBM TCP/IP manuals
- IBM printer manuals
- PSF for AIX manuals for PSF for AIX configuration
- The *IBM Remote PrintManager User's Guide and Installation Guide*
- The *i-data 7913-03 IPDS Printer LAN Attachment - Installation Guide*
- The *i-data 7913-04 IPDS Printer LAN Attachment - Installation Guide*

This part of the guide organizes all of these tasks and directs you, when necessary, to the correct manual required to complete a task.

Chapter 7. Advanced Function Presentation (AFP) resources

| This chapter discusses Advanced Function Presentation resources.

Some of the resources are shipped with the system and some of them can come from another system. You can download resources from another system, or they can come inline with the data that is to be printed. Form definitions, fonts, page segments, overlays, and page definitions are examples of resources that can come from another system. Additionally, you could have created overlays and page segments yourself using the Infoprint Designer for iSeries licensed program (5733-ID1).

If you are certain you have all the resources needed to use AFP, you can skip this chapter and go to Chapter 9, “Printing AFPDS data,” on page 49. If you do not have the resources, or are unsure, read this chapter.

Resource objects contain data and control information that can be used in a printing job and that can be shared by different pages and different print data sets. Examples of resources are fonts, which define the characters used to print text, and page segments, which can include images and text.

Resources can be stored and accessed from within the operating system being used. By referring to the name of the stored resource, many data streams can share the same resources.

When you receive AFPDS resource data from a system other than an iSeries server, you transform that data to a format that can be used on the iSeries server. You do that by using the following commands:

- CRTFORMDF
- CRTFNTRSC
- CRTPAGSEG
- CRTOVL
- CRTPAGDFN

When the commands are run, it is important that the transformed data be placed in a **library** that is defined to your **library list** when you initially sign on the system. This ensures that the resources are available when the spooled file is created and when it is printed.

A **library** is an object on disk that serves as a directory to other objects. A **library list** is a list that indicates which libraries are to be searched and the order in which they are to be searched.

When specifying an overlay, page definition, or page segment it is important to have the library they are placed in on your library list. And, if you have more than one overlay, page definition, or page segment with the same name, make sure the one you want to use is in the first library searched. Otherwise, you could specify the correct name, but not print with the correct resources.

Working with AFP resources and libraries

When the spooled file is created, the system saves the libraries in your library list. Within that list are the libraries that contain the resources used to create the spooled file.

When the system searches the saved libraries for the resources needed to print the spooled file, it searches in the following order:

1. System libraries

These libraries are identified in system value QSYSLIBL. System libraries are available to all users; they are identified in your library list with a type of SYS.

2. Current library

The current library is identified in your user profile as the value for the current library (CURLIB) parameter. In your library list, the current library has a type of CUR.

3. User libraries

User libraries are identified in system value QUSRLIBL or a job description. In your library list, these libraries are identified with a type of USR.

If you have a resource that you want many users to have access to (fonts, for example), you may want to put that resource in a library that everyone has access to, such as a library identified in the system value QSYSLIBL.

On the other hand, if you have a resource that you want to restrict access to (signatures, for example), you may want to put that resource in a library that is accessible only to the users that need that resource. For example, if you own the library that the resources are stored in, you can grant access to that object (the library) with the Grant Object Authority (GRTOBJAUT) command.

You may override the above system library search list and specify a library search list for a particular printer with the PSF configuration object. The PSF configuration object allows you to specify additional parameters for a particular device that are not supported on the Create Device Description (CRTDEVPRT) command. This includes the ability to specify a user library list (USRRSCLIBL parameter) and device library list (DEVRSCLIBL parameter). If you create a PSF configuration object, the default for the user and device library lists will be the same as the library search described above. For more information about specifying AFP resource library lists with a PSF configuration object, see “User and device resource library lists” on page 65.

Working with AFP resources in the integrated file system

Print Services Facility for OS/400 (PSF/400) can process both AFP and several types of non-AFP resources that are stored in the integrated file system. AFP resource types that can be stored in the integrated file system are IOCA (image), GOCA (graphics) and BCOCA. These are objects that are not stored within a page segment or overlay. The non-AFP resource types supported are TIFF, JFIF (typically referred to as JPG), PCL page object and PDF (with or without transparency).

IOCA and GOCA objects are examples of objects that customized applications can place inline, or within a spooled file. Those objects, as well as the others listed above, can also be stored in the integrated file system, external to a spooled file. DDS keyword AFPRSC is used to identify these resources as well as their location. See *DDS Reference: Printer files* in the iSeries Information Center for more information about DDS keyword AFPRSC.

The benefits of storing objects external to the spooled file are:

- Objects do not have to be created into a page segment.
- Non-AFP resources can be used.
- Objects can be obtained from other systems and referenced without further modification (created into a page segment).
- Applications that generate AFP resources and write them to the integrated file system, can have those resources accessed by PSF without requiring creating of a page segment or overlay.

When referencing resources in the integrated file system, you must understand how the operating system searches for those resources. The operating system searches the integrated file system for resources as follows:

- If you specify (*PATH *NONE) with AFPRSC or do not specify *PATH, then :
 1. The path specified with the system-level value for environment variable QIBM_AFP_RESOURCES_PATH is searched.

- 2. If the resource is not found, and the spooled file resides on an independent disk pool, the /QIBM/UserData/OS400/AFPresources directory on the independent disk pool is searched. Subdirectories are not searched.
- 3. If the resource is not found, or the spooled file resides on *SYSBAS, the /QIBM/UserData/OS400/AFPresources directory on the system disk pool is searched. If the spooled file itself resides on an independent disk pool, that disk pool is searched. Subdirectories are not searched.
- If you specify (*PATH *CWD) with AFPRSC, then:
 1. The current working directory for the job that generated the spooled file is searched.
 2. If the resource is not found, the path specified with the system-level value for environment variable QIBM_AFP_RESOURCES_PATH is searched.
 3. If the resource is not found, and the spooled file resides on an independent disk pool, the /QIBM/UserData/OS400/AFPresources directory on the independent disk pool is searched. Subdirectories are not searched.
 4. If the resource is not found, or the spooled file resides on *SYSBAS, the /QIBM/UserData/OS400/AFPresources directory on the system disk pool is searched. If the spooled file itself resides on an independent disk pool, that disk pool is searched. Subdirectories are not searched.
- If you specify a path name with AFPRSC, then the specified path, which must be absolute and a single directory, is searched. If the resource is not found, an error is reported. No further searching is performed.

Commands used to work with environment variables are: WRKENVVAR, ADDENVVAR, CHGENVVAR and RMVENVVAR. A colon is used to separate paths in QIBM_AFP_RESOURCES_PATH. For example, /home/officers/signatures:/home/checkimages/2003 identifies two directories to be searched:

- /home/officers/signatures (This directory is searched first.)
- /home/checkimages/2003. (This directory is searched second.)

The directories are searched in the order in which they are listed.

The /QIBM/UserData/OS400/AFPresources directory is created on your system when OS/400 is installed. It is always available for use.

Fonts and font libraries

When a printer writer is started for an AFP-configured printer, the system searches for the specified font in the user's library list and then the IBM-supplied font libraries. The IBM-supplied font libraries are:

- QFNTCPL
This library contains the OS/400 compatibility fonts. These are the fonts shipped with the iSeries server.
- SBCS font libraries numbered QFNT01 through QFNT19 and DBCS font libraries numbered QFNT61 through QFNT69.

These are the font libraries that support various IBM licensed programs on the iSeries server.

Any of those libraries that are found are put in the library list of the job printing the spooled file. These font resource libraries are then available for printing spooled files even if they were not in the library list of the job (user) that originally created the spooled file. Also, if you have acquired additional font resources, you could store them in these IBM-supplied font libraries. Storing them in the IBM-supplied libraries provides widespread access based on the way the system searches for a font.

Putting the font resource in a separate library that is not one of the QFNTxx libraries listed above require that in order to use that font, users have that library specified in their library list when the spooled file is created.

For information about specifying a different font library list on a printer, see “User and device resource library lists” on page 65.

Font resource objects

A font is a collection of characters of a certain size, typeface, and type style. Each character in a font is identified by a 1-byte or a 2-byte code. The internal structure of fonts depends on whether the font is for a phonetic writing system, like English, or for a nonphonetic writing system, like Kanji.

At least two resources are needed to make up a font: a font character set and a code page. A third resource, a coded font, can define a font by naming a font character set and a code page.

Font character set

This resource contains the patterns for each character in the font and associates an 8-byte character identifier with each pattern. This resource also contains descriptive information for the entire character set.

Code page

This resource associates code points with character identifiers, each representing a character pattern. A code point is an 8-bit binary number representing one of 256 potential characters.

Coded font

This resource associates one or more code pages with the appropriate font character sets.

Fonts from zSeries

Fonts may be sent to the iSeries server from the zSeries. Check your licensing agreements to see if they preclude the transfer of printer resources between systems.

Font resources can be downloaded from the zSeries. These font resources cannot be altered by the iSeries server operator. If changes need to be made to any font resources the zSeries site must be notified.

When these font resources are received from the zSeries, you place them in a data file. In order to convert these font resources to a format that can be used by OS/400, you use the **CRTFNTRSC** (Create Font Resource) command.

3800 Printer Font Restrictions on the iSeries server:

- | You can receive data from a zSeries server that was generated to print on a 3800 printer using 3800
 - | printer font character sets. However, the iSeries server does not support the 3800 printer and its font
 - | character sets. Therefore you should not receive 3800 printer font character sets on the iSeries server.
- If you have AFPDS data that calls for a 3800 font and you have the 3800 printer font character sets on the system, the system will try to use them and you will get an error when the data prints.
- Instead, download the 3820 printer font character sets from the zSeries. When the data generated for the 3800 printer starts to print, OS/400 will substitute the 3820 printer font character sets.
- The naming convention for 3800 printer font character sets is: C1xxxxxx. The naming convention for 3820 printer font character sets is: C0xxxxxx.

Fonts provided by the OS/400 program

The compatibility set is provided to allow OS/400 applications to print on the 3820, 3825, 3827, 3828, 3829, 3831, 3835, and 3900 Model 1 Printers. The numeric font identifiers specified in the application are translated into one of the fonts in the compatibility set.

The following font families comprise the IBM-supplied compatibility font set that is provided with the OS/400 program for Advanced Function Presentation:

- APL
- Boldface

- Courier
- Document
- Essay
- Format
- Gothic
- Orator
- Prestige
- Proprinter Emulation
- Roman
- Script
- Serif
- Symbol Set
- Text

In addition to these 240-pel raster fonts, the compatibility set includes a number of code pages that are downloadable to printers. For use on printers that support outline fonts, the set also includes a Letter Gothic outline font that contains the euro symbol.

When your operating system was loaded, you had to choose to install or not install IBM-supplied fonts. If you chose not to install the fonts at that time, and now wish to install them, use the Software Install PDF to install the fonts.

IBM Infoprint Fonts for Multiplatforms (5648-E77)

The IBM Infoprint Fonts provide the IBM Expanded Core Fonts. Code pages and coded fonts compatible with the Expanded Core Fonts are also provided. The IBM Expanded Core Fonts combine the IBM Core Interchange Fonts, IBM Coordinated Fonts, and IBM BookMaster® Fonts.

The IBM Expanded Core Fonts are derived from Adobe Type 1 font technology and are only provided in the AFP outline format supported by AFP software for SBCS fonts. DBCS fonts are derived from the Adobe CID-Keyed font and Type 1 technologies. The DBCS fonts are only available in AFP outline format.

For more information refer to *IBM Infoprint Fonts: Font Summary, S544-5846*.

Advanced Function Printing Fonts/400 (Program 5769-FNT)

The licensed program Advanced Function Printing Fonts/400 contains all the fonts listed below. They can also be purchased individually.

- Sonoran Serif^{** 1}
- Sonoran Serif Headliner
- Sonoran Sans Serif^{** 2}
- Sonoran Sans Serif Headliner
- Sonoran Sans Serif Condensed
- Sonoran Sans Serif Expanded
- Monotype Garamond^{**}
- Century Schoolbook^{**}
- Pi and Specials

1. Sonoran Serif is a functional equivalent of Monotype Times New Roman.

2. Sonoran Sans Serif is a functional equivalent of Monotype Arial.

- ITC Souvenir**
- ITC Avant Garde Gothic**
- Mathematics and Science
- Optical Character Recognition (OCR-A and OCR-B)
- DATA1
- APL2®

If you purchase any of the fonts and want to install them, you will have to use the Software Install PDF to install the fonts.

For information on font substitution go to Appendix D, “Working with Fonts, Font Character Sets, Code Pages, CHRIDs, and Coded Fonts,” on page 177.

AFP font collection

Version 2.1.0 of the AFP Font Collection is similar to the first version (1.1.0). It also adds support for the Euro currency symbol to the Latin1, Thai language, and Lao language fonts, as well as some new code pages. Version 2.1.0 divides the font collection into two categories:

- | • IBM AFP Font Collection for VM and VSE
- | • IBM AFP Font Collection for Workstations and OS/400

| **IBM AFP Font Collection for VM and VSE:**

| This font collection provides font resources for the VM and VSE operating environments. It includes font data formats for 240-pel bitmaps, 300-pel bitmaps, and AFP outline fonts. No additional font utilities are offered with this collection.

| **IBM AFP Font Collection for Workstations and OS/400:**

| This font collection provides font resources for workstations and OS/400 operating environments. In addition to the font resources, additional font utilities are available that allow you to edit outline fonts, create AFP font resources from Type 1 outline fonts, create and modify code pages, and create and modify coded fonts.

| Chinese, Japanese, and Korean languages have DBCS CID-keyed outline fonts.

AFP expanded core fonts

The Expanded Core Fonts are the SBCS type families provided in the AFP Font Collection. They include:

- Boldface Latin-1 (with Euro)
- BookMaster Latin-1 and Specials (with Euro)
- Courier (with Euro)
- Courier APL2
- Gothic Katanka
- Gothic Text Latin-1 (with Euro)
- Helvetica (with Euro)
- IBM Logo (for BookMaster)
- Letter Gothic Latin-1 (with Euro)
- OCR-A
- OCR-B
- Prestige Latin-1 (with Euro)
- Times New Roman (with Euro)

Language support includes the Latin-1–5 language groups, along with Arabic, Cyrillic, Greek, Hebrew, Lao and Thai for the Courier, Helvetica, and Times New Roman type families.

DBCS type families and languages provided in the AFP Font Collection for Outline Fonts and Programs include:

- Japanese
 - Heisei Kaku Gothic
 - Heisei Maru Gothic
 - Heisei Mincho
- Korean with unified Hangeul characters
 - Gothic
 - Myengjo
- Chinese-Simplified
 - Fang Song (GB)
 - Hei (GB)
 - Kai (GB)
 - Song (GBK)
- Chinese-Traditional
 - Kai
 - Sung

The Version 2.1.0 AFP Font Collection does not contain any of the following:

- Font licensed products, including the Sonoran fonts.
- Font RPQs, including Postal Bar Codes and Bar Code/OCR
- 4028 Font Metrics
- Compatibility fonts in 5648-B33; however, they are included in 5648-B45.

Supported languages

The AFP Font Collection products provide language support as follows:

Note: Language groups identified in items 1 through 9 are defined in the International Organization for Standardization (ISO) standard 8859. Not every font provides characters for every language cited.

1. The Latin/Arabic language group contains characters for Latin and Arabic scripts.
2. The Latin/Cyrillic language group contains characters for Bulgarian, Byelorussian, Macedonian, Russian, Serbian, Ukrainian, and English.
3. The Latin/Greek language group contains characters for Latin and Greek scripts.
4. The Latin/Hebrew language group contains characters for Latin and Hebrew scripts.
5. The Latin-1 language group contains characters for the following languages: Danish, Dutch, English, Faeroese, Finnish, French, German, Icelandic, Irish, Italian, Norwegian, Portuguese, Spanish, and Swedish.
6. The Latin-2 language group contains characters for the following languages: Albanian, Czech, English, German, Hungarian, Polish, Romanian, Serbocroatian, Slovak, and Slovenian.
7. The Latin-3 language group contains characters for the following languages: Afrikaans, Catalan, Dutch, English, Esperanto, French, German, Italian, Maltese, Spanish, and Turkish.
8. The Latin-4 language group contains characters for the following languages: Danish, English, Estonian, Finnish, French, German, Greenlandic, Lappish, Latvian, Lithuanian, and Norwegian.
9. The Latin-5 language group contains characters for the following languages: Danish, Dutch, English, Finnish, French, Irish, Italian, Norwegian, Portuguese, Spanish, Swedish, and Turkish.
10. The Latin/Thai language group contains characters for Latin and Thai scripts.
11. The Latin/Lao language group contains characters for Latin and Lao scripts.

12. Katakana/Gothic Katakana contains phonetic syllabic characters used for writing non-Japanese words and for emphasis in Japanese.
13. The DBCS Fonts contain characters for Simplified Chinese, Traditional Chinese, Japanese, and Korean.

IBM compatibility fonts:

These fonts consist of uniformly spaced and mixed-pitch type families such as Courier, Document, Essay, Letter Gothic, Orator, and Prestige. The Proprinter Emulation fonts are also included, which are used with the supported printers emulation mode.

The IBM Compatibility Fonts are provided in 240-pel bounded and 300-pel raster formats.

IBM 4028 font metrics:

These font metrics allow AFP applications to format documents to be printed on the 300 dots-per-inch IBM LaserPrinter 4028 using printer resident fonts.

Advanced Function Printing DBCS Fonts/400 (Program 5769-FN1)

The licensed program Advanced Function Printing DBCS Fonts/400 contains all the fonts listed below. Each of the five features can be ordered separately.

- AS/400 Font DBCS - Japanese
- AS/400 Font DBCS - Korean
- AS/400 Font DBCS - Traditional Chinese
- AS/400 Font DBCS - Simplified Chinese
- AS/400 Font DBCS - Thai

Page segments

Page segments are objects containing composed text and image, prepared before formatting and included during printing.

For example: you may want to repeat constant data at different positions on a page or overlay, and you may also want to repeat that data on different pages or overlays. You can do this by using a page segment. A company logo is an example of this type of data.

- | Using the Infoprint Designer for iSeries licensed program, the Advanced Function Printing Utilities/400
| licensed program or the AFP printer drivers provided with Microsoft® Windows®, you can create page
| segments on the iSeries server. Page segments can also be downloaded from zSeries. The page segments
| must be stored in an accessible library.

When page segment data is received from the zSeries, you place it in a data file. In order to convert the page data to a format that can be used by OS/400, use the **CRTPAGSEG** (Create Page Segment) command.

Overlays

Overlays are a collection of predefined data (such as lines, shading, text, boxes, or logos) that can be merged with variable data on a sheet while printing is being performed.

To use overlays, specify them in the front and back overlay parameters of the printer file being used with your application: temporarily using an Override with Printer File (OVRPRTF) command, permanently using the Change Printer File (CHGPRTF) command, or before the spooled file prints using the Change Spooled File Attributes (CHGSPLFA) command.

You can also use the DDS OVERLAY keyword to include overlays with your printed output.

- | The licensed program Infoprint Designer for iSeries, the licensed program Advanced Function Printing Utilities/400 or the AFP printer drivers provided with Microsoft Windows provide the capability to create overlays on the iSeries server. Overlays can also be downloaded from the zSeries.

The overlays must be stored in an accessible data file.

When overlay data is received from the zSeries, you place it in a data file. In order to convert the page overlay data to a format that can be used by OS/400, use the **CRTOVL** (Create Overlay) command.

Form definitions

A form definition is an AFP resource object that defines the characteristics of the form including:

- Overlays
- Position of page data on the form
- Rotation
- Duplexing
- Input drawer
- Formfeed type
- Print quality
- Number of copies of each page and the modifications that apply to each set of copies.

Whenever you are printing to a printer configured as AFP(*YES), a form definition is required. If a form definition is not specified on the printer file, an inline form definition is built from the printer file parameters.

The following list details the origin of AFP-related form definitions:

- Provided with the iSeries server
- | • Created (automatically) with Infoprint Designer for iSeries.
- Downloaded from zSeries
- Inline from zSeries

Form definitions provided with the iSeries server

The following form definitions are provided with the iSeries server in library QSYS.

Name	Across (Inches)	Down (Inches)	Presentation	Direction	Bin	Duplex
F1A10110	1/6	1/6	Portrait	Across	1	No
F1A10111	1/6	1/6	Portrait	Across	1	Yes
F1A10112	1/6	1/6	Portrait	Across	1	Tumble
F1A10120	1/6	1/6	Portrait	Across	2	No
F1A10121	1/6	1/6	Portrait	Across	2	Yes
F1A10122	1/6	1/6	Portrait	Across	2	Tumble
F1C10110	1/6	1/6	Landscape	Down	1	No
F10101PA	0	1/2	Portrait	Across	1	No
F10101PD	0	1/2	Portrait	Down	1	No
F10101LA	0	1/2	Landscape	Across	1	No
F10101LD	0	1/2	Landscape	Down	1	No
F1OGL	0	0	Portrait	Across	1	No

Name	Across (Inches)	Down (Inches)	Presentation	Direction	Bin	Duplex
<p>Note: The IBM-supplied form definitions do not set the print quality for the 4224, 4230, 4234, and 4247 printers. You must set the print quality on the printer operator panel when using an IBM-supplied form definition.</p>						

Form definitions downloaded from zSeries server

Form definitions can also be downloaded from the zSeries server. These form definitions cannot be altered by the iSeries server operator. If changes need to be made to any form definition, the zSeries server site must be notified.

When these form definitions are received from zSeries server, you place them in a data file. In order to convert this form definition data to a format that can be used by OS/400, use the **CRTFORMDF** (Create Form Definition) command.

Form definitions that are inline from zSeries

Form definitions can also be part of the AFPDS file that is sent to the iSeries server. That is, the form definition and the data all come in one large data stream. Here again, if any change is needed to the form definition, the zSeries site must be notified.

FORMDF parameter on printer file

To use or identify a fully-qualified form definition, specify the FORMDF parameter with the CRTPRTE, CHGPRTF or OVRPRTF CL commands.

You can specify a form definition with the following device types:

- *AFPDS
- *AFPDSLNE
- *LINE
- *IPDS
- *SCS
- *USERASCII

Whenever you specify any output directed to an AFP printer but do not specify a form definition, an inline form definition is built from the printer file parameters and passed to PSF/400.

Depending upon the specifications given, some printer file parameters may be ignored when output is printed through PSF/400. For example, if you specify a form definition on the CRTPRTE, CHGPRTF or OVRPRTF CL command, an inline form definition will not be built from the printer file parameters. In this example, if you send the data to an AFP printer PSF/400 ignores the following printer file parameters:

- BACKMGN
- CORNERSTPL
- DRAWER
- DUPLEX
- EDGESTITCH
- FORMFEED
- FRONTMGN
- MULTIUP (N_UP)
- PAGRTT
- PRTQLTY

- REDUCE (N_UP)
- SADLSTITCH

However, if you send the data to a non-AFP printer with a devtype of *IPDS or *SCS in this example, the form definition parameter is ignored and the printer file parameters are used.

When specifying a form definition on the printer file, the values you specify on the DRAWER and DUPLEX parameters will override the drawer and duplex values specified in the form definition. If you want to use the drawer and duplex values specified in the form definition, you must specify DRAWER(*FORMDF) and DUPLEX(*FORMDF) on the printer file.

To indicate an output bin for a form definition, specify the OUTBIN parameter on the print file.

The spooled file attributes for the form definition are changeable.

Page definitions

Page definitions are resources that format and compose line data into pages. A page definition contains printing controls that specify:

- Where data from each input record is to be printed
- Page size (height and width)
- Data fields that can be suppressed
- Print positions for line-data records containing carriage-control characters
- Inline printing direction
- Number of lines per inch
- List of page segments that may be used
- List of overlays that may be used
- Record definitions
- Constant data to be printed
- List of fonts that may be used

Whenever you are printing to a printer configured as AFP(*YES), and you are printing line data or mixed data, a page definition is required. If a page definition is not specified on the printer file, an inline page definition is built from the printer file parameters.

The page definitions shown in Table 2 are provided with the iSeries server in library QSYS.

Table 2. IBM-Supplied Page Definitions

Name	Size of Form	Orientation on Page	Description
P1A06462	8.5 x 11.0 inches	Portrait	Letter size. 6 lines per inch (LPI). 64 lines per page
P1A08584 ¹	9.5 x 11.0 inches	Portrait	Continuous forms. 8 lines per inch (LPI). 85 lines per page.
P1A08682	8.5 x 11.0 inches	Portrait	Letter size. 8 lines per inch (LPI). 86 lines per page.
P1B08262	8.5 x 14.0 inches	Portrait	Legal size. 6 lines per inch (LPI). 82 lines per page.
P1B04963	8.5 x 14.0 inches	Portrait	Legal size. 6 lines per inch (LPI). 82 lines per page.
P1B11082	8.5 x 14.0 inches	Portrait	Legal size. 8 lines per inch (LPI). 110 lines per page.

Table 2. IBM-Supplied Page Definitions (continued)

Name	Size of Form	Orientation on Page	Description
P1B06683	14.0 x 8.5 inches	Landscape	Legal size. 8 lines per inch (LPI). 66 lines per page.
P1C09182	8.27 x 11.69 inches	Portrait	Legal size. 8 lines per inch (LPI). 91 lines per page.
P1D08462	14.33 x 10.12 inches	Landscape	B4 size forms. 6 lines per inch (LPI). 84 lines per page.
P1D08083	14.33 x 10.12 inches	Landscape	B4 Size forms. 8 lines per inch (LPI). 80 lines per page.
P1D11382	10.12 x 14.33 inches	Portrait	B4 Size forms. 8 lines per inch (LPI). 113 lines per page.
P1J04964 ¹	12.0 x 8.5 inches	Landscape	Continuous forms. 6 lines per inch (LPI). 49 lines per page.
P1J06484 ¹	12.0 x 8.5 inches	Landscape	Continuous forms. 8 lines per inch (LPI). 64 lines per page.
P1L06464 ¹	14.88 x 11.0 inches	Landscape	Continuous forms. 6 lines per inch (LPI). 64 lines per page.
P1L08584 ¹	14.88 x 11.0 inches	Landscape	Continuous forms. 8 lines per inch (LPI). 85 lines per page.
P1V04863	8.27 x 11.00 inches	Portrait	Combined letter/A4 size forms. 6 lines per inch (LPI). 48 lines per page.
P1V06483	8.27 x 11.00 inches	Portrait	Combined letter/A4 size forms. 8 lines per inch (LPI). 64 lines per page.
P1V06683	8.27 x 11.00 inches	Portrait	Combined letter/A4 size forms. 8 lines per inch (LPI). 66 lines per page.
P1W240F3	8.27 x 11.00 inches	Portrait	Combined letter/A4 size forms using MULTIUP. 15 lines per inch. 240 lines printed per page. 4 logical pages printed on one physical page.
P1W120C2	8.27 x 11.00 inches	Portrait	Combined letter/A4 size forms using MULTIUP. 12 lines per inch. 120 lines printed per page. 2 logical pages printed on one physical page.

Table 2. IBM-Supplied Page Definitions (continued)

Name	Size of Form	Orientation on Page	Description
P1W12883	8.27 x 11.00 inches	Portrait	Combined letter/A4 size forms using MULTIUP. 8 lines per inch. 128 lines printed per page. 2 logical pages printed on one physical page.
Note:			
¹ Can only be used with the 4224, 4230, 4234, and 4247 printers.			

When page definition data is received from the zSeries server, you place it in a data file. To convert the page definition data to a format that can be used by OS/400, use the **CRTPAGDFN** (Create Page Definition) command.

- Page definitions are created automatically with Infoprint Designer.

PAGDFN parameter on printer file

To use or identify a fully-qualified page definition, specify the PAGDFN parameter with the CRTPRTE, CHGPRTE, or OVRPRTE CL commands.

You can specify page definitions with *LINE or *AFPDSLIN data. After PSF/400 completes formatting, it converts the line data and page definition to IPDS.

When you specify a page definition on the printer file, some printer file parameters may be ignored when the spooled file is printed through PSF/400. For example, if you specify a page definition on the CRTPRTE, CHGPRTE, or OVRPRTE CL command, and also specify line data or mixed data, an inline page definition will not be built from the printer file parameters. In this case, if you send the data to an AFP printer, PSF/400 ignores the following print parameters:

- CDEFNT
- CHRID
- CPI
- FNTCHRSET
- FOLD
- FONT
- LPI
- MULTIUP
- PAGESIZE
- PAGRTT
- REDUCE

However, in this example, if you send the data to a non-AFP printer with a devtype of *LINE, the page definition parameter is ignored and the print parameters are used. The line data is converted to SCS or IPDS.

To change the PAGDFN spooled file attribute, use the CHGSPLFA command.

What to do next:

Once you are sure you have all the above resources in place, go to Chapter 9, "Printing AFPDS data," on page 49

Chapter 8. Working with line data

Advanced Function Presentation (AFP) applications can generate Advanced Function Printer Data Stream (AFPDS), Line, or Mixed (AFPDS and line) spool files. This chapter describes line and mixed data stream support.

Definitions of line data and mixed data

- Line data

Line data is record oriented readable text. The generating application can partially format line data by adding carriage control characters to the first column of each record, by adding blank lines to adjust vertical positioning, or by using skipping and spacing control in their applications (such as on a RPG output specification). Line data is supported as a device type in the print file commands (CRTPRTF, CHGPRTF, and OVRPRTF) through the DEVTYPE(*LINE) specification.

- Mixed data

Mixed data is line data intermixed with AFPDS data. Only certain AFPDS structured fields are allowed to be intermixed with line data. Refer to *Advanced Function Printing: Programming Guide and Line Data Reference*, (S544-3884), for more information about mixing line data and AFPDS structured fields.

For line data and mixed data, the following terms are used interchangeably:

- *LINE and line data
- *AFPDSLINe and mixed data

The following sections provides information about line data application considerations, device type considerations, OS/400 printer file parameters, carriage control characters (ANSI and Machine), Table Reference Characters, IGC parameters, Medium-Map-Name (INVMMAP) DDS keyword, restrictions when using PAGDFN and FORMDF.

DEVTYPE values

To place line data or mixed data onto the printer spool, specify either the *LINE or *AFPDSLINe values with the DEVTYPE parameter for the CRTPRTF, CHGPRTF, and OVRPRTF CL commands.

***LINE** Line data is placed onto the spool. For *LINE:, specify any of the following:

- CTLCHAR(*FCFC)
- CTLCHAR(*MACHINE)
- CTLCHAR(*NONE)

To place line data and skipping or spacing controls directly onto the printer spool without converting it to another data stream, specify *LINE. The line data is not in a printer-ready format and, like AFPDS, will be converted to the appropriate printer format at print time.

***AFPDSLINe:**

Mixed data (line and AFPDS data) is placed onto the printer spool.

For *AFPDSLINe, specify any of the following:

- CTLCHAR(*FCFC)
- CTLCHAR(*MACHINE)
- CTLCHAR(*NONE)

You can specify page definitions to format traditional application line data without making any application programming changes. If, however, you want to use any one of the following AFPDS

structured fields (which can be intermixed with line data), you must specify, in hex, a X'5A' record in the output buffer. Refer to *Advanced Function Printing: Programming Guide and Line Data Reference*, (S544-3884), for more information about mixed documents and AFPDS. For example: by changing your application, you can specify any one of the following AFPDS structured fields, and they can be intermixed with line data:

- Invoke Data Map
- Invoke Medium Map
- Invoke Page Segment
- Include Page Overlay
- Presentation Text

Refer to the *Advanced Function Presentation Programming Guide and Line Data Reference* (S544-3884) for more information about mixed data streams.

CTLCHAR values

When machine code control characters exist in the data (rather than ANSI control characters), specify the CTLCHAR parameter with a value of *MACHINE on the CRTPRTF, CHGPRTF, or OVRPRTF CL commands.

See Table 4 on page 43 for information about machine code control characters.

TBLREFCHR parameter

To indicate whether a table reference character (TRC) exists in the data, specify the TBLREFCHR parameter with the CRTPRTF, CHGPRTF, or OVRPRTF CL commands.

If forms control characters are used with the data, the TRC follows the forms control character, but precedes the data bytes. If forms control characters are not used, the TRC is the first byte of the data record. As with forms control characters, if table reference characters are used, every data record must contain a TRC byte.

The TBLREFCHR parameter provides support for applications migrating from S/390® to OS/400.

Note: The TBLREFCHR parameter is ignored if specified for *USERASCII, *SCS, *IPDS, and *AFPDS device types.

See “Table reference characters (TRC)” on page 44 for more information.

AFPCHARS parameter

To identify up to four 4-byte names of coded fonts, specify the AFPCHARS parameter with the CRTPRTF, CHGPRTF, or OVRPRTF CL commands. The 4-byte names are concatenated to 'X0' to identify up to four coded fonts that are needed when TBLREFCHR is used within the data.

The AFPCHARS parameter is only valid for *LINE and *AFPDSLIN device types.

CVTLINDTA parameter

Use the CVTLINDTA parameter to specify whether line data and a page definition should be converted to AFPDS before the data is spooled. You can specify this parameter in the CRTPRTF, CHGPRTF, and OVRPRTF commands.

Application considerations for line data

Line data and mixed data on OS/400 are used by S/370™ AFP users who are migrating data to iSeries server users who are generating AFPDS, IPDS, or SCS data streams.

If you are a S/370 user, you should be familiar with the concepts of AFP and page definitions. When using line data, page definitions, and form definitions, your applications are generating line data with either an ANSI or machine code control character in column 1 of the spooled output. To migrate data to iSeries prior to OS/400 Version 3, Release 2, and Version 3, Release 7, S/370 users had to use PrintManager/400 API calls to rewrite their applications. With line data support, applications do not need to be rewritten. To migrate data to OS/400, specify CTLCHAR(*FCFC) for ANSI code control, or CTLCHAR(*MACHINE) for machine code control. You should also specify DEVTYPE(*LINE) or DEVTYPE(*AFPDSLINE)

If you are an OS/400 user, and want to use line data, page definitions, and form definitions, you must determine whether your application generates an ANSI control character exists in column 1 of your spooled output.

If your application does generate an ANSI control character in column 1 of your spooled output to control skipping and spacing, specify CTLCHAR(*FCFC) on the printer file. Also, to convert to line data, specify the following in the OS/400 printer file:

- DEVTYPE(*LINE)
- PAGDFN (a page definition)
- FORMDF (a form definition) optional format

Note: Specifying a form definition in this format is optional; you could specify that an inline form definition be built from the print file parameters by indicating FORMDF(*NONE) on the printer file.

You can change your application to place an ANSI control character in column 1 of your spooled output to control skipping and spacing, by using a language or application construct (such as a SKIP or SPACE option on a COBOL WRITE statement), or by making an RPG output specification.

When you specify a device type of *AFPDS, *IPDS, or *SCS, control information is used to generate the appropriate skipping or spacing commands in the specified data stream. The control information for *AFPDS and *LINE that is passed by the compilers and application is converted to a machine code control character. Thus, applications that do not use ANSI control characters can generate line data with control characters onto the spool and use a page definition for post spool formatting, if you specify CTLCHAR(*NONE) and DEVTYPE(*LINE).

Device type considerations

When using line data, you can specify various combinations of DEVTYPE(*LINE), PAGDFN and FORMDF parameter support on the print file. For example:

- Specify DEVTYPE(*LINE), PAGDFN and FORMDF
 - When you print to an AFP printer, PSF/400 uses the PAGDFN and FORMDF parameters to transform the data to IPDS.
 - When you print to a non-AFP printer, the PAGDFN and FORMDF parameters are ignored. The parameters on the print file are used, and the line data is transformed to IPDS or SCS.
- Specify DEVTYPE(*LINE), no PAGDFN, with FORMDF
 - When you print to an AFP printer, an inline page definition is built from the print file parameters. PSF/400 uses the inline page definition and user-specified FORMDF parameter to transform the data to IPDS.

- When you print to a non-AFP printer, the FORMDF parameter is ignored. The print file parameters are used, and the line data is transformed to IPDS or SCS.
- Specify DEVTYPE(*LINE), PAGDFN, no FORMDF
 - When you print to an AFP printer, an inline form definition is built from the print file parameters. PSF/400 uses the user-specified PAGDFN parameter and the inline form definition to transform the data to IPDS.
 - When you print to a non-AFP printer, the PAGDFN parameter is ignored. The print file parameters are used, and the line data is transformed to IPDS or SCS.
- Specify DEVTYPE(*LINE), no PAGDFN, no FORMDF
 - When you print to an AFP printer, an inline PAGDFN and FORMDF is built from the print file parameters. PSF/400 uses the inline page definition and inline form definition to transform the data to IPDS.
 - When you print to a non-AFP printer, the print file parameters are used, and the line data is transformed to IPDS or SCS.

The support for combinations of PAGDFN and FORMDF for DEVTYPE(*AFPDSLIN) are similar to DEVTYPE(*LINE) line data. However, you should be aware of the following exceptions:

- When you send data to a non-AFP printer, the data can not be transformed to IPDS or to SCS. The spooled file must be printed on an AFP printer.
- Although you are not required to specify PAGDFN or FORMDF with *AFPDSLIN data ³, certain AFPDS commands in the data stream (for example, Invoke Medium Map) may reference named structured fields in the PAGDFN or FORMDF that may not match those in the inline PAGDFN and FORMDF

Carriage control characters

The carriage control character can be represented as either ANSI or machine code.

ANSI carriage control is a standard representation that is used with printers from many different manufacturers. Table 3 lists the ANSI codes and their functions. Machine code control characters were defined by IBM; they correspond to channel command words issued by the operating system. Table 4 on page 43 lists the IBM machine code values and functions.

Note: You may not use both ANSI and machine codes within a single data set.

There are differences in the conventions used by OS/400 for ANSI and machine code line spacing. The OS/400 convention for ANSI handles line spacing and then causes the line to be printed. The OS/400 convention for machine codes causes the line to be printed and then the spacing action is performed.

ANSI carriage control characters

Table 3. ANSI Carriage Control Characters

Control Character Value (in hexadecimal)	Function
X'40' (blank)	Space 1 line, then print (single spacing)
X'F0' (zero)	Space 2 lines, then print (double spacing)
X'60' (dash)	Space 3 lines, then print (triple spacing)
X'4E' (plus sign)	Suppress spacing, then print (overstrike previous line)

3. You are not required to specify PAGDFN or FORMDF with *AFPDSLIN data because it can be built inline from a print file.

Table 3. ANSI Carriage Control Characters (continued)

Control Character Value (in hexadecimal)	Function
X'F1'	Print the data at line position defined as Channel 1 (by convention, the first line on a new page)
X'F2'	Print the data at the line position defined as Channel 2
X'F3'	Print the data at the line position defined as Channel 3
X'F4'	Print the data at the line position defined as Channel 4
X'F5'	Print the data at the line position defined as Channel 5
X'F6'	Print the data at the line position defined as Channel 6
X'F7'	Print the data at the line position defined as Channel 7
X'F8'	Print the data at the line position defined as Channel 8
X'F9'	Print the data at the line position defined as Channel 9
X'C1'	Print the data at the line position defined as Channel 10
X'C2'	Print the data at the line position defined as Channel 11
X'C3'	Print the data at the line position defined as Channel 12
<p>Note: When ANSI carriage controls are used, only the values that appear in this table are considered valid by PSF/400. PSF/400 treats any other ANSI carriage control value as invalid and prints any data on the line using single spacing.</p>	

Machine carriage control characters

Table 4. Machine Code Control Characters

Control Character Value (in hexadecimal)	Function
X'03'	No operation
X'09'	Print and space 1 line (single spacing)
X'11'	Print and space 2 lines (double spacing)
X'19'	Print and space 3 lines (triple spacing)
X'01'	Print without spacing (overstrike next line)
X'89'	Print the data, then skip to the line position defined as Channel 1 (by convention, the first line on a new page)
X'91'	Print the data, then skip to the line position defined as Channel 2
X'99'	Print the data, then skip to the line position defined as Channel 3
X'A1'	Print the data, then skip to the line position defined as Channel 4
X'A9'	Print the data, then skip to the line position defined as Channel 5
X'B1'	Print the data, then skip to the line position defined as Channel 6
X'B9'	Print the data, then skip to the line position defined as Channel 7
X'C1'	Print the data, then skip to the line position defined as Channel 8
X'C9'	Print the data, then skip to the line position defined as Channel 9
X'D1'	Print the data, then skip to the line position defined as Channel 10
X'D9'	Print the data, then skip to the line position defined as Channel 11
X'E1'	Print the data, then skip to the line position defined as Channel 12
X'0B'	Space 1 line without printing

Table 4. Machine Code Control Characters (continued)

Control Character Value (in hexadecimal)	Function
X'13'	Space 2 lines without printing
X'1B'	Space 3 lines without printing
X'8B'	Skip to Channel 1 immediate (by convention, the first line on a new page)
X'93'	Skip to the Channel 2 position immediate
X'9B'	Skip to the Channel 3 position immediate
X'A3'	Skip to the Channel 4 position immediate
X'AB'	Skip to the Channel 5 position immediate
X'B3'	Skip to the Channel 6 position immediate
X'BB'	Skip to the Channel 7 position immediate
X'C3'	Skip to the Channel 8 position immediate
X'CB'	Skip to the Channel 9 position immediate
X'D3'	Skip to the Channel 10 position immediate
X'DB'	Skip to the Channel 11 position immediate
X'E3'	Skip to the Channel 12 position immediate

Note: PSF/400 ignores the following hexadecimal machine-code carriage control characters and does not print lines containing them: X'02' through X'07', X'0A', X'12', X'23', X'43', X'63', X'6B', X'73', X'7B', X'EB', X'F3', and X'FB'. PSF/400 treats any other carriage control value as invalid and prints any data on the line using single spacing.

Table reference characters (TRC)

Table Reference Characters allow an additional byte to appear at the beginning of a line to indicate which one of up to four different character arrangement tables (coded fonts specified by AFPCHARS parameter) will be used to print the line. This byte, the *table reference character* contains a value of X'F0', X'F1', X'F2', or X'F3', corresponding to the relative position of the desired coded font in the list of coded fonts specified by the AFPCHARS parameter. If carriage control bytes are used with the data, the table reference character follows the carriage control byte but precedes the data bytes. If a carriage control bytes are not used, the table reference character is the first byte of the data record. As with carriage control, if table reference characters are used, every data record must contain a TRC byte.

The following tables summarize the valid forms of line data:

Table 5. Simple data line

D A T A

Table 6. Data line with carriage control byte

CC	D A T A
----	---------

Table 7. Data line with table reference character

TRC	D A T A
-----	---------

Table 8. Data line with carriage control byte and table reference character

CC	TRC	D A T A
----	-----	---------

Line data and IGC parameters

The IGC parameters of an OS/400 printer file are described here.

IGCDTA

Indicates IGC data may be used in the file. The user for a line or mixed data file will need to indicate that there is SO/SI present in the data by setting IGCDTA to *YES.

IGCCPI

For AFP printers, this parameter is ignored, as the pitch of the DBCS data is determined by the selected font.

For non-AFP printers, during transformation from line data to SCS, this parameter specifies the pitch of the DBCS data. DBCS SO/SI can not be transformed when going to an IPDS printer.

Mixed data can not be transformed when going to a SCS or IPDS printer.

IGCSOSI

This keyword indicates what action should be taken when SO/SI are found in the data. If the data is mixed, the SO/SI should be taken out and appropriate spaces inserted based on the value of this keyword.

*YES

The SO/SI characters will be printed as blanks.

*NO

The system does not print the shift control characters. These characters do not occupy a position on the printed output.

*RIGHT

The system prints two blanks when printing the shift-in characters but does not print shift-out characters.

IGCEXNCHR

Ignored, as extension character processing only applies to SCS DBCS printer, not AFP attached printers.

IGCCHRRTT

For AFP printers, this parameter is ignored. Character rotation can be specified in the PAGDFN.

For non-AFP printers, when line data is transformed to SCS, this parameter is used to rotate the DBCS data.

The following is a list of DDS keywords that are supported for line data. If you use DDS keywords that are not included on this list while processing line data, they will be ignored.

- ALIAS
- BLKFOLD
- CCSID
- DATE
- DATFMT
- DATSEP
- DFT
- DLTEDT
- INVDTAMAP
- EDTCDE
- EDTWRD
- FLTFIXDEC
- FLTPCN

- IGCALTTYP
- IGCANKCNV
- INDARA
- INDTXT
- INVMMAP
- MSGCON
- PAGNBR
- REF
- REFFLD
- SKIPA
- SKIPB
- SPACEA
- SPACEB
- TEXT
- TIME
- TIMFMT
- TIMSEP

INVDTAMAP (invoke data map) keyword

INVDTAMAP is a record-level keyword to invoke a new data map. It specifies the name of the data map in a page definition. The page definition is used to map the line data. Data maps in page definitions can perform functions, including multiple-up or rotated printing, changing fonts, and lines per inch. You must have PSF/400 installed to use this keyword.

The format of the keyword is:

```
INVDTAMAP(data-map-name | &data-map-name-field)
```

The data-map-name parameter is required and defines a data map in the page definition. This parameter is 8 characters. The data map name can be specified as a constant or program-to-system field.

This keyword is valid with DEVTYPE(*LINE) or DEVTYPE(*AFPDSLIN). A page definition must be specified on the print file. If DEVTYPE is changed to anything other than *LINE or *AFPDSLIN, the keyword will be ignored and a warning message will be issued at print time.

The INVDTAMAP, SKIP, and SPACE keywords are processed in the following order:

- SKIPB
- SPACEB
- INVDTAMAP
- SPACEA
- SKIPA

The following example shows how to specify the INVDTAMAP keyword.

```

0      1      2      3      4      5      6      7      8
123456789012345678901234567890123456789012345678901234567890
*
      R RECORD1
02      R RECORD2      INDTAMAP(MAP1)
      MAP      8A P      INVDTAMAP(&MAP);
*

```

INVMMAP (medium-map-name) DDS keyword

INVMMAP is a record level keyword in DDS used to invoke a medium map. Invoke Medium Map (IMM) specifies the name of a medium map in a form definition. Use the IMM in the form definition to select or change print parameters such as input drawer, page rotation, overlays.

The medium map name is limited to 8 characters. You can specify the medium map name as a constant or a program-to-system field.

- medium-map-name
- field1

The INVMMAP keyword is valid only with DEVTYPE(*AFPDS). Also, a form definition must be specified on the print file. If DEVTYPE is changed to anything other than *AFPDS, the INVMMAP keyword is ignored and a warning message will be issued at print time.

PSF/400 ends printing on the current sheet when a invoke medium map is encountered.

INVMMAP, SKIP, and SPACE keywords are processed in the following order:

- SKIPB
- SPACEB
- INVMMAP
- SPACEA
- SKIPA

The medium map specified remains in effect for the rest of the file unless changed by another INVMMAP keyword.

The invoke medium map keyword is validated at print time. An error message will be issued if it is not valid.

Option indicators are valid for the INVMMAP keyword.

The following example shows how to specify the INVMMAP keyword.

```
0          1          2          3          4          5          6          7          8
1234567890123456789012345678901234567890123456789012345678901234567890
*
          R RECORD1
02          R RECORD2          INVMMAP(MAP1)
          MAP          8A P          INVMMAP(&MAP);
*
```

If indicator 02 is on, RECORD1 uses a new medium map (MAP1).

RECORD2 allows the application program to specify the name of medium map by setting program variable MAP.

Restrictions when using line data and mixed data

Externally described printer files (DDS SUPPORT) support both line and mixed data device types.

Device type *LINE or *AFPDSLIN and SPOOL(*NO) will not be allowed on the CRTPRTF or CHGPRTF commands. If this condition exists, Message CPD7341, indicating the value SPOOL(*NO) is not valid with device type, will be issued.

Chapter 9. Printing AFPDS data

This chapter discusses two ways of printing AFPDS data:

- Go to “Printing AFPDS data generated on the iSeries server” to read about printing AFPDS data that was generated on the iSeries server.
- Go to “System/390 AFPDS and line data” to read about printing AFPDS and line data generated on a System/390.

Printing AFPDS data generated on the iSeries server

Follow these steps to generate and print OS/400 AFPDS data:

Step 1 Creating AFPDS data.

- You can create AFPDS data on the iSeries server from applications using a printer file with the device type (DEVTYPE) parameter value set to *AFPDS.
- You can create AFPDS data with DDS printing functions that are tailored for use with AFPDS. For more information about the DDS functions that support AFPDS, see the DDS Reference information in the iSeries Information Center.
- You can create and print AFPDS data from an existing database file, merged with an overlay, using the Advanced Function Printing Utilities/400 licensed program.
You can learn more about this licensed program by going to “Advanced Function Printing Utilities/400” on page 125.

Step 2 Using overlays.

After overlays are created and placed in a library, you can use them by specifying them in the front overlay (FRONTOVL) and back overlay (BACKOVL) parameters of a printer file.

Overlays can also be specified using the DDS OVERLAY keyword. For more information on using overlays in a printer file, go to the DDS Reference information in the iSeries Information Center.

Step 3 Using application program.

The application program that creates the data to be used with the overlays may need to be tailored so that the printed output fits with the overlays that you designed.

Tailoring the program to fit the overlay is similar to tailoring the program to work with a pre-printed form.

System/390 AFPDS and line data

From an Advanced Function Presentation (AFP) perspective, data sent to OS/400 from the System/390 can be any of the following:

- Print Data (letters, documents, and so on)
 - Advanced Function Presentation Data Stream (AFPDS)
 - AFPDSLIN (AFPDS and line data mixed)
AFPDSLIN is data that has a mixture of line data and AFPDS data. AFPDSLIN contains data that specifies placement and presentation information needed for printing.
 - LINE (line data)
Line data is data that has been prepared for printing on a line printer. Line data does not contain all placement or presentation information that is needed for printing on page printers. Line data is created on the System/390 computer.
- Resources

- Fonts
- Form definitions
- Overlays
- Page definitions
- Page segments

Working with the System/390

Communication with the System/390 is important to determine how the System/390 will send data to your iSeries server.

When data is sent from a System/390 to the iSeries server, it can go directly to the output queue of a designated user ID or it can go into your network files.

Notes:

1. Sending print data to the output queue of a user ID is supported only when your host System/390 RSCS/JES subsystem is connected to the iSeries server VM/MVS Bridge.
2. To send data to another system (iSeries server or System/390), you can use the Send Network Spooled File (SNDNETSPLF) command.
3. The *SNA Distribution Service* guide contains information on how to create communications networks that enable you to send data from the iSeries server to other systems.

If the data consists of print data (AFPDS, LINE, or AFPDSLIN data), the data can be sent directly to an output queue of a specified user ID on OS/400. AFPDS data can go to your network files, but you must then use the Print Advanced Function Printer Data (PRTAFPDTA) command to put the file on an output queue.

If the data consists of resources (fonts, form definitions, overlays, page definitions, or page segments), the data must go into your network files.

Sending print data to the output queue of a user ID

The destination of print data sent from a System/390 to an iSeries server should be the output queue of a specified user ID.

Sending print data from VM System/390 to a user's output queue on OS/400

A VM System/390 can issue either a PRINT command or a PSF command to place a file directly into an OS/400 user's output queue.

Using the PRINT command: The following set of commands places the file named reports letter a into the output queue of the user named userone on OS/400 with a node ID of as4002.

```
'TAG DEV PRT as4002 userone'  
'SPOOL PRT TO rscs COPY 1'  
'PRINT reports letter a (NOCC'
```

Using the PSF command: The following set of commands places the LINE data spooled file named reports letter a into the output queue of the user named userone on the iSeries server with a node ID of as4002. A PAGEDEF will be used when the data is printed.

When using the PSF command, you must place the characters P1 in front of the PAGEDEF name. When using a FORMDEF, you must place the characters F1 in front of the FORMDEF name. This example uses PAGEDEF; the PAGEDEF object name in the command is P1MYFORM.

```
'TAG DEV PRT as4002 userone'  
'SPOOL PRT TO RSCS COPY 1'  
'PSF reports letter a (PAGEDEF (P1MYFORM RESOURCE A))'
```

Sending print data from MVS™ System/390 to a user's output queue on an iSeries server

The following set of commands, when issued by an MVS System/390, places the AFPDS spooled file into the output queue of the specified user on OS/400.

These commands are job control language (JCL) commands. Do not place a P1 (for PAGEDEF) or an F1 (for FORMDEF) in the instructions. In the example below a FORMDEF named MYFORM is used.

```
//INSTR      PROC      NODE='as4002',USER='userone'
                        INFIL='dept265.userx.files(report) '
//SPOOL      EXEC      PGM=IEBGENER
//MYOUT      OUTPUT    DEST=NODE..USER,
                        COPIES=1,
                        FORMDEF=MYFORM
//SYSPRINT   DD        SYSOUT=*
//SYSIN      DD        DUMMY
//SYSUT1     DD        DSN=&,DISP=SHR,DCB=(RECFM=FBA);
//SYSUT2     DD        SYSOUT=A,OUTPUT=*.MYOUT
// PEND
//STEP01     EXEC      PROC=INSTR
```

System/390 parameters and matching OS/400 printer file parameters

Be aware of the following special considerations when working with these System/390 (VM and MVS) parameters:

FCB

If you specify the FCB parameter on VM or MVS, the printer file of that name in the library list of the user receiving the spooled file on OS/400 is used. If the FCB parameter is not specified, the iSeries server printer file QSYSPRT is used.

BIN AND DUPLEX

If the BIN and DUPLEX parameter values are not specified from VM and MVS and the form definition is not specified from VM or MVS, the values for the DRAWER and DUPLEX parameters are taken from the printer file specified in the FCB parameter. If the FCB parameter is not specified, the DRAWER and DUPLEX values are set to *FORMDEF, meaning that the values are taken from the form definition.

FORMDEF

If the form definition (FORMDEF) parameter is not specified from VM or MVS, the OS/400 form definition parameter value is set to *DEVLD and *LIBL is used for the library. *DEVLD means the form definition used is the one specified in the device description for the printer you want to use.

The following System/390 parameters are supported when data is sent directly to the output queue of a user on the iSeries server.

If a System/390 printer parameter that is not in this table is specified, and there is no matching or equivalent OS/400 printer file parameter, the System/390 printer parameter is ignored when the data is printed on the iSeries server.

Table 9. VM System/390 Parameters

System/390 Printer Parameter Names	VM Commands	Function	OS/400 Printer File Parameter Names
BIN	PSF	Specifies which drawer or bin the paper is taken from.	DRAWER
CC	PRINT, PSF	Specifies control characters.	CTLCHAR ¹
CHARS	SPOOL	Specifies a table of coded fonts.	AFPCHARS
COPY	SPOOL	Specifies the number of copies.	COPIES

Table 9. VM System/390 Parameters (continued)

System/390 Printer Parameter Names	VM Commands	Function	OS/400 Printer File Parameter Names
DATAACK	PSF	Specifies whether or not the printer will block print positioning and invalid character errors. Twinaxial attached printers will always block print positioning and invalid character errors unless the printer file used to create the spooled file has the fidelity parameter value set to *ABSOLUTE.	No equivalent OS/400 parameter
DEST	TAG	Specifies node and user ID.	No equivalent OS/400 parameter
DUPLEX	PSF	Specifies if duplex printing is to be used.	DUPLEX
FCB	SPOOL, TAG	Specifies the printer file used.	FILE
FORM	SPOOL	Specifies the form type to be used.	FORMTYPE
FORMDEF	PSF	Specifies the form definition to be used.	FORMDF
PAGEDEF	PSF	Specifies the page definition to be used.	PAGDFN
PRMODE ²	PSF	Specifies the device type, ideographic character data, processing shift-out/shift-in characters.	DEVTYPE, IGCDDTA, IGCOSI
TRC	PRINT, PSF	Specifies if the data stream contains table reference codes.	TBLREFCHR

¹ In order to correctly print System/390 line data with first-character forms control, each channel value specified in the CTLCHAR parameter must have a unique line number associated with that channel value.

² Only PRMODE values of PAGE, LINE, SOSI1, and SOSI2 are supported. The supported PRMODE values translate to device types of *AFPDS, *LINE, or *AFPDSLIN. See Network Job Entry Formats and Protocols for more specific information

Table 10. MVS System/390 Parameters

System/390 Printer Parameter Names	MVS JCL Statements	Function	OS/400 Printer File Parameter Names
CHARS	DD, OUTPUT	Specifies a table of coded fonts.	AFPCHARS
CONTROL	OUTPUT	Specifies line spacing.	No equivalent OS/400 parameter
COPIES	DD, OUTPUT	Specifies the number of copies.	COPIES
DATAACK	OUTPUT	Specifies whether or not the printer will block print positioning and invalid character errors. Twinaxial attached printers will always block print positioning and invalid character errors unless the printer file used to create the spooled file has the fidelity parameter value set to *ABSOLUTE.	No equivalent OS/400 parameter
DCB=RECFM	DD	Specifies control characters.	CTLCHAR ¹
DEST	DD, OUTPUT	Specifies node and user ID.	No equivalent OS/400 parameter
FCB	DD, OUTPUT	Specifies the printer file used.	FILE
FORMDEF	OUTPUT	Specifies the form definition to be used.	FORMDF
FORMS	OUTPUT	Specifies the form type to be used.	FORMTYPE
PAGEDEF	OUTPUT	Specifies the page definition to be used.	PAGDFN

Table 10. MVS System/390 Parameters (continued)

System/390 Printer Parameter Names	MVS JCL Statements	Function	OS/400 Printer File Parameter Names
PRMODE ²	OUTPUT	Specifies the device type, ideographic character data, processing shift-out/shift-in characters.	DEVTYPE, IGCDTA, IGCSOSI
TRC	OUTPUT	Specifies if the data stream contains table reference codes.	TBLREFCHR

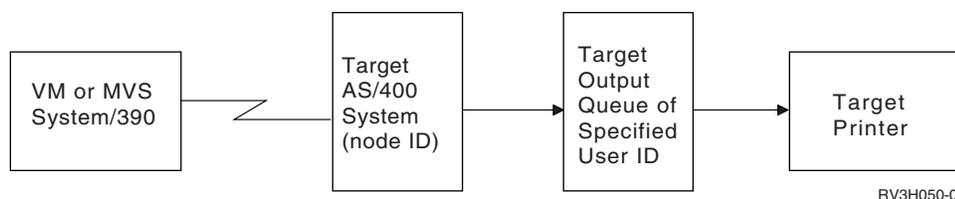
¹ In order to correctly print System/390 line data with first-character forms control, each channel value specified in the CTLCHAR parameter must have a unique line number associated with that channel value.

² Only PRMODE values of PAGE, LINE, SOSI1, and SOSI2 are supported. The supported PRMODE values translate to device types of *AFPDS, *LINE, or *AFPDSLIN. See Network Job Entry Formats and Protocols for more specific information

Managing print data sent to an OS/400 output queue

The ability of the System/390 to send these files directly to the output queue of a specified user ID on the iSeries server eliminates the steps of receiving the files to a library and then using the PRTAFPDTA command to print them. The following diagram shows the path of the files from the System/390 to the OS/400 printer.

Note: If you cannot find the spooled file on the output queue of the specified user ID, look in the QNFTP job log for informational, diagnostic, and error messages. The QNFTP job runs under the QSNADS user profile.



Target iSeries server

The target iSeries server is the system in a communications network that the System/390 is sending the files to. The iSeries server is providing the function of a file server for the host System/390. The iSeries server is known to the host System/390 by a unique node name (node ID).

Note: The target user ID must have access to the libraries containing the resources (overlays, fonts, page segments) that the spooled file needs when it prints on the iSeries server. Go to “Working with AFP resources and libraries” on page 25 for more information about resources and libraries.

Target user ID

The host System/390, working with the iSeries server, can send spooled files directly to the output queue of a specified user ID. This capability eliminates manually receiving spooled files and then using the PRTAFPDTA command to print the files.

Target output queue

Caution should be used when having the sent file placed directly on the output queue. Spooled files placed directly into the output queue of the user ID could be printed without the owner of the user ID being aware of it if a printer is active for that output queue.

Possible solutions are:

- Create a special user ID and a special output queue for that user ID.

You could then sign on using that user ID and assign a printer to your output queue to print the spooled files.

- Make sure the output queue of the receiving user ID is held before the System/390 sends the files.
- Use the End Writer (ENDWTR) command to end the printer assigned to that output queue before the System/390 sends the files.

Target printer

Make sure that the printer you want to print the files on is assigned to the correct output queue. If any special handling of the printer is necessary (form choice, drawer selection, envelopes, and so on), it should be done before the files are sent.

Sending resources and AFPDS data to network files

The destination of Advanced Function Presentation resources (fonts, overlays, page segments, page definitions, and form definitions) sent from a System/390 to an iSeries server must be network files.

Note: AFPDS data can also be sent to network files. However, this is not the recommended way to send this data to an iSeries server. If you choose this way, you must use the Print Advanced Function Printer Data (PRTAFPDTA) command to put the file on an output queue.

Sending resources and AFPDS data from VM System/390 to network files

The following command, when issued by a VM System/390, places the specified file into the network files of a user on an iSeries server.

```
SENDFILE fonts resource a TO userone AT as4002
```

Sending resources and AFPDS data from MVS System/390 to network files

The following command, when issued by an MVS System/390, places the specified file into the network files of a user on an iSeries server.

```
TRANSMIT as4002.userone DSNNAME('system.afp.resources(font)')
```

Receiving resources and AFPDS data sent to network files

To make receiving resources and AFPDS data as easy as possible, you should be aware of the following:

- Make sure you do not send LINE data or mixed data (AFPDSLIN data) to network files.
- The AFPDS files, as they exist on System/390, are in variable-length record format. Make sure the System/390 site converts the AFPDS files to a fixed length record format. If this is not done prior to sending the AFPDS files, large amounts of iSeries server disk space will be required. You need to reach an agreement with the System/390 site as to what fixed-length record format you will use; for example, 4000 bytes. AFPDS records longer than the fixed-length record size must be converted into multiple fixed-length records, with the last record padded out with blank characters (if necessary).
- Before receiving AFPDS files from the System/390, you should consider creating a fixed-length physical data file to hold the files from the System/390. The command to do this is the CRTPF (Create Physical File) command.

The length of the records in the physical data file should be the number that you and the System/390 site agreed to; for example, 4000 bytes.

Many types of resources are sent to the iSeries server. Administratively, it is more convenient to store the different types of resources in separate physical files. That is, put all the font data in a physical file that contains only fonts, the overlay data in a physical file that contains only overlays, and so on.

The following sample command creates a physical file that can receive resources and AFPDS data:

```
CRTPF FILE(MYLIB/MYFILE) RCDLEN(4000) MBR(*NONE) MAXMBRS(*NOMAX) LVLCHK(*NO)
```

Using the Work with Network Files (WRKNETF) and Receive Network File (RCVNETF) Commands

These commands can be used to receive resources and AFPDS files from the System/390.

To see a prompt display for these commands, type WRKNETF or RCVNETF and press F4 (Prompt).

The Work with Network Files (WRKNETF) command allows you to work with a list of files that have arrived for a user, or creates a database file containing a list of the files.

If the list is displayed, you can enter an option to select a function to be performed on the file. You can:

- Receive the file into a user file.
- Delete the file.
- Browse the file (not valid for save files).
- Submit files (submit the job).

Restrictions: (1) A user with security officer authority can display the network files for any user. If you are not the security officer, you can display only those files that were sent to you or to your group profile. (2) To perform any of the options from this display, you must be authorized to the command corresponding to that option. For example, you must be authorized to the Browse Physical File Member (BRWPFM) command for the browse function, and the Submit Database Jobs (SBMDBJOB) command for the submit job function.

Examples

The following command allows you to work with all network files for the user running this command.

```
WRKNETF
```

If the command is issued as an interactive job, the list of files is displayed at the requesting work station. If the command is issued as a batch job, the list of files is printed with the job's spooled output.

The following command allows you to work with the network files for USR1 and prints the output with the job's spooled output.

```
WRKNETF USER(USR1) OUTPUT(*PRINT)
```

This command can only be issued by USR1, a member of the USR1 group, or a user with security officer rights.

The following command allows you to work with the network files for all users and is written to the first member of a database file named NETFILES.

```
WRKNETF USER(*ALL) OUTPUT(*OUTFILE) OUTFILE(NETFILES)
```

If the file exists in a library on the library list, the existing file is used; otherwise, the file is created in library QGPL. If the file did not exist, or did not contain any members, a member with the same name as the file is added to the file; otherwise, the first member of the file is cleared and used. This command can be issued only by a user with security officer rights.

The following command receives the network file SCRIPT, member \$REPORT, into a physical file named MYFILE in library MYLIB.

```
RCVNETF FROMFILE(SCRIPT) TOFILE(MYLIB/MYFILE) FROMMBR($REPORT)
```

The new member in MYFILE is \$REPORT.

Creating resources on the iSeries server

When resource data is received from System/390, use the following commands to convert the resources to a format that can be used by OS/400.

- CRTPAGSEG
- CRTOVL
- CRTFORMDF
- CRTFNTRSC
- CRTPAGDFN

Printing AFPDS data on the iSeries server

The PRTAFPDTA command can be used to print AFPDS files.

If you want to use a prompt display with this command, type PRTAFPDTA and press F4 (Prompt).

Notes:

1. The PRTAFPDTA command prints AFPDS data. Any padding between the AFPDS structured fields must be hex 40. The padding cannot be hex 00.
2. When using the PRTAFPDTA command, do not override the DEVTYPE parameter on the QSYSPRT printer file.
3. When using the PRTAFPDTA command, the form definition usually identifies the drawer to print from. An exception is when an Override Printer File (OVRPRTF) command has been issued with a different drawer value. In this case, the drawer value is taken from the override command.

Examples

The following command prints the first member in file MYFILE starting with page 2 and ending on page 6.

```
PRTAFPDTA FILE(MYLIB/MYFILE) STRPAGE(2) ENDPAGE(6)
```

The following command prints the member \$REPORT in file MYFILE using a form definition of F10101 and all available exception handling.

```
PRTAFPDTA FILE(MYLIB/MYFILE) MBR($REPORT) FORMDF(F10101) FIDELITY(*CONTENT)
```

Additional PSF/400 functions

PSF/400 provides functions that are accessible through a mechanism separate from DDS, printer files, printer device descriptions, or the Start Printer Writer (STRPRTWTR) command. These additional functions allow you to specify how PSF/400 works with printers and fonts.

Chapter 10. Working with Print Services Facility (PSF) configuration objects

This chapter provides information about PSF configuration objects and some of the print functions that are enabled by them:

- IPDS pass-through
- IPDS to PDF transform
- Session and IPDS dialog sharing
- User resource library list
- APPC and TCP/IP Retry Count (RETRY)

About PSF configuration commands

There are several PSF configuration commands you can use to create, change, delete, display, and work with a PSF configuration object. The following provides a brief description about each command. For information about specific parameters of the configuration object, see online help. You can also use the AFP Manager component of iSeries Navigator to create, change, and delete a PSF configuration object.

Creating a PSF configuration object

To create a PSF configuration object, use the Create PSF Configuration (CRTPSFCFG) command. This command allows you to specify additional parameters for an AFP printer that are not supported in the Create Device Description (Printer)(CRTDEVPRT).

Changing a PSF configuration object

To change a PSF configuration object, use the Change Print Services Facility Configuration (CHGPSFCFG) command. This command changes the PSF configuration object in the library specified on the command.

Displaying a PSF configuration object

To display a PSF configuration object, use the Display Print Services Facility Configuration (DSPPSFCFG) command. This command allows the you to display or print the contents of a PSF configuration object.

Deleting a PSF configuration object

To delete a PSF configuration object, use the Delete Print Services Facility Configuration (DLTPSFCFG) command. This command deletes a PSF configuration object form a specified library. If the PSF configuration is found, it is deleted. If it is not found, a message is sent to the user indicating that the PSF configuration object could not be found.

Working with PSF configuration objects

To work with a PSF configuration object, use the Work with PSF configuration (WRKPSFCFG) command. This command allows the user to work with all of the PSF configuration objects from the system or user libraries.

Using PSF configuration objects

To use a PSF configuration object, name the object with the USRDFNOBJ parameter and specify AFP(*YES) on either the CRTDEVPRT or CHGDEVPRT commands.

Working with IPDS pass-through support for PSF for OS/400

This topic provides information about Intelligent Printer Data Stream (IPDS) pass-through support and how to enable it to work with printers attached to the iSeries server. IPDS pass-through support is a function that allows Print Services Facility for OS/400 (PSF/400) to accept print data in the IPDS format and pass the data directly to a printer. Print data in this format that is directed to a supported printer is no longer transformed into AFPDS format before it is made available to PSF/400.

IPDS pass-through support is available for any IPDS printer that provides resident fonts. IPDS pass-through support is not available for the following IBM IPDS printers: 3820, 3825, 3827, 3828, 3829, 3831, 3835, and 3900-001. These printers do not provide resident fonts.

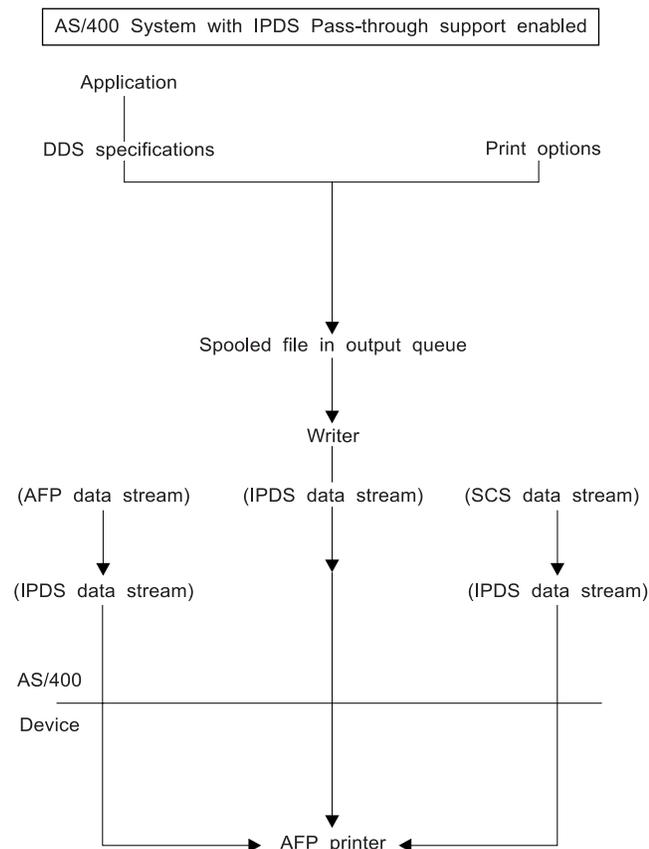
Why use IPDS pass-through support?

You may want to use IPDS pass-through support if you have applications that generate SCS or IPDS data streams when printing to an AFP printer. Consider using IPDS pass-through if the following apply:

- You are using applications such as Business Graphics Utilities, GDDM[®], or Virtual Print that does not support AFPDS.
- Your SCS or IPDS application does not contain any reference to overlay page segments or host font character sets.

How IPDS pass-through function works

The following figure shows the data stream origination, flow, and conversion for a spooled file when IPDS pass-through support is enabled.



RBAFT525-0

IPDS pass-through limitations

Consider the following IPDS pass-through limitations which determine if a job or printer is not eligible for IPDS pass-through:

- Some SCS or IPDS jobs are not eligible for IPDS pass-through because they contain special functions that require transform to AFPDS for the job to print correctly. Specifying IPDS pass-through in the PSF configuration object allows only those jobs eligible for IPDS pass-through to bypass the extra transforms. Those jobs not eligible for IPDS pass-through are still transformed to AFPDS and back to IPDS.

Spooled files that contain the following data or printer file attributes are not eligible for IPDS pass-through:

- SCS or IPDS data streams that contain image object content architecture (IOCA) or IM1
- For SCS or IPDS data stream, a front or back overlay was specified in the printer file.
- For SCS data stream, IGCDDTA(*YES) was specified in the printer file.
- For SCS or IPDS data streams, MULTIUP with REDUCE(*NONE) was specified in the printer file.
- For SCS or IPDS data stream, a Form definition was specified in the printer file.
- When specifying EDGESTITCH or CORNERSTPL finishing operations in the printer file.

If IPDS pass-through is specified in the PSF configuration object and the job is not eligible for IPDS pass-through, a diagnostic message is sent and the print file is transformed to AFPDS and then back to IPDS.

- Not all printers supported by PSF for OS/400 can use IPDS pass-through. This is because the resident fonts referenced in the data stream must be mapped to the host fonts which are downloaded to the printer. The following printers can not support IPDS pass-through when AFP(*YES) is specified: 3820, 3825, 3827, 3828, 3829, 3831, 3835, and 3900-001.

When a printer writer is started to a printer configured with AFP(*YES) that does not support IPDS pass-through and IPDSPASTHR(*YES) is specified, a diagnostic message is sent stating that IPDS pass-through is not supported. The printer file is transformed to AFPDS and then back to IPDS.

Enabling IPDS pass-through support

IPDS pass-through support is enabled by doing the following:

- You can enable IPDSPASTHR by specifying *YES to the IPDSPASTHR parameter in the printer file. You can also enable IPDSPASTHR by specifying *DEVLD for the IPDSPASTHR parameter in the printer file and then specifying IPDSPASTHR in the PSF configuration object.

Parameters supporting IPDS pass-through

The following PSF configuration object parameters are used by the IPDS pass-through function:

PSFCFG

Print Services Facility configuration object. The possible values are:

PSF configuration name

Specify the name of the PSF configuration object being created. The name of the PSF configuration object is qualified by one of the following.

*CURLIB.

The current library for the job is used for creating the PSF configuration object. If no library is specified as the current library for the job, library QGPL is used.

Library-name

Specify the name of the library where the PSF configuration object is being created.

IPDSPASTHR

IPDS Pass-through

*NO No IPDS pass-through is done.

***YES.** IPDS pass-through is done for the device for all spooled files that are eligible for IPDS pass-through.

Printer device description: The following CRTDEVPRT parameter can be used to enable IPDSPASTHR.

USRDFNOBJ

User defined object.

***NONE.**

No user-defined object is used.

Element 1: Name of User-Defined Object

The name of the user-defined object is qualified by one of the following.

- ***LIBL:** All libraries in the library list for the job are searched until the first match is found.
- ***CURLIB:** The current library for the job is searched. If no library is specified as the current library for the job, library QGPL is used.
- **library-name:** Specify the name of the library to be searched.
- **Object-name:** Specify the user-defined object to be used by the user application or the user specified program that processes the spooled files.

Element 2: Type of User-Defined Object

The possible values are:

- PSF configuration object (*PSFCFG)

Note: On this element, the only valid value for IPDS pass-through is *PSFCFG.

Printer file: The following printer file parameters can be used to enable IPDSPASTHR support:

IPDSPASTHR

IPDS Pass-through, which allows you to specify IPDSPASTHR on a file-by-file basis.

***DEV D**

This is the default value. When specified, PSF/400 will first check for IPDSPASTHR in USRDFNDTA. PSF/400 will then check for a value for IPDSPASTHR in the PSF configuration object that is specified in the printer device description, if one is specified. If there is no object that is specified in the printer device description, IPDS pass-through is ignored.

***NO** No IPDS pass-through. This value takes precedence over a value that is specified for IPDSPASTHR in a PSF configuration object.

***YES** Specifying *YES for a printer file enables IPDS pass-through for the spooled file. This value takes precedence over the value that is specified for USRDFNDTA in a printer file.

USRDFNDTA

User defined data. These values were available prior to V4R3, allowing you to specify IPDSPASTHR on a file-by-file basis. However, now they are used by PSF/400 for migration purposes, and only if you specify *DEV D for the new IPDSPASTHR parameter. These values take precedence over a value that is specified for IPDSPASTHR in a PSF configuration object.

IPDSPASTHR(*NO)

No IPDS pass-through is done. Note that this is the same as not specifying IPDSPASTHR in the USRDFNDTA parameter.

IPDSPASTHR(*YES)

IPDS pass-through is done for the spooled file if it is eligible for IPDS pass-through.

IPDS to PDF transform

- | This topic provides information about IPDS to PDF transform support. The IPDS to PDF transform support allows the creation of PDF files from AFP, SCS, or IPDS output files. You can use the PDF files in electronic mail applications, internet-based softcopy repositories, or for printing to PDF printers. The PSF transform interface supports an IPDS to PDF transform program that emulates a TCP/IP-connected IPDS 4028, 3812, or Infoprint 40 printer device.
- | The IPDS to PDF transform enables intelligent routing, which is the ability to take the entire spooled file, or any segment of the input spooled file and e-mail it as a PDF file, store it as a PDF stream file in the integrated file system, spool it as a PDF file, spool it as an AFP file, or any combination of those.
- | PSF can mail the PDF files electronically by specifying the PDFGEN *MAIL parameter value (see “CRTPSF CFG parameters” on page 62). After the PDF file creation, PSF/400 retrieves a mail tag from the USRDFNDDTA or the STRPAGGRP DDS keyword. You can use CRTPSF CFG PDFMAPPGM to specify a user exit program to map the mail tag into one or more email addresses and optional message text. If you do not specify an exit program, you must provide a valid email address in the USRDFNDDTA parameter of the printer file or in the STRPAGGRP DDS keyword. PSF/400 then electronically mails the output by using the SNDDST command. PSF can also use an SMTP server specified in the PSF configuration object.
- | You can handle the distribution function manually by routing the PDF output as a stream file to a directory by using CRTPSF CFG PDFGEN(*STMF) and PDFDIR. You can route the PDF output to a PDF printer by using the CRTPSF CFG PDFGEN(*SPLF) parameter value with the PDFOUTQ parameter.
- | To subdivide an output file into multiple PDF files, you can use CRTPSF CFG PDFMULT(*YES *SPLIT) with the DDS keywords STRPAGGRP and ENDPAGGRP. You can also use PDFMULT(*YES *INDEX) to specify that an index tag is placed at each Start Page Group tag. You would get one file with index tags instead of several small files. PSF can mail each to a different address.
- | By using the PDF mapping program with or without a PDF mapping object, you can specify that each new file is distributed however you want: any combination of e-mail, stream file, and spooled file, as well as respooled as AFP (for use with FAX). For example, you can subdivide a customer statement run on customer statement boundaries, by using the DDS STRPAGGRP and ENDPAGGRP keywords. The STRPAGGRP for each customer statement can specify a mail tag. The mail tag can be, for example, a customer number, that a user exit program can convert to an email address. For each customer statement, the user exit program can instruct PSF either to mail, or not mail, the output to one or more addresses. For each PDF file, PSF can do any combination of mail, store as a stream file, and spool to an output queue.

An IPDS to PDF transform that can be used with PSF/400, is provided in the Infoprint Server for iSeries product. The transform converts IPDS controls and data into PDF files. The files include with text, graphics, and image data. The transform also stores the mail tag from USRDFNDDTA or STRPAGGRP in a comment statement in the PDF output. For detailed information on the IPDS to PDF transform (including the user exit), see the Infoprint Server for iSeries User’s Guide.

Format of the printer file’s USRDFNDDTA mail information

The format of the mail information when specified in USRDFNDDTA is:

```
USRDFNDDTA('MAILTAG(80 bytes of text) MAILSENDER(10 byte name)')
```

The 80 bytes of text can contain a mail address or a tag that is converted by the mail exit routine into a mail address and optional message. The MAILSENDER parameter is 10-bytes long and specifies the name of the user profile that is sending the file. This parameter overrides CRTPSF CFG PDFSENDER.

Format of the STRPAGGRP mail tag

- | When specifying PDFMULT(*YES *SPLIT), the name parameter of STRPAGGRP can contain a mail tag.
- | The mail tag can contain either a mail address or a tag that is converted by the user exit routine into a mail address and optional message. The STRPAGGRP name overrides a mail tag in USRDFNDDTA

IPDS to PDF transform device configuration

You can configure the IPDS to PDF transform in the same way as a TCP/IP IPDS printer. The only difference is that the remote location address must be a loopback address of 127.0.0.1. Use CRTDEVPRT to configure the printer and CRTPSFCFG to specify PSF configuration parameters.

CRTDEVPRT parameters

You should specify the following CRTDEVPRT parameter values when configuring a TCP/IP attached printer that will convert IPDS to PDF:

- Device description: printer-name
- Device class: *LAN
- Device type: *IPDS
- Device model: 0
- LAN attachment: *IP
- Advance function printing: *YES
- Port number: xxxx (unique number for each printer)
- Font: printer font
- Remote location: 127.0.0.1
- User defined object: PSF configuration object

You can have multiple IPDS to PDF printers active, but you must configure each printer with a different port.

CRTPSFCFG parameters

- | See the CRTPSFCFG command description in the iSeries Information Center for details on the parameter values that you can specify when configuring a TCP/IP attached printer that will convert IPDS to PDF.
- | See also the Infoprint Server for iSeries: User's Guide for more information.

Sharing print sessions and IPDS dialogs

Several parameters from the PSF configuration object allow you to configure PSF/400 to share sessions with other PSFs or ASCII print drivers automatically.

Parameters supporting printer session and dialog sharing

Described below are descriptions of the parameters you need to consider for printer session and dialog sharing.

ACTRLSTMR: Specifies the point at which the Release Timer (RLSTMR) is activated. Valid values are *NORDYF, *IMMED, *PRTNORDYF and *PRTIMMED.

*NORDYF

Specifies that the Release Timer (RLSTMR) is activated when there are no more spooled files to print and all pages of the last spooled file have been printed. If the RLSTMR expires, the session attached to the printer is released. When the session is released, another PSF, such as PSF/400, PSF/MVS, PSF/VM, PSF/VSE, or PSF for AIX may start a session to the printer.

If a spooled file becomes ready after the Release Timer has been activated and not yet elapsed, use of the timer is stopped. When there are no more spooled files to print and all pages of the last spooled file have been printed, the timer is activated again using its full specified value,

PSF will attempt to start a session with the printer when the value specified with `RESTRTMR` expires and there is a spooled file with a status of `RDY`.

Use this parameter when you are sharing either a single TCP/IP port such as an Infoprint printer, or a single APPC remote location (PSF Direct) with another PSF.

***IMMED**

Specifies that the Release Timer is activated immediately after PSF has successfully started a session with the printer or PSF Direct. If the `RLSTMR` expires, the session to the printer is released. If a spooled file is being sent to the printer and the timer elapses, the session is released after all pages of the spooled file have been printed.

PSF will attempt to start a session with the printer when the value specified with `RESTRTMR` expires and there is a spooled file with a status of `RDY`.

Use this parameter when you are sharing either a single TCP/IP port such as an Infoprint printer, or a single APPC remote location (PSF Direct) with another PSF.

***PRTNORDYF**

Specifies that the Release Timer (`RLSTMR`) is activated when:

- The printer has indicated that it has non-IPDS files to print,
- There are no more spooled files for PSF to print, and
- All pages of the last spooled file have been printed.

After the `RLSTMR` expires, the IPDS dialog with the printer is released. When the dialog is released, the printer may print non-IPDS files queued at the printer.

If a spooled file becomes ready after the Release Timer has been activated and not yet elapsed, use of the timer is stopped. When there are no more spooled files to print and all pages of the last spooled file have been printed, the timer is activated again using its full specified value,

PSF does not release the session when the dialog is released.

PSF will start a dialog with the printer when the value specified with `RESTRTMR` expires and there is a spooled file with a status of `RDY`.

This value is ignored if the printer does not support dialog sharing. PSF does not release the session until the writer is ended.

When PSF is in between spooled files and has not released a dialog, PSF queries the printer every 60 seconds to see if the printer has a non-IPDS file to be printed.

Use this parameter when you are sharing IPDS and non-IPDS printing on a printer that supports IPDS dialog management.

***PRTIMMED**

Specifies that the Release Timer (`RLSTMR`) is activated as soon as the printer has indicated that it has non-IPDS files to print. The IPDS dialog with the printer is released when the `RLSTMR` has expired. If the timer expires while PSF is sending a spooled file to the printer, PSF does not release the dialog until the spooled file has been completely printed. PSF will then release the dialog even when there are spooled files with a status of `RDY` on the output queue in use by the writer.

PSF does not release the session when the dialog is released.

When the dialog is released, the printer may print non-IPDS files queued at the printer.

PSF will start a dialog with the printer when the value specified with `RESTRTMR` expires and there is a spooled file with a status of `RDY`.

When PSF is in between spooled files and has not released a dialog, PSF queries the printer every 60 seconds to see if the printer has a non-IPDS file to be printed.

Use this parameter when you are sharing IPDS and non-IPDS printing on a printer that supports IPDS dialog management.

If you are using a non-impact continuous forms printer, do not set PRTRQSTMR in the printer device description to *NOMAX. If you set the PRTRQSTMR to *NOMAX, an operator must perform a manual NPRO at the printer. PSF will not release a session, or IPDS dialog, until printing is complete for the last file that is sent to the printer.

ACTTMR: Specifies the length of time (in seconds) that PSF/400 waits for a TCP/IP-attached printer to respond to an activation request. PSF uses this timer only after a session has been opened with the printer.

No timers can influence the length of time that TCP/IP takes to wait for a response to a session start request. But if you want PSF to retry session start requests after a failure of the session start request failure is detected, you may use PSF configuration object parameter RETRY to specify how many session start request retries PSF should perform.

ACTTMR is specified in the printer device description. In previous releases, ACTTMR was specified differently.

RESTRTMR: Specifies the amount of time to wait before the printer writer attempts to reestablish either a session or dialog. For example, if this value is set to 10, PSF/400 activates the timer as soon as a session or dialog is released. After 10 minutes have elapsed, PSF/400 checks for a spooled file with a status of RDY. If there is one, PSF/400 attempts to start a session or dialog with the printer in order to print the file. If a spooled file is not ready after the timer expires, PSF/400 will wait for a spooled file with a RDY status to be placed on its output queue before attempting to start a session or dialog.

This timer is ignored if PSF/400 has not been configured to release either a session or dialog. Use the ACTRLSTMR and RLSTMR parameters to configure PSF/400 to release either a session or dialog.

RETRY: Specifies the number of additional attempts PSF will make to establish an APPC or TCP/IP session. When PSF/400 is sharing a PSF directly attached printer with other PSFs, you may want to set the value to *NOMAX so that PSF/400 will continue retrying to obtain a session. The default value for the RETRY parameter has been changed from 2 to 15.

The RETRY parameter is helpful for TCP/IP-attached printers in the following situations: You wish to share an AFCCU printer with more than three PSFs. A printer is temporarily unavailable when PSF attempts to open a session with it. You may have seen this when PSF failed to start a printer session. One example of this is when PSF issues message PQT3603 with error code 22. Use of RETRY specifies that PSF is to not terminate and continue retrying, up to the number of times specified, to open a session with the printer.

RETRYDLY: Specifies the number of seconds to wait between each retry attempt to establish a session. This parameter is used only when PSF/400 is using an SNA attachment. The default value for the RETRYDLY parameter has been changed from 0 to 90.

RLSTMR: This is the timer whose value is referenced by the ACTRLSTMR parameter. The default setting is *NOMAX, which means that PSF/400 does not release the session or dialog with the printer until the writer is ended.

The value specified for parameter RESTRTMR determines when PSF/400 reestablishes a session or dialog.

Additional information on session sharing

1. PSF/400 supports session sharing with TCP/IP-attached printers.
2. PSF/400 supports session sharing with any printer attached to PSF Direct.
3. PSF/400 does not support session sharing with APPC-attached printers. If you wish to use session sharing with these printers, either use their TCP/IP support, if available, or attach them to PSF Direct, if supported.
4. PSF/400 does not support session sharing with Twinaxial-printers attached to local or remote workstation controllers. If you want to use session sharing with these printers, check if TCP/IP support is available.

Parameters supporting automatic session recovery

The following parameters support automatic session recovery:

AUTOSSNRCY

Automatic session recovery. This specifies whether PSF/400 will automatically attempt to resume printing when a session has been unexpectedly ended by a printer or other network device, such as a router. The acknowledgement request responses from the printer contain information that indicates the pages sent to the printer. AUTOSSNRCY(*YES) also lets you power your printer off and on without ending PSF. If you plan to use a value of *YES, you should consider the following values set for other parameters:

- For a TCP/IP connection, use RETRY or ACKFRQ in the PSF configuration object.
- For an APPC connection, use RETRY, RETRYDLY or ACKFRQ in the PSF configuration object.

Note: When automatic session recovery takes place, pages may be printed when printing resumes.

ACKFRQ

Acknowledgment frequency. It specifies the frequency, in pages, with which PSF/400 sends IPDS acknowledgment requests to a printer. The acknowledgment request responses from the printer that contains information as to the status of pages that is sent to the printer. You may wish to consider adjusting this value if:

- you are concerned about losing a connection to a printer while spooled files are being printed.
- you are concerned about duplicate pages being printed.

More frequent acknowledgment request responses provide more information about pages that have been printed. If PSF is configured to reconnect to a printer when the session is ended abnormally, and PSF is in the middle of printing a spooled file, the number of pages reprinted is minimized but not eliminated; the nature of an abnormal session termination is such that eliminating the reprinting of pages is not possible. If you decide to increase the frequency of acknowledgment requests (by specifying a lower value), the printing process can be slowed down, especially if a very low value is specified. You may need to experiment with different values in order to find one that is suitable for your environment.

User and device resource library lists

You may specify a User and Device Resource Library List in the PSF configuration object. These libraries will be used to searched for AFP resources needed to print the spool file. The user library list allows you to specify what user libraries are to be searched for their jobs. It may vary from user to user while the device resource library list will be the same for the device. The user library list is searched first and then the device library list.

User resource library list

You can specify libraries to search for font and AFP resources in the user resource library list. The value specified in this parameter will only be used when the USRRSCLIBL parameter of the printer file has a value of *DEV.D.

Values supported for the User Resource library list are:

***JOBLIBL**

Specifies that the job's current library list that created the spool file is used in searching for AFP resources. The job's library list at the time the spool file is created is saved. Each time you create a new spool file, the current job library list is saved. This is the default.

***CURLIB**

The current library for the job that created the spool file is used for searching for AFP resources. If no library is specified as the current library for the job, then library QGPL is used.

***NONE**

No user resource library list will be used for searching for AFP resources. Only the device resource library list will be used.

Device resource library list

The device resource library list allows you to specify a device resource library list to be used for searching AFP resources. The user resource library list is searched first and then the device resource library list is searched when attempting to find an AFP resource specified with the spool file.

The following are valid values for the device resource library list:

***DFT** Specifies that the following libraries (if present on system) will be used in searching for AFP resources.

- QFNTCPL
- QFNT01 - QFNT19
- QFNT61 - QFNT69

device-resource-library-names

This is a list of up to 30 library names that will be used to search for AFP resources.

The value in using the user resource library and device resource library lists is two-fold. It enhances usability since you can now specify one set of libraries for a 240 pel printer and another set for a 300 pel printer. You can also make sure that the libraries that contain the resources needed by this printer job are actually in the library list that PSF will use. It also improves performance since you can just fill in the libraries that need to be searched and leave out the ones that do not need to be searched.

Part 4. Other printing functions available on OS/400

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Chapter 11. Working with ASCII Lexlink protocol LAN-attached printers

This section of the manual discusses ASCII LAN-attached printers that use the Lexlink protocol

Information provided is:

- Benefits of using ASCII LAN-attached printers
- How ASCII LAN-attached printers are supported on the iSeries server
- Restrictions when using ASCII LAN-attached printers
- Configuration parameters that support ASCII LAN-attached printers
- Configuring and starting ASCII LAN-attached printers

Current support requires that ASCII printers be attached to the IBM 4033 LAN adapter device or MarkNet XLe device, or the printer have a MarkNet or MarkNet XL Internal Network Adapter (INA) card resident in the printer. (The IBM 4039 Printer is an example of a printer with an INA card.)

OS/400 provides all the support for ASCII printers attached to the LAN. Once the physical environment is created, the ASCII LAN-attached printers operate similar to any other ASCII printer attached to an iSeries server.

Benefits of using ASCII LAN-attached printers

ASCII LAN-attached printers offer many benefits over printers attached using other methods. Some of these benefits are:

- Low-cost

Typically, ASCII printers are less expensive than larger SCS or IPDS printer. With new technology, ASCII printers are fast becoming capable of performing advanced functions formerly found only on SCS or IPDS printers.

- Central printing and portability

Using a Local Area Network (LAN) to attach ASCII printers allows you to position the printer at the point where most of your printing requirements are. If this requirement changes, the printer can be physically moved to another point on the LAN.

- Sharing the printer between different operating systems

Sharing, in this case, actually has two benefits. The first is that any user attached to the LAN can send print jobs to the printer. The second is a LAN-attached ASCII printer can perform printing for an iSeries server, an RS/6000*, or a PS/2® running OS/2®.

Note: The RS/6000 and PS/2 must have the Network Print Adapter Utility installed. The utility is offered by Lexmark and IBM. The utility allows PCs and RS/6000s to use the 4033 LAN adapter device to attach to the LAN. An IBM 4039 printer with the INA card can also attach to the LAN

- Eliminating emulation requirements

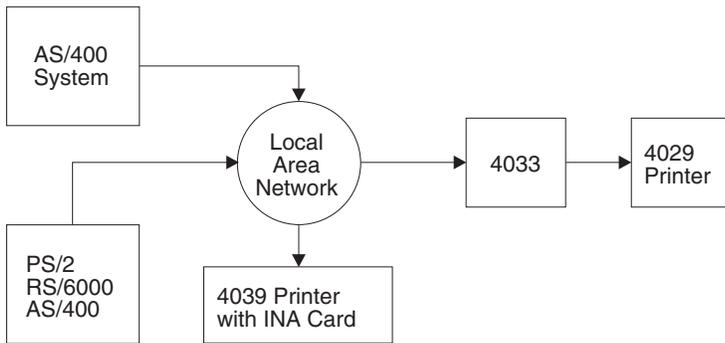
Before the ASCII LAN-attached printer function became available, ASCII printers used with iSeries servers were predominantly used through an emulation program and attached to a physical device such as a PC.

ASCII printers attached to the LAN can receive print jobs composed of the SCS, USERASCII, or AFP data streams. The SCS or AFP data stream is sent through the host print transform function. The host print transform function transforms an SCS or AFP data stream to an ASCII data stream. The USERASCII data stream is sent directly to the printer.

In general, you can access LAN printers attached to the devices through bridges instead of routers. For example the IBM 4033, the MarkNet XLe, the MarkNet and the MarkNet XL support the IBM 8209 LAN bridge.

How ASCII LAN-attached printing works

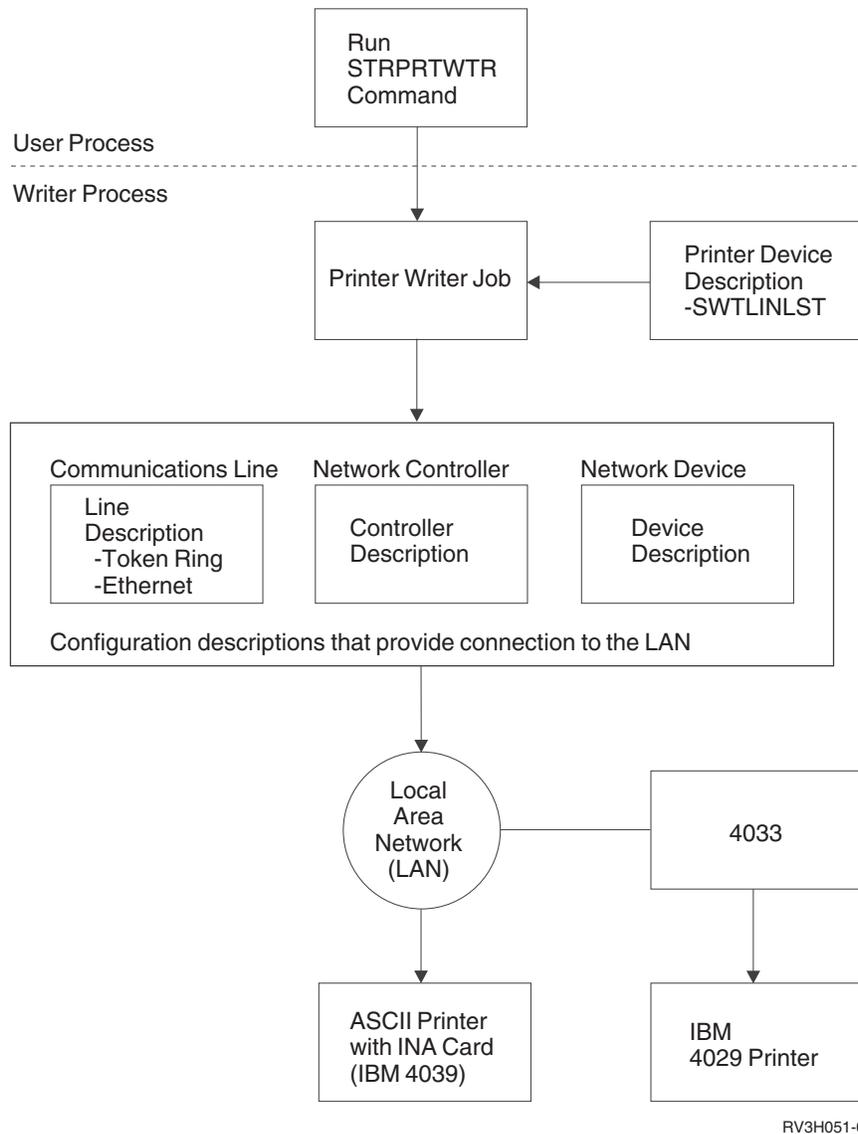
Figure 1 provides a physical view of how ASCII LAN-attached printers connect to the iSeries server.



RV3H006-0

Figure 1. Physical view of ASCII LAN-attached printers

Figure 2 on page 71 provides a software view of how ASCII LAN-attached printers appear to the iSeries server.



RV3H051-0

Figure 2. Software view of ASCII LAN-attached printers

Once the physical environment is in place and the correct configuration for the ASCII printer complete, printing operations can begin. As with other printers, the Start Printer Writer (STRPRTWTR) command is used to begin printing operations.

Note: The printer device description must be varied on before the writer can be started.

When the STRPRTWTR command is run, the printer's device description switched line list (SWTLINLST) parameter is used to identify available communications lines. These communications lines must be either Ethernet or Token Ring. The line descriptions must already exist and they must be varied on to be eligible for LAN printing. The source service access point (SSAP) parameter value of the line description must contain an SSAP value of 12 and the SSAP type value must be *NONSNA.

Notes:

1. On existing communications lines, the SSAP value of 12 and the SSAP Type value of *NONSNA must be added to the SSAP list before using ASCII-LAN attached printers.
2. If the printer writer ends with message CPI400C and a reason code of 1, the line being used does not have SSAP 12 configured.

The line descriptions provide a network controller (NETCTL) parameter. If this parameter has a controller specified, and if the controller is available, it is attached to the line description.

In turn, the controller description has a device (DEV) parameter. If the DEV parameter has a device specified, and if the device is available, it is attached to the controller description.

If the network controller and network device are not available, they are automatically created when the STRPRTWTR command is run. The network controller and network device description objects are not deleted when the writer session is ended. Each time the STRPRTWTR command is run, and the network controller is not available, another network controller and network device is created.

Note: The LAN adapter device is locked when the first spooled file begins to print. The inactivity timer parameter in the printer device description is used to determine when to release the adapter. Releasing the adapter enables other users on the LAN to use the printer.

Due to a hardware restriction on the 4033 LAN adapter device, it is suggested that *ATTACH or *NOMAX be used as the value for the inactivity parameter. Thus, on a 4033, the lock on the adapter device is not given up shortly after a spooled file prints but rather when the writer is ended.

Restrictions when using ASCII LAN-attached printers

The following list contains restrictions for ASCII LAN-attached printers:

- All ASCII printers must be attached to the IBM 4033 LAN adapter device or the MarkNet XLe device, or the printer must have a MarkNet or MarkNet XL Internal Network Adapter (INA) card.
- Only spooled files with device type attributes of *SCS, *USERASCII, or *AFPDS are supported.
- Direct printing (SPOOL parameter value = *NO on the CRTPRTF, CHGPRTF, and OVRPRTF commands) is not allowed to ASCII LAN-attached printers.
- Printer sharing through the allow direct print (ALWDRTPRT) parameter on the STRPRTWTR command is not supported. Printer sharing means having the SPOOL parameter value = *NO on the CRTPRTF command and the ALWDRTPRT parameter value = *YES on the STRPRTWTR command.
- Only Token Ring or Ethernet communications lines (values in the Switched Line List (SWTLINLST) parameter of the printer device description) are supported.
- Error recovery will not be detailed.
- Spooled files of type other than *SCS, *USERASCII, or *AFPDS that reach an output queue associated with a ASCII LAN-attached printer are held. A message indicating the spooled file is held is sent to the message queue specified on the STRPRTWTR command.

Line, controller, and device description parameters that support ASCII LAN-attached printers

To correctly configure descriptions (line, network controller, network device, and printer device) certain parameters on these descriptions must have specific values.

Line description parameters that support ASCII LAN-attached printers

All lines must be either Token Ring or Ethernet.

Note: The Ethernet standard parameter value must be IEEE8023 or *ALL.

Not all of the parameters that make up the line description are discussed here. Only the parameters required to support ASCII LAN-attached printers are shown.

SSAP

Source service access point

For the IBM 4033, MarkNet and MarkNet XL, specify *SYSGEN, or 12. For the MarkNet XLe, specify 12, 16 and 1A.

Note: If the required SSAP values are not added to existing communications lines used for ASCII LAN-attached printers, message CPI400C is sent to the message queue with a reason code of 1.

SSAP type

Source service access point (TYPE)

This value must be *NONSNA. This means SNA communications cannot be used.

Note: If the line description already exists you can use the Change Line Description (Token-Ring) (CHGLINTRN) or Change Line Description (Ethernet) (CHGLINETH) commands to update the line descriptions with the required SSAP values.

NETCTL

Network controller

The name of the network controller this line attaches to.

Controller and device description parameters that support ASCII LAN-attached printers

Network controller and network device descriptions are needed to complete the communications connection to the ASCII LAN-attached printer.

If they don't exist, they are created automatically when the STRPRTWTR command is run for a ASCII printer attached to the LAN.

Network controllers must be used. They must exist or you can create them using the Create Controller Network (CRTCTLNET) command.

Not all of the parameters that make up the controller description are discussed here. Only the parameters required to support ASCII LAN-attached printers are shown.

DEV

Device name

The name of the device this controller attaches to.

Network device description parameters that support ASCII LAN-attached printers

A network device must be used. The Create Device Network (CRTDEVNET) command must be used. This command creates a network device necessary to connect to the LAN. Only the parameters required to support ASCII LAN-attached printers are shown.

TYPE

Device type

This device is attached to a network that is supported by a program using the user-defined communications Application Program Interface (APIs).

Printer device description parameters that support ASCII LAN-attached printers

An ASCII printer device must be configured. The Create Device Description (Printer) (CRTDEVPRT) command must be used.

ASCII LAN-attached printers are enabled by selecting certain values for parameters in the printer device description. Not all of the parameters that make up the printer device description are discussed here. Only the parameters required to support ASCII LAN-attached printers are shown.

The following parameters, on the printer device description, are used to configure ASCII LAN-attached printers.

DEVCLS

Device class

Specifies the device class for the printer. This value must be *LAN and it indicates the ASCII printer is connected to a local area network (LAN).

TYPE

Device type

Specifies the type of printer this device configuration represents. For example, you can specify 3812 as IBM 3812 emulation is used.

MODEL

Device model.

Specifies the model of the device. For example, you can specify 1 as IBM 3812 Model 1 emulation is used.

SWTLINLST

Switched line list

Specifies the name of the switched communications lines to which the printer is associated when DEVCLS(*LAN) is specified. A maximum of 8 switched communications lines can be specified.

ADPTADR

LAN remote adapter address (printer address)

Specifies the 12-character hexadecimal LAN address of the ASCII printer when DEVCLS(*LAN) is specified. Valid values range from 000000000001 through FFFFFFFF0001. This address is available with the LAN adapter.

Note: The adapter address for the 4033 LAN-adapter is printed on the box it is packaged in.

The address for a 4039 printer with an INA card can be found using the printer's operator panel. The address for the MarkNet XLe is printed on the back side of the device.

It is possible for the adapter address to be changed using the Network Print Utility. If the adapter address is changed, the new address must be the value specified for the ADPTADR parameter in the printer's device description.

LANATTACH

LAN attachment.

Specifies the attachment of the printer when DEVCLS(*LAN) is specified. This value must be *LEXLINK.

ADPTTYPE

Adapter type

Specifies the type of LAN printer adapter to be used when DEVCLS(*LAN) is specified.

***INTERNAL**

The printer has an internal LAN adapter. For example, a printer with an INA card installed.

***EXTERNAL**

The printer has an external LAN adapter. For example, a printer is connected to the IBM 4033 LAN adapter or the MarkNet XLe

ADPTCNNTYP

Adapter connection type

Specifies the type of ports supported by the external LAN printer adapter when DEVCLS(*LAN) and ADPTTYPE(*EXTERNAL) are specified.

*PARALLEL

The printer is attached to the adapter using the parallel port.

*SERIAL

The serial port on the adapter is used to communicate with the attached printer.

ATTACH

Physical attachment

For ASCII LAN-attached printers, specifies the physical attachment of the LAN adapter.

Note: This parameter is used only if ADPTTYPE is *EXTERNAL and ADPTCNNTYPE is *SERIAL.

For ASCII LAN-attached printers, possible values are:

*DIRECT

Specifies EIA-232 direct attachment.

*WIRE4

Specifies EIA-232 4-wire attachment.

PORT

Port

For ASCII LAN-attached devices, if there is more than one serial or parallel port available, this parameter specifies which port is used. Possible values are 0 through 17.

For the MarkNet XLe the following values are used:

Value	Port
-------	------

0	Serial
---	--------

1	Parallel 1
---	------------

2	Parallel 2
---	------------

Note: This parameter is not used if the printer is attached to a 4033 LAN adapter.

INACTTMR

Inactivity timer

Specifies an inactivity timer (time-out) value. For ASCII LAN-attached printers, this value indicates the amount of time the printer writer keeps a lock on the device before releasing it.

Note: This parameter is not used if the printer is attached to a 4033 LAN adapter.

Possible values are:

- *ATTACH

If the printer has an INA card, 15 seconds must pass before releasing the adapter back to the network.

If the Adapter type is specified as *EXTERNAL, *ATTACH sets *NOMAX as the value for releasing the adapter back to the network. *NOMAX is used if the printer is attached to a 4033 because the 4033 does not support sharing between jobs or systems. Since the MarkNet XLe supports sharing, it is recommended that you set the INACTTMR value to *SEC15.

- *NOMAX - Maximum inactivity time is not tracked.

- *SEC15 - A 15-second time-out period is used.

- *SEC30 - A 30-second time-out period is used.
- Inactivity timer - The range to select from is 1 through 30 minutes.

ACTTMR

Activation timer

Specifies the amount of time (in seconds) to wait for the printer to respond to the activation request from the host system. If the printer does not respond within this time, it is considered not available and a cancel/retry message is issued to the user.

For example, if the activation timer value is 120 seconds, the writer attempts to lock the adapter every 15 seconds for 120 seconds. After 120 seconds elapses, a cancel/retry message is issued. A cancel reply to the message cancels the writer. A retry reply causes the writer to attempt to lock the adapter again every 15 seconds for 120 seconds. If the lock attempt fails the cancel/retry message is issued again. If the message is not answered in 5 minutes, the system automatically attempts to lock the adapter. There is also an allocate (A) reply which releases the 4033 from any system. Before selecting the A reply for a printer with an INA card, the printer must be powered off and back on.

Possible values are:

170 The printer waits 170 seconds. This is the default.

Activation -timer

Specify a number indicating the number of seconds before the device is considered not available. When this number of seconds has elapsed, an inquiry message is issued.

If DEVCLS(*LAN) is specified, valid values range from 1 through 2550.

TRANSFORM

Host print transform function

The host print transform function value is defaulted to *YES if the device class (DEVCLS) parameter value is *LAN and LANATTACH(*LEXLINK).

***NO** The printer does not use the host print transform function.

***YES** The printer uses the host print transform function.

USRDTATFM

User data transform.

Specifies the qualified name of a user data transform program that is used to transform the spooled file data. The possible values are:

*NONE

No user-defined data transform program name is specified.

name Specifies the name of the user data transform program. It can be qualified by one of the following library values:

***LIBL** All libraries in the job's library list are searched until the first match is found.

*CURLIB

The current library for the job is searched. If no library is specified as the current library for the job, the QGPL library is used.

Library-name

Specifies the library to be searched.

Configuring and starting ASCII LAN-attached printers

This example shows how to configure and then start an IBM 4039 printer with an INA card resident in the printer. Use the following list to identify parameters and values for configuring the device description. Use default values for the other parameters.

- Device description - PRT4039

- Device class - *LAN
- Device type - 3812
- Device model - 1
- Switched line list

The line descriptions don't need to exist to create the device description. However, they must be entered as values in the switched line list parameter.

- LAN remote adapter address - comes with the LAN adapter

Note: The adapter address for the 4033 LAN-adapter is printed on the box it is packaged in.

The address for a 4039 printer with an INA card can be found using the printer's operator panel.

It is possible for the adapter address to be changed using the Network Print Utility. If the adapter address is changed, the new address must be the value specified for the ADPTADR parameter in the printer's device description.

- Adapter type - *INTERNAL (the 4039 printer has an INA card)
- Font - a font must be specified
- Manufacturer type and model - *IBM4039HP
- Text 'description' - Device description for an ASCII LAN-attached printer

Note: If *SERIAL is selected as the adapter connection type the following parameters need to be used:

- Line speed
- Word length
- Parity
- Stop bits
- Physical attachment

Type CRTDEVPRT and prompt (F4). The following screen appears.

```

Create Device Desc (Printer) (CRTDEVPRT)

Type choices, press Enter.

Device description . . . . . > PRT4039      Name
Device class . . . . . > *LAN             *LCL, *RMT, *VRT, *SNPT, *LAN
Device type . . . . . > 3812             3287, 3812, 4019, 4201...
Device model . . . . . > 1               0, 1, 2, 3, 4, 10, 13, 200...
Switched line list . . . . . > TRNLIN     Name
+ for more values
LAN remote adapter address . . . > 8FFFFFFFF 000000000001-FFFFFFFFFE
Adapter type . . . . . > *INTERNAL       *INTERNAL, *EXTERNAL
Emulated twinaxial device . . . > 3812   3812, 5219, 5224, 5256
Font:
  Identifier . . . . .           3, 5, 11, 12, 13, 18, 19...
  Point size . . . . .           *NONE      000.1-999.9, *NONE
Manufacturer type and model . . > *IBM4039HP
Text 'description' - Device description for an ASCII LAN-attached

More...

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

To start PRT4039 type STRPRTWTR and prompt (F4). The following screen appears. Type PRT4039 for the Printer parameter value and type the name of the output queue from which you want to print spooled output files.

Spoiled files from MYOUTQ will print on the printer named PRT4039.

Chapter 12. Working with ASCII TCP/IP network-attached printers

This chapter provides the following information:

- Benefits of using ASCII TCP/IP network-attached printers
- Support for ASCII TCP/IP network-attached printers on iSeries servers.
- Restrictions when using ASCII TCP/IP network-attached printers
- Configuration parameters that support ASCII TCP/IP network-attached printers
- Configuring and starting ASCII TCP/IP network-attached printers

For network printing, the iSeries server supports HP Printer Job Language (PJL), Simple Network Management Protocol (SNMP), and Internet Printing Protocol (IPP).

HP printer job language (PJL)

To print using PJL, your ASCII printer must be attached to the TCP/IP network and accept print data on a TCP/IP port. The printer must support PCL5e and the network interface (either internal or external) must support bidirectional PJL on a TCP/IP port. OS/400 uses the PJL commands to obtain printer status.

OS/400 provides all the support for ASCII printers that are attached to the TCP/IP network. Once the physical environment is created, the ASCII TCP/IP network-attached printers operate similarly to any other ASCII printer that is attached to an iSeries server.

Simple network management protocol (SNMP)

To print using SNMP, your ASCII printer must be attached to the TCP/IP network and accept print data on a TCP/IP port. The SNMP management API communicates using a different TCP/IP port than the print data stream. OS/400 uses the SNMP management API to obtain printer status. You can specify the SNMP print driver by using the system driver program parameter of the printer device description. Once the physical environment is created, your ASCII TCP/IP network-attached printer operates similarly to any other iSeries server-attached ASCII printer.

Internet Printing Protocol (IPP)

To print using IPP, your ASCII printer must be attached to the TCP/IP network and accept print data on the well known IPP port, port 631. You can specify the IPP print driver by using the system driver program parameter of the printer device description. Once the physical environment is created, your ASCII TCP/IP network-attached printer operates similarly to any other iSeries server-attached ASCII printer.

Benefits of using ASCII TCP/IP network-attached printers

ASCII TCP/IP network-attached printers offer many benefits over printers that are attached with other methods. Some of these benefits are:

- Low-cost
Typically, ASCII printers are less expensive printers. The low cost and new function provide increased printer flexibility.
- Central printing and portability

Attaching ASCII printers to a TCP/IP network allows you to position the printer at the point where most of your printing requirements are. If this requirement changes, you can physically move the printer to another point on the TCP/IP network.

- Sharing the printer between different operating systems

Any user that is attached to the network can send print jobs to the printer. A TCP/IP network-attached ASCII printer can perform printing for an iSeries server concurrently with printing for other IBM and non-IBM operating systems.

- Eliminating emulation requirements

Before the ASCII TCP/IP network-attached printer function became available, OS/400 users often had to use the ASCII printers through an emulation program and a physical device such as a PC.

ASCII printers that are attached to the network can receive print jobs that contain the SCS, USERASCII, or AFP data streams. You can send the SCS or AFP data stream through the host print transform function. The host print transform function transforms an SCS or AFP data stream to an ASCII data stream. The USERASCII data stream is sent directly to the printer.

How ASCII TCP/IP network-attached printing works

Figure 3 provides a physical view of how ASCII TCP/IP network-attached printers connect to the iSeries server.

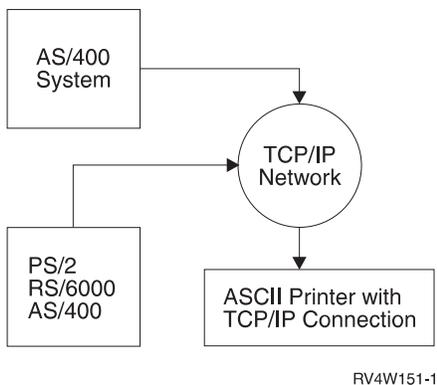
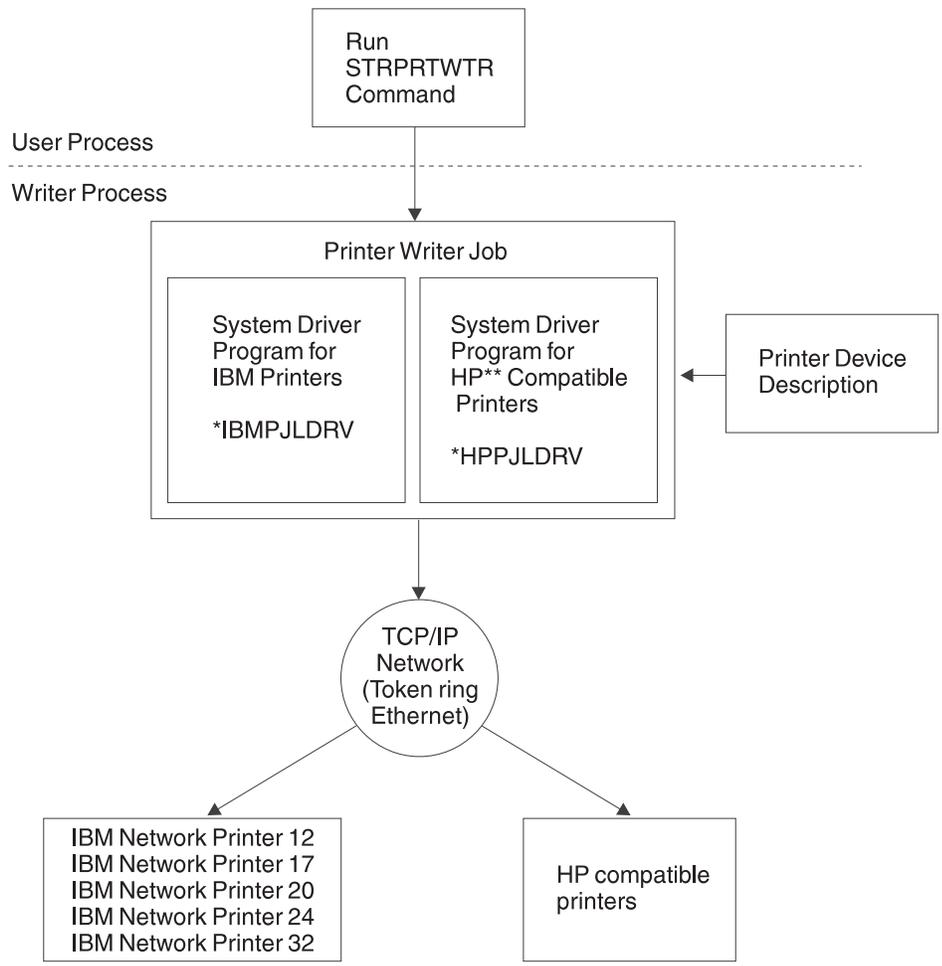


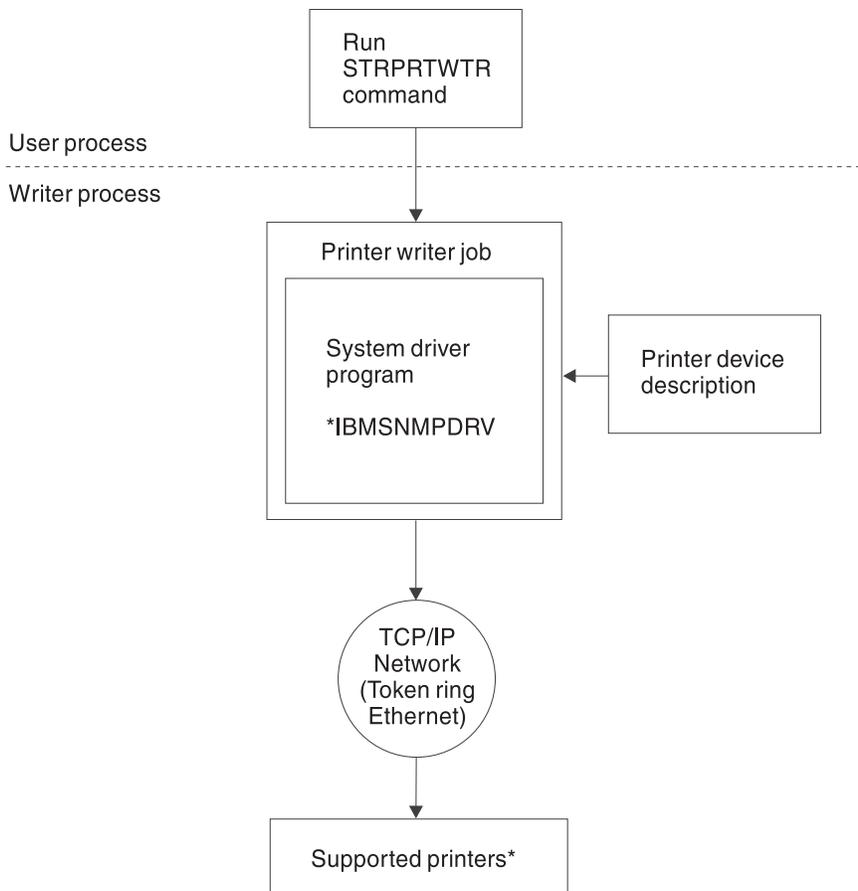
Figure 3. Physical view of ASCII TCP/IP network-attached printers

Figure 4 on page 81 and 3 provide software views of how ASCII TCP/IP network-attached printers appear to the iSeries server.



RV4W152-2

Figure 4. Software view of ASCII TCP/IP network-attached printers using PJI



RBAFT501-1

Note: See your printer manufacturer’s manual to determine if your printer is capable of SNMP printing. Also, see “Common restrictions” and “SNMP restrictions” on page 83 for additional requirements for SNMP printing.

Figure 5. Software view of ASCII TCP/IP network-attached printers using SNMP

Once the OS/400 TCP/IP configuration for the ASCII printer is complete and the physical environment is in place, the printing operations can begin. As with other printers, you can use Start Printer Writer (STRPRTWTR) command to start printing operations.

Note: You must vary on the printer device description before starting the printer writer.

When you start the STRPRTWTR command, the OS/400 establishes communications with the printer by opening a TCP/IP connection with the printer. The port number of the printer is in the printer device description.

Restrictions when using ASCII TCP/IP network-attached printers

Common restrictions

These restrictions apply to all ASCII TCP/IP network-attached printers:

- They must be able to attach directly to a TCP/IP network and accept print data on a TCP/IP port number.
- They only support spooled files with device type attributes of *SCS, *USERASCII, or *AFPDS.
- They do not allow direct printing (SPOOL parameter value = *NO on the CRTPRTE, CHGPRTE, and OVRPRTE commands).

- They do not support sharing printers through the direct print (ALWDRTPRINT) parameter on the STRPRTWTR command. Printer sharing means specifying the SPOOL parameter value = *NO on the CRTPRTF command and the ALWDRTPRINT parameter value = *YES on the STRPRTWTR command.
- They do not provide detailed error recovery message.
- If an output queue is associated with an ASCII TCP/IP network-attached printer, it will hold any spooled file type except *SCS, *USERASCII, or *AFPDS when *TRANSFORM(*YES) has been specified on the Printer Device Description. When a spooled file is held, a spooled file status message will be sent to the message queue that is specified on the STRPRTWTR command.

PJL restrictions

In addition to the common restrictions listed above, the following restrictions apply only to ASCII TCP/IP network-attached printers that use PJL:

- They must be able to accept HP PJL commands on the same TCP/IP port on which the print data is received .

Additional PJL requirements are listed in “HP printer job language (PJL)” on page 79 section.

SNMP restrictions

In addition to the common restrictions listed above, the following restrictions apply only to ASCII TCP/IP network-attached printers that use SNMP :

- They must support the industry standard Host Resource Management Information Base (RFC 1514). It is highly recommended, but not required, that these printers support the Printer Management Information Base (RFC 1759).
- If the printer is connected to a network adapter, the adapter must be compatible with the printer. The adapter must also support the Host Resource Management Information Base. Consult the manufacturer of the adapter to determine if it supports the printer. Some network adapters do not support all printers.
- If the printer is attached to an external network adapter that has more than one port, the printer should be connected to the first parallel port. There should be no other SNMP capable devices attached to the adapter.
- You must set the printer, and any adapter that is connected to it, to a community name of public. Public is usually the default community setting from the factory. Community names are a means of access control for SNMP devices. Read-only access to the public community is sufficient.

IPP restrictions

In addition to the common restrictions listed above, the following restrictions apply only to ASCII TCP/IP network-attached printers that use IPP:

- They must support the industry standard Internet Printing Protocol (IPP) as defined in the following:
 - RFC 2911 IPP/1.1: Model and Semantics
 - RFC 2910 IPP/1.1: Encoding and Transport
- To configure for secure connections, the printers or print servers must support TLS or SSL.

Printer device description parameters that support ASCII TCP/IP network-attached printers

You must use the Create Device Description (Printer) (CRTDEVPRT) command to configure an ASCII printer device.

You can enable ASCII TCP/IP network-attached printers by selecting certain values for parameters in the printer device description. Not all of the parameters that make up the printer device description are discussed here. Only the parameters required to support ASCII TCP/IP network-attached printers are shown.

You can use the following parameters to configure ASCII TCP/IP network-attached printers.

DEVCLS

Device class

It specifies the device class for the printer. This value must be *LAN. It indicates that the ASCII printer is connected to network of any type.

TYPE

Device type

It specifies the type of printer this device configuration represents. For example, you can specify 3812 as IBM 3812 emulation is used.

MODEL

Device model.

It specifies the model of the device. For example, you can specify 1 as IBM 3812 Model 1 emulation is used.

LANATTACH

LAN attachment.

You need to specify *IP for this parameter.

PORT

Port

Many printers accept print data on port 9100. For IBM network printers, use port 2501. Refer to the printer manual, or contact the manufacturer of your printer to get the port information.

For printers supporting IPP, use port 631.

INACTTMR

Inactivity timer

It specifies an inactivity timer (time-out) value. This value indicates the amount of time the printer writer keeps a TCP/IP connection open to the printer before closing it, when there are no files in a ready status. Possible values are:

***ATTACH**

A 15-second time-out period is used.

***NOMAX**

Maximum inactivity time is not tracked. The printer writer keeps the connection to the printer open until the writer is ended.

***SEC15**

A 15-second time-out period is used.

***SEC30**

A 30-second time-out period is used.

Inactivity timer

The range to select from is 1 through 30 seconds.

ACTTMR

Activation timer

It specifies the amount of time (in seconds) to wait for the printer to respond to the connection request from the host system. It is also used to timeout when waiting for a response from the printer after sending data or PJI commands. If the printer does not respond within this time, it is considered not available and a cancel/retry message appears. The user must end and restart the writer when this happens. For example, if the activation timer value is 120 seconds, the printer writer attempts to establish a connection to the printer and waits for 120 seconds. After 120 seconds elapses, the cancel/retry message appears. A cancel reply to the message cancels the writer. A retry reply causes

the writer to attempt to establish a connection again and waits for 120 seconds. If the attempt fails, the message appears again. The speed of the network influences what the setting should be.

The possible values are:

170 The printer waits for 170 seconds. This is the default value.

Activation timer

It specifies the number of seconds before the device is not available. When the number of seconds has elapsed, an inquiry message appears. If DEVCLS(*LAN) is specified, valid values can range from 1 through 2550.

TRANSFORM

Host print transform function

The value of the host print transform function defaults to *YES if the device class(DEVCLS) parameter value is *LAN and LANATTACH(*IP).

***NO** The printer does not use the host print transform function.

***YES** The printer uses the host print transform function.

RMTLOCNAME

Remote location name

| For TCP/IP-attached printers that use SNMP or PJI, it specifies either the TCP/IP address of the
| printer or the name of the printer if a name is configured in the TCP/IP host table. For
| TCP/IP-attached printers that use IPP, it specifies the URL of the printer.

SYSDRVPGM

System driver program.

It specifies the print driver type for this configuration.

For IBM printers that use PJI, this value should be *IBMPJLDRV. For other TCP/IP-attached printers that use PJI, this value should be *HPPJLDRV.

For TCP/IP-attached printers that use SNMP, this value should be *IBMSNMPDRV.

For TCP/IP-attached printers that use IPP, this value should be *IBMIPPDRV.

USRDFNOPT

User-defined options.

It specifies, for spooled output only, one or more user-defined options to user applications or user-specified programs or by user-specified programs that process spooled files. You can specify a maximum of four user-defined options. The possible values are:

***NONE**

No user-defined option is specified.

user-defined option

If you specify *IBMSNMPDRV for the SYSDRVPGM parameter, you can specify *IBMSHRCNN for the user-defined option. The printer writer will open and close the connection to the data port on the printer for every copy of every spooled file. This allows multiple printer writers and systems to access the printer even when there are additional copies or files in a ready status to be processed. If you specify *IBMSHRCNN, the INACTTMR parameter is ignored.

Note: You must specify *IBMSHRCNN for the IBM Infoprint 21 printer.

USRDTATFM

User data transform.

It specifies the qualified name of a user data transform program that transforms the spooled file data. The possible values are:

***NONE**

No user-defined data transform program name is specified.

name It specifies the name of the user data transform program. One of the following library values can qualify it:

***LIBL** All libraries in the job's library list are searched until the first match is found.

***CURLIB**

The current library for the job is searched. If no library is specified as the current library for the job, the QGPL library is used.

Library-name

It specifies the library to be searched.

SECURECNN

Secure connection

This parameter is used only by the IPP driver. It specifies whether a secure connection is established with the printer. A secure connection provides an encrypted communications session to ensure print data that passes over the connection remains private.

***NO** Connection with printer is not secure.

***YES** Connection with printer is secure. The printer must support SSL (Secure Sockets Layer) or TLS (Transport Layer Security) and must have a system digital certificate.

VLDL

Validation list

This parameter is used only by the IPP driver. It specifies a validation list that is used if the printer requests authentication. See "Setting up validation lists for the IPP print driver" for details.

Setting up validation lists for the IPP print driver

An IPP printer or IPP print server may require user authentication on requests from the iSeries IPP print driver. If this is the case, the validation list, specified in the VLDL parameter of the printer device description, is used to look up the password for a given user ID.

A validation list holds pairs of user IDs and passwords. The IPP print driver checks the validation list for an entry in the following order:

1. The iSeries user profile that owns the spooled file
2. The iSeries printer device description name
3. The iSeries system name

If a match is found, the password will be retrieved for that entry and passed in subsequent requests to the printer. You might choose not to include individual user IDs in the list and instead provide the printer device description name or the system name as a generic entry to be used by multiple users.

If a match is not found, then the user authentication cannot be done.

Use the Create Validation List (CRTVLDL) command to create an empty validation list, as shown in the following example:

```
CRTVLDL VLDL(MYLIB/MYUSRS) AUT(*EXCLUDE) TEXT('My users')
```

This command creates an empty validation list named MYUSRS in the MYLIB library. The validation list is specified in the VLDL parameter of the printer device description. See the CL category in the iSeries Information Center for details. Use the AUT parameter to limit user access to the validation list.

After you create the validation list to be used by the IPP print driver, you populate the list with entries consisting of a user ID and a password that the system encrypts when the list is stored. You can add, change, and remove entries with the Validation List APIs. See the APIs category in the iSeries Information Center for details.

Use the QsyAddValidationLstEntry() API to add an entry to a validation list. You must specify the QsyEncryptData attribute when adding entries in order to permit the retrieval of the encrypted password.

Configuring and starting ASCII TCP/IP network-attached printers

This example shows how to configure and then start an IBM 4312 printer. The network interface card must support the TCP/IP protocol and be active. You can use the following list to identify parameters and values for configuring the device description. For the other parameters, use the default values.

- Device description - PRT4312
- Device class - *LAN
- Device type - 3812
- Device model - 1
- LAN attachment type - *IP
- Port number - 2501
- Font - a font must be specified
- Manufacturer type and model - *IBM4312
- Text 'description' - Device description for an ASCII network-attached printer
- Remote location - 9.5.11.334
- System driver program - Specify *IBMPJLDRV if you are using PJL. Specify *IBMSNMPDRV if you are using SNMP.

To configure an IBM 4312 printer, type CRTDEVPRT and press F4=Prompt. The following display appears.

```

Create Device Desc (Printer) (CRTDEVPRT)

Type choices, press Enter.

Device description . . . . . > PRT4312      Name
Device class . . . . . > *LAN              *LCL, *RMT, *VRT, *SNPT, *LAN
Device type . . . . . > 3812              3287, 3812, 4019, 4201...
Device model . . . . . > 1                0, 1, 2, 3, 4, 10, 13, 301...
LAN attachment . . . . . > *IP            *LEXLINK, *IP, *USRDFN
Port number . . . . . > 2501              0-65535
Online at IPL . . . . . *YES              *YES, *NO
Font:
  Identifier . . . . . > 11                3, 5, 11, 12, 13, 18, 19...
  Point size . . . . . *NONE              000.1-999.9, *NONE
Form feed . . . . . *Type                *Type, *CONT, *CUT, *AUTOCUT
Separator drawer . . . . . *FILE          *1-225, *FILE
Separator program . . . . . *NONE         Name *NONE
Library . . . . . *LIBL                  Name *LIBL,*CURLIB
Printer error message . . . . . *INQ     *INQ, *INFO

More...

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

To start an IBM 4312 printer, type STRPRTWTR and press F4=Prompt. The following display appears. Type PRT4312 for the Printer parameter value and type the name of the output queue from which you want to print spooled output files.

Spooled files from MYOUTQ will print on printer PRT4312.

Chapter 13. Working with the host print transform function

This chapter provides information about the host print transform function and how to enable it to work with existing emulators that support ASCII printers attached to the iSeries server. The host print transform function is an OS/400 function that converts an SNA character string (SCS) or Advanced function print (AFP) data stream into an ASCII data stream. The ASCII data stream is then formatted and sent to an ASCII printer through one or more hardware connections, such as iSeries Access for Windows, or the 3477 or 3487 work stations. This single location of the conversion allows for consistent ASCII printing through any of the hardware connections. The host print transform function can also be used to send the ASCII data stream to a printer or system by using the Send TCP/IP Spooled File (SNDTCPSPLF) command, or to an ASCII LAN attached printer.

Why use the host print transform function?

The host print transform function allows the SCS-to-ASCII or AFP-to-ASCII data stream conversion to take place on the iSeries server instead of on an emulator. Having the conversion take place on the iSeries server provides these advantages:

- Consistent output for most ASCII printers

The host print transform function is capable of supporting many different types of ASCII data streams. For example, the Hewlett-Packard** printer control language (PCL), the IBM personal printer data stream (PPDS), and the Epson** FX and LQ data streams.

Having the conversion done on the iSeries server ensures that the resultant ASCII data stream provides the same printed output regardless of the emulator the printer is physically attached to.

- 3812 SCS Printer Emulation

The host print transform function is based on the 3812 SCS printer emulation of the iSeries Access for Windows work station function. Using the host print transform function, all of the ASCII printers connected to an iSeries server can perform a 3812 SCS level of function.

Note: You cannot perform functions that your printer does not support. For example, you cannot print in 180 degree orientation when your printer only supports 0 and 90 degree orientations.

- Support for many different ASCII printers

Without host print transform function, each emulator supports a limited number of ASCII printers. With the host print transform function, most IBM printers and a large number of other printers are supported.

- Customized printer support

Workstation customizing objects that come with the host print transform function can be updated by the user to change or add characteristics to a particular printer. Also, if the host print transform function does not have a workstation customizing object for a printer you want to use, you can create your own.

- Support for the image object content architecture (IOCA) imbedded in an SCS data stream. Image output can be printed on PCL printers (Hewlett-Packard LaserJet**) or PPDS laser printers (IBM 4019 or 4029).

This support allows you to print the following to PCL and PPDS laser printers. This support is available to all emulators discussed in this chapter.

- OfficeVision/400™ documents that contain image

Images can be brought into OfficeVision/400 documents through the Graphic Instruction.

- Incoming faxes from Facsimile Support/400

Incoming faxes saved in a folder as RFT:DCA can be printed by using the Print Document (PRTDOC) command. You can also use the Print Fax (PRTFAX) command to direct the incoming

faxes directly to an ASCII print device configured to use the HPT. For V3R7, HPT has also been enhanced to do image resolution scaling which allows faxes to be printed in normal size. See the Facsimile Support for OS/400 book for more information.

- Support for conversion of double-byte SCS or AFP data stream into ASCII data stream.

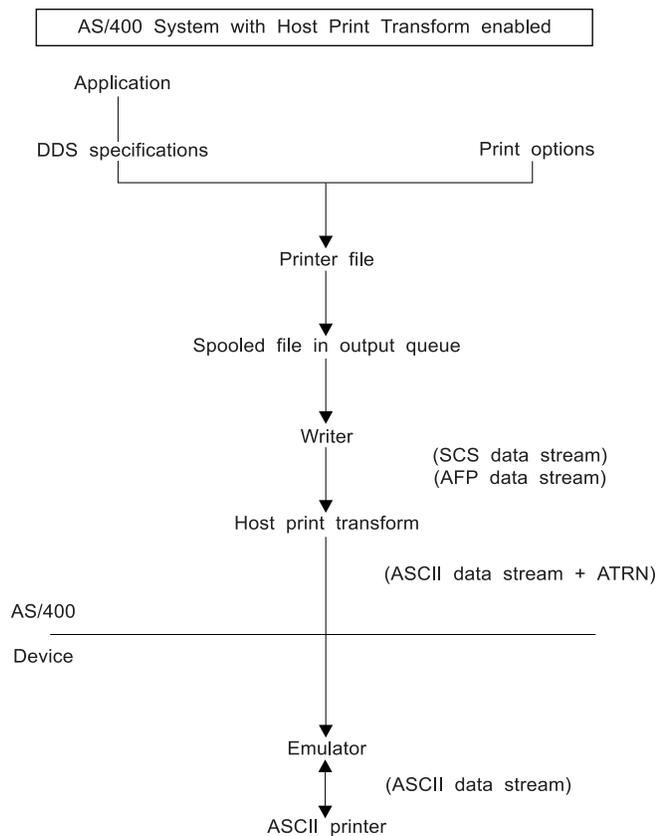
For the AFP-to-ASCII data stream conversion, there are additional advantages such as support for AFP font, text, image and bar code commands.

How the host print transform function works

The host print transform function converts the print data stream just before it is sent from the iSeries server. The spooled file contains the print data and not the converted ASCII data.

Note: The host print transform function works with jobs that are sent directly to the printer (SPOOL(*NO) on the printer file).

The following figure shows the data stream origination, flow, and conversion for a spooled file when the host print transform function is enabled.



RBAFT526-0

The host print transform function generates an ASCII printer data stream for a number of IBM and non-IBM printers. To generate the different ASCII data streams, the host print transform function uses iSeries server objects that describe characteristics of a particular ASCII printer. Using the SCS ASCII Transparency (ATRN) command, passes the ASCII data stream through the existing emulator. The existing emulator deletes the ASCII Transparency commands and passes the ASCII data stream that is generated by the host print transform function to the personal printer. CA/400 PC5250 and IBM Personal Communications do not support partial ASCII transparency printing.

Note: The emulator must support the SCS ASCII Transparency (ATRN) command to use it with the host print transform function. All the emulators described in this chapter support the ATRN command.

To enable the host print transform function, you work with the printer device description.

Using AFP-to-ASCII transform function

The AFP-to-ASCII transform function supports AFP font, text, bar code commands, as well as double-byte code pages and fonts. The function works well with the following types of printers:

- IBM Network printers and IBM Infoprint printers
- HP laser and ink jet printers
- IBM pages printers

On other printers, images or bar code may not be supported by AFP-to-ASCII transform function, and the text may not be positioned correctly.

Using bar codes

A bar code is a predetermined pattern of bars and spaces that represent numeric or alphanumeric information in a machine readable form. Bar codes are commonly used in many applications including, item tracking, inventory control, point of sale operations, patient care and so on.

IBM's Advanced Function Print (AFP) data stream defines an architecture for presenting bar codes. Bar codes can be printed by using printer files and the BARCODE DDS keyword. They can also be printed by using the Advanced Function Printing Utilities/400. Bar code support works best on laser printers. Dot matrix printers, and some ink jet printers do not support bar codes.

The AFP-to-ASCII transform supports the following industry standard bar code types:

- Code 39, AIM USS-39
- MSI
- UPC/CGPC Version A
- UPC/CGPC Version E
- UPC Two-digit Supplemental
- UPC Five-digit Supplemental
- EAN-8
- EAN-13
- Industrial 2-of-5
- Matrix 2-of-5
- Interleaved 2-of-5
- Interleaved 2-of-5, AIM USS-1 2/5
- Codabar 2-of-7, AIM USS-Codabar
- Code 128, AIM USS-128
- EAN Two-digit Supplemental
- EAN Five-digit Supplemental
- POSTNET
- PLANET
- Japan Postal
- Royal Mail
- Australian Postal 4-state
- Dutch Postal (KIX)

Limitations of AFP-to-ASCII transform function

Currently, the AFP to ASCII transform has the following limitations:

- It does not support graphics (GOCA) commands
- It does not support multi-up printing
- It does not provide support for computer output reduction (COR) printing
- It ignores the fidelity attribute of the spooled file and always performs content printing
- It can only produce 240 dpi images and 300 dpi images
- It does not support color images (IOCA or IM).
- It does not support two-dimensional bar codes. MaxiCode, Data Matrix, and PDF-417 are examples of 2D bar codes.

Using the host print transform in raster mode

In raster mode, the Host Print Transform builds a raster image for each page of the output. The raster image is then compressed. AFP fonts must be installed on OS/400 before using the raster mode. Both the SCS-to-ASCII and AFP-to-ASCII transforms support raster mode.

Why use raster mode?

You would use raster mode for the following:

- Raster mode preserves the relative position of text, images, barcodes, and overlays if the output is positioned within the no print border of your ASCII printer.
- To transform SCS or AFP output to formats other than printer data streams. The Host Print Transform function can, for example, transform SCS or AFP output to TIFF (Tagged Image File Format) for viewing or archiving.
- To support SCS or AFP functions not available on your ASCII printer. For example, the IBM 4019 printer does not support multiple print orientations on the same page.
- To support the printing of AFP output spooled with DBCS or Unicode encoded data.

Enabling raster mode

To enable raster mode:

- Install product option 8, AFP Compatibility Fonts, for Operating System/400®.
- For better font support install, IBM AFP Font Collection for IBM Operating System (5648-B45).
- For SCS or AFP output containing double byte characters (DBCS) install the Advanced Function Printing DBCS Fonts/400 (5769FN1). You can also install one of the DBCS outline font features for the IBM AFP font collection. For AFP output containing Unicode encoded data, install the AFP Unicode migration fonts or OS/400 Option 43 - Additional Fonts. For SCS output you must also specify, the OS/400 system value QIGCCDEFNT (double byte coded font).
- Configure the Host Print Transform to use a Workstation Customization Object (WSCST) with the following tag:

```
:RASTERMODE
  SCS=YES
  AFP=YES.
```

Raster mode does not support all printer data streams. Refer to the Workstation Customization Programming manual for detailed information about raster mode support.

Limitations of raster mode

The following are limitations of raster mode:

- Raster mode requires more OS/400 resources and is slower than the Host Print Transform mapping mode.

- Raster mode does not support dot matrix printers.
- The Host Print Transform can only produce raster images with 240 or 300 dots per inch (dpi). It does not support ink jet printers that have a resolution of 360 or 720 dpi.
- Raster mode does not support hardware justification of text.
- For SCS output that contains double byte characters (DBCS), you can specify only one double byte coded font. Setting the QIGCCDEFNT system value selects this font..

Enabling the host print transform function using printer device description parameters

The host print transform function is enabled by selecting certain values for parameters in the printer device description. If you need more detailed information on these parameters, see the Local Device Configuration PDF.

Parameters supporting the host print transform function

The following parameters on the printer device description are used by the host print transform function:

TRANSFORM

Host print transform function

***YES** Enables the host print transform function for this printer. This function is only to be used for ASCII printers.

***NO** Disables the host print transform function for this printer.

Note: When TRANSFORM(*YES) is specified, the FORMFEED parameter value for this device is ignored. The FORMFEED type is based on the value specified in the paper source 1 (PPRSRC1) parameter.

MFRTYPMDL

Manufacturer, type, and model.

Press F4 or the Help key for a list of printers supported by the host print transform function. Examples of the values for this parameter are *IBM4029 for the IBM 4029 LaserPrinter Model 10 or *HPIIID for the Hewlett-Packard LaserJet IIID**.

Note: You must choose a value for MFRTYPMDL if TRANSFORM(*YES) is specified. There is no default for this parameter. Default values for PPRSRC1, PPRSRC2, and ENVELOPE are selected based on the MFRTYPMDL value.

PPRSRC1

Paper source 1.

The value for this parameter is used to specify the size of the paper in drawer 1 or continuous size paper if applicable. Press F4 (Prompt) or the Help key for a list of paper sizes supported by the host print transform function.

Note: The paper size value is used by the host print transform function to support the computer output reduction (COR) function.

*MFRTYPMDL

This is the default. The iSeries server substitutes the value that is most common for your printer. It substitutes *LETTER for all page printers, *CONT80 for narrow-carriage continuous-feed printers, and *CONT132 for wide-carriage continuous-feed printers. If the printer uses a paper size other than the default size, you should explicitly specify that size to completely support the COR function.

PPRSRC2

Paper source 2.

The value for this parameter is used to specify the size of the paper in drawer 2. The value in PPRSRC2 is ignored for continuous feed printers. Press F4 (Prompt) or the Help key for a list of paper sizes supported by the host print transform function.

***MFRYPMDL**

This is the default. The iSeries server substitutes the value that is most common for your printer. It substitutes *LETTER for all page printers.

ENVELOPE

Envelope source.

The value for this parameter is used to specify the size of the envelope. Press F4 (Prompt) or the Help key for a list of envelope sizes supported by the host print transform function.

***MFRYPMDL**

This is the default. The iSeries server substitutes a value of *NUMBER10 if your printer supports an envelope feeder.

ASCII899

ASCII code page 899 support.

***YES** Select *YES if your printer supports code page 899. Code page 899 is not resident on most ASCII printers. With the IBM 4029 LaserPrinter, a font card is required.

***NO** *NO is the default. If your printer does not support code page 899, use *NO.

The following additional parameter can be used by the host print transform function when a user-defined workstation customizing object is necessary. A user-defined customizing object for the printer is usually not needed due to the extended support provided by the host print transform function.

WSCST

Workstation customizing object and library.

If the host print transform function is enabled and an object name is specified on the WSCST parameter, that object must be compatible with the host print transform function.

***NONE**

The default is *NONE.

Working with printer device descriptions

The host print transform function is enabled when you specify *YES for the TRANSFORM parameter in the printer device description. The TRANSFORM parameter can be specified when the printer device description is created or when you change an existing printer device description. Because of the complexity of creating a device description manually, it is recommended that you use automatic configuration. Then, after the device description has been created, change the device description to enable the host print transform function.

Notes:

1. Automatic configuration of devices (printers, in this case) attached to the ASCII Work Station Controller is not supported. The CRTDEVPRT command must be used to create the printer device description.
2. The work station function of iSeries Access for Windows creates or changes its printer device descriptions based on the printer's session configuration. For this emulator, the host print transform function should be enabled by changing the session configuration on the personal computer and not the device description in the iSeries server.

Creating printer device descriptions using a command

You may not want your printer device descriptions to be created by automatic configuration, for example, if your printer is attached to the ASCII Work Station Controller.

In this case, you should create your printer device descriptions by typing the Create Device Description (Printer) (CRTDEVPRT) command and pressing F4 (Prompt). You will need to enter a value for most of the parameters. See “Enabling the host print transform function using printer device description parameters” on page 93 for information on the parameters and values used by the host print transform function.

Automatically creating printer device descriptions

You can have printer device descriptions created automatically if the automatic configuration (QAUTOCFG) system value is *YES. The printer device description is automatically created when:

- A display or printer is powered on
- The personal computer or PS/2 emulation programs are started

To enable the host print transform function after automatic configuration, type the Change Device Description (Printer) (CHGDEVPRT) command and press F4 (Prompt).

Note: Before you change a printer device description, it is recommended that you:

- End the printer writer (ENDWTR command)
- Vary off the printer device (WRKCFGSTS command)

See “Enabling the host print transform function using printer device description parameters” on page 93 for information on the parameters and values used by the host print transform function.

Note: The work station function of iSeries Access for Windows can automatically configure printers with the host print transform function enabled.

Changing an existing printer device description

When working with existing printer device descriptions, you can enable the host print transform function by changing certain parameter values in the printer device description.

To enable the host print transform function, type the Change Device Description (Printer) (CHGDEVPRT) command and press F4 (Prompt).

Note: Before you change a printer device description, it is recommended that you:

- End the printer writer (ENDWTR command)
- Vary off the printer device (WRKCFGSTS command)

See “Enabling the host print transform function using printer device description parameters” on page 93 for information on the parameters and values used by the host print transform function.

Note: The work station function of iSeries Access for Windows can automatically configure printers with the host print transform function enabled.

Displaying the printer device description

If you want to verify your host print transform function parameters, use the Display Device Description (DSPDEVD) command to display the printer device description. If the default value *MFRTPMDL was specified for the PPRSRC1, PPRSRC2, and ENVELOPE parameters, the system-supplied values are shown when the device description is displayed.

Use the Change Device Description (Printer) (CHGDEVPRT) command to change any parameter values that are not correct for your printer.

Using the host print transform function with an emulator

The following emulator products provide printer emulation for ASCII printers on the iSeries server. Each section provides a brief description of the emulator, some advantages of using the host print transform function with this emulator, and suggested emulator configuration values. The host print transform function does not eliminate the need for existing emulators. Existing emulators are still necessary to attach the personal printer to the iSeries server.

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To Work With:

96	IBM iSeries Access for Windows work station function program
97	IBM 348x InfoWindow® II displays
98	IBM 3477 InfoWindow display
99	IBM 3197 Display Station
100	IBM ASCII Work Station Controller
101	IBM Remote 5250 Emulation Program

Using the host print transform function with the IBM iSeries Access for Windows work station function

The iSeries Access for Windows work station function program provides the following data link control attachment of IBM personal computer systems for work station function and printer emulation:

- Twinaxial
- Token-ring
- Asynchronous
- Synchronous

The iSeries Access for Windows work station function provides a DOS 5250 emulator for all of the supported iSeries Access for Windows Support connection methods. Up to five work station sessions, in any combination of display or printer sessions, can be configured. The work station function provides 3812 SCS printer emulation. The personal printer can be attached to the personal computer through either the parallel or serial interface.

Configuration recommendations

To use the host print transform function, change the printer session profile on the personal computer using the options on the CFGWSF configuration program. CFGWSF is the configuration program for the iSeries Access for Windows work station function. The CFGWSF program provides options for specifying:

- Printer manufacturer, type, and model
- Paper sizes
- Envelope sizes
- Symbols code page support
- Workstation customizing object.

When the printer session is started, these parameters are passed from the personal computer to the iSeries server. The printer device description is created or changed to reflect the values passed from the CFGWSF program. Any changes must be made by changing the printer session profile on the personal computer instead of using the CHGDEVPRT command.

Maintaining printer customization

Before you do the work of creating a workstation customizing object for a printer, try printing jobs using the host print transform function support. You may not need to create a customizing object for the printer due to the extended support provided by the host print transform function.

The iSeries Access for Windows work station function uses the Printer Function Table Setup (PFTSETUP) program to customize features on a printer. If you have used PFTSETUP to customize a printer, use of the host print transform function overrides this customization.

However, if you need to customize your printer while using the host print transform function, you should:

1. Make a note of the printer features that you customized.
You can use the PFTSETUP program to locate the customized features.
2. Transfer those customized features to an object compatible with the host print transform function.
This means changing some features on this object to match the features you customized with the PFTSETUP program.
3. Use this object name as the value for the workstation customizing object parameter in that printer's session profile.

See the Workstation Customization Programming manual for detailed information on customizing printers.

Using the host print transform function with the 3486/3487/3488 InfoWindow display

The 3486/3487/3488 InfoWindow II display stations are twinaxial display stations that attach to the iSeries server using a twinaxial controller or a remote workstation controller. The displays support up to two display sessions and a printer session. The 3486/3487/3488 display provides 5256, 4214, or 3812 SCS printer emulation for many IBM personal printers and some Hewlett-Packard personal printers.

Configuration recommendations

Configure printers that are supported by the InfoWindow display as recommended in the InfoWindow display's configuration menus. Configure any printer that is not included in the list of supported printers as a 4201/4202 printer.

When you leave the InfoWindow display's configuration menu, the printer device description is automatically created if both the following are true:

- The printer is powered on
- Automatic configuration is on

After the printer device description is created on OS/400, enable the host print transform function using the CHGDEVPRT command. The display's printer configuration is not used after the host print transform function is enabled. The data stream generated for the printer is based on the MFRTYPMDL parameter value specified in the printer device description on OS/400.

Note: Do not change the display's printer configuration after your device description has been created on the iSeries server. Doing so can cause the OS/400 printer device description to be replaced. In this case, the host print transform function is no longer enabled. The CHGDEVPRT command can be used to enable the host print transform function again.

Maintaining printer customization

Before you do the work of creating a workstation customizing object for a printer, try printing jobs using the host print transform function support. You may not need to create a customizing object for the printer due to the extended support provided by the host print transform function.

The 348x displays can use a workstation customizing object (located in the device description of the display) to define the printer attached to it. Conversely, the host print transform function uses a workstation customizing object located in the device description of the printer. If you have customized some printer features in the display's workstation customizing object, use of the host print transform function overrides the customization.

However, if you need to customize your printer while using the host print transform function, you should:

1. Make sure the host print transform function is enabled.
The TRANSFORM parameter value for the printer device description must be *YES.
2. Use a workstation customizing object that is compatible with the host print transform function.
Customize the printer features in this object to match the customized features that you used in the display's workstation customizing object.
3. Use the workstation customizing object name that is compatible with the host print transform function as the value for the WSCST parameter in the printer device description.

Remember: The location of the WSCST object name (in the printer device description, not the display device description) is important when using customization with the host print transform function.

See the Workstation Customization Programming manual for detailed information on customizing printers.

Using the host print transform function with the 3477 InfoWindow display

The 3477 InfoWindow display station is a twinaxial display station that attaches to the iSeries server using a twinaxial controller or a remote workstation controller such as 5294, 5394, or 5494. The display supports up to two display sessions, or one display session and one printer session. The 3477 display provides 5256, 4214, or 5219 SCS printer emulation for most IBM personal printers.

Configuration recommendations

Configure printers that are supported by the InfoWindow display as recommended in Appendix A of the *IBM 3477 InfoWindow user's guide*. Configure printers that are not supported by the 3477 with the following values:

- Type A for *Printer Character Set*
- 5256 for *Printer Emulation*

When you leave the display's configuration menu, the printer device description is automatically created if both the following are true:

- The printer is powered on
- Automatic configuration is on

After the printer device description is created on the iSeries server, enable the host print transform function using the CHGDEVPRT command. The display's printer configuration is not used after the host print transform function is enabled. The data stream generated for the printer is based on the MFRTYPMDL parameter value specified in the printer device description on the iSeries server.

Note: Do not change the display's printer configuration after your device description has been created on the iSeries server. Doing so can cause the OS/400 printer device description to be replaced. In this case, the host print transform function is no longer enabled. The CHGDEVPRT command can be used to enable the host print transform function again.

Understanding the 3477 power-on initialization sequence

The 3477 sends a power-on initialization sequence to the attached printer every time the printer or display is powered on. This initialization is designed for IBM printers. If a printer is attached that does not support the IBM data stream, some unrecognizable characters may be printed. After this initialization sequence, the data stream generated is based on the MFRTYPMDL parameter in the printer device description on the iSeries server. No more unrecognizable characters will be printed.

If your 3477 is a Model H, you can turn off the power-on initialization sequence by doing the following:

1. From the 3477's setup menu, select *Test Workstation*.
2. Press the Alt, Shift, and Setup keys together.
3. The F6 key is now set to switch between power-on initialization active and power-on initialization not active.

Pressing F6 displays +6 or *6 on the bottom of the screen. If +6 is displayed, power-on initialization is not active. If *6 is displayed, power-on initialization is active.

4. Press the Reset key to return to the 3477 setup menu.

Maintaining printer customization

Before you do the work of creating a workstation customizing object for a printer, try printing jobs using the host print transform function support. You may not need to create a customizing object for the printer due to the extended support provided by the host print transform function.

The 3477 Model H is the only 3477 InfoWindow display that supports customization. The 3477 Model H display can use a workstation customizing object (located in the device description of the display) to define the printer attached to it. Conversely, the host print transform function uses a workstation customizing object located in the device description of the printer. If you have customized some printer features in the display's workstation object, use of the host print transform function overrides the customization.

However, if you need to customize your printer while using the host print transform function, you should:

1. Make sure the host print transform function is enabled.
The TRANSFORM parameter value for the printer device description must be *YES.
2. Use a workstation customizing object that is compatible with the host print transform function.
Customize the printer features in this object to match the customized features that you used in the display's workstation customizing object.
3. Use the workstation customizing object name that is compatible with the host print transform function as the value for the WSCST parameter in the printer device description.

Remember: The location of the WSCST object name (in the printer device description, not the display device description) is important when using customization with the host print transform function.

See the Workstation Customization Programming manual for detailed information on customizing printers.

Using the host print transform function with the 3197 display station

The 3197 display station is a twinaxial display station that attaches to the iSeries server using a twinaxial controller or a remote workstation controller such as 5294, 5394, or 5494. The 3197 supports a single display, two displays, or one display and one emulated printer. The 3197 provides 5256 or 4214 printer emulation for many IBM personal printers.

Configuration recommendations

Refer to the *IBM 3197 Display Stations User's Guide* to set up your display for a printer session. Select *Display-Printer Mode* with a *Printer Device ID* of 5256. Specify 850 as the *Printer Character Set Selection*.

When you leave the InfoWindow display's configuration menu, the printer device description is automatically created if both the following are true:

- The printer is powered on
- Automatic configuration is on

After the printer device description is created on the iSeries server, enable the host print transform function using the CHGDEVPRT command. The display's printer configuration is not used after the host print transform function is enabled. The data stream generated for the printer is based on the MFRTYPMDL parameter value specified in the printer device description on OS/400.

Notes:

1. The 3197 sends a power-on initialization sequence to the attached printer every time the printer or display is powered on. This initialization is designed for IBM printers. If a printer is attached that does not support the IBM data stream, some unrecognizable characters may be printed. After this initialization sequence, the data stream generated is based on the MFRTYPMDL parameter in the printer device description on OS/400. No more unrecognizable characters will be printed.
2. Do not change the display's printer configuration after your device description has been created on the iSeries server. Doing so can cause the OS/400 printer device description to be replaced. In this case, the host print transform function is no longer enabled. The CHGDEVPRT command can be used to enable the host print transform function again.

The order in which the 3197 display and its attached printer are powered on can affect the iSeries server's ability to recognize the printer. This order is dependent on the model of the 3197. Use the Work with Configuration Status (WRKCFGSTS) command to check the status of a printer device. If the status of the printer is *vary on pending* or if the printer is not automatically configured, reverse the order in which the display and printer were powered on.

Using the host print transform function with the ASCII work station controller

The ASCII Work Station Controller (AWSC) resides on the iSeries server and allows up to 18 ASCII displays or printers to attach to each controller. The AWSC provides 3812, 5219, 5224, or 5256 SCS printer emulation for most IBM printers that support an EIA-232 or EIA-422 serial interface.

Configuration recommendations

There is no automatic configuration capability for printers attached to the AWSC. The Create Device Description (Printer) (CRTDEVPRT) command must be used to create the configuration descriptions. For existing printers, use the Change Device Description (Printer) (CHGDEVPRT) command.

Configure printers not supported by the AWSC with 4019 as the device type, Model 1 as the model, and 3812 as the emulated printer. Many of the other parameters depend on the attached printer (line speed, data bits, and so on). To avoid OS/400 parameter checking, specify *YES as the value on the emulating ASCII parameter in the printer device description. For example, this allows a communications line speed of 38 400 bps.

After the host print transform function is enabled, the device type and model parameters in the device description have no effect on the data stream sent to the printer. The data stream generated for the printer is based on the MFRTYPMDL parameter in the OS/400 printer device description.

Maintaining printer customization

Before you do the work of creating a workstation customizing object for a printer, try printing jobs using the host print transform function support. You may not need to create a customizing object for the printer due to the extended support provided by the host print transform function.

The ASCII work station controller can use a workstation customizing object in the printer device description to define the printer's characteristics. That workstation customizing object can be customized to use special features of a printer that the AWSC does not support.

If the host print transform function is enabled, the customizing object specified for the AWSC printer device description must be removed or replaced. The customizing objects created for the AWSC are not compatible with the host print transform function.

However, if you need to customize your printer while using the host print transform function, you should:

1. Make sure the host print transform function is enabled.
The TRANSFORM parameter value for the printer device description must be *YES.
2. Use a workstation customizing object that is compatible with the host print transform function.
Customize the printer features in this object to match the customized features that you initially used in the workstation customizing object specified in the AWSC printer device description.
3. Use the workstation customizing object name that is compatible with the host print transform function as the new value for the WSCST parameter in the printer device description.

Remember: The AWSC and the host print transform function both use the workstation customizing object parameter in the printer device description. That object must contain the customized features and be compatible with the host print transform function.

See the Workstation Customization Programming manual for detailed information on customizing printers.

Using the host print transform function with the IBM remote 5250 emulation program

The Remote 5250 Emulation Program is a personal computer program that allows a personal computer or PS/2 to emulate an IBM 5294 Remote Workstation Controller. The Remote 5250 Emulation Program relies on an SDLC communications line to communicate with the iSeries server. The Remote 5250 Emulation Program provides the ability to establish up to two display sessions or one display and one printer session.

Configuration recommendations

See the *Remote 5250 Emulation Program User's Guide*, G570-2203, for information on configuring printer sessions. For example, use the IBM5204.PDT file and select 5219 Printer emulation for the IBM 5204 Quickwriter*. Configure printers that were not previously supported by the emulation program using the TBLPRT.PDT and selecting 5219 printer emulation.

When the printer session is started, the iSeries server automatically creates the printer device description (if automatic configuration is turned on).

On the iSeries server, use the CHGDEVPRT command to enable the host print transform function. See "Enabling the host print transform function using printer device description parameters" on page 93 for the parameters that enable the host print transform function.

Maintaining printer customization

Before you do the work of creating a workstation customizing object for a printer, try printing jobs using the host print transform function support. You may not have to create a customizing object for the printer due to the extended support provided by the host print transform function.

The Remote 5250 Emulation Program supports printers through a printer description table (PDT). If you have customized a printer by changing the supplied PDT, use of the host print transform function overrides this customization.

However, if you need to customize your printer while using the host print transform function, you should:

1. Make sure the host print transform function is enabled.
The TRANSFORM parameter value for the printer device description must be *YES.
2. Make a note of the features you customized in the PDT.
3. Use a workstation customizing object that is compatible with the host print transform function.

Update the features in this object to reflect the customized features you used in the PDT.

4. Use the workstation customizing object name that is compatible with the host print transform function as the value for the WSCST parameter in the printer device description.

See the Workstation Customization programming manual for detailed information on customizing printers.

Chapter 14. Working with the image print transform function

This chapter provides information about the image print transform function and how to enable it to provide additional support for printers that are attached to an iSeries server. The image print transform function is an OS/400 function that is capable of converting image or PostScript** data streams into various ASCII and non-ASCII printer data streams. The conversion takes place on the iSeries server, which means the data stream generated is independent of any printer emulators or hardware connections.

What is the image print transform function?

The image print transform function converts image or print data from one format into another. A supporting printer interprets the resultant printer data stream. The image print transform function can convert the following data streams:

- Tag Image File Format** (TIFF)
- Graphics Interchange Format** (GIF)
- OS/2 and Windows** Bitmap (BMP)
- PostScript** Level 1 with DBCS extensions

The image print transform function can generate the following printer data streams:

- Advanced Function Print Data Stream (AFPDS)
- Hewlett-Packard** Printer Control Language (PCL)
- PostScript** Level 1

Similar to the host print transform function, the image print transform function converts the data on the iSeries server instead of an emulator.

When a data stream is converted by the image print transform function, the printer data stream that is created contains a bit-mapped image. A *bit-mapped image* is an array of numerical values. Each value represents part or all of a *pixel*. A *pixel* is a single point or dot of an image. An image is usually measured in terms of pixels, for both width and height. The *resolution* of an image is then defined as the number of pixels (dots) per unit of measure. For example, a resolution supported by many printers is 300 dots per inch (dpi). Therefore, an image having dimensions 1200 pixels by 1500 pixels would have a width of 4 inches and a height of 5 inches when printed at 300 dpi.

Why use the image print transform function?

There are many advantages for using the image print transform function.

- Support for Intelligent Printer Data Stream (IPDS) printers
TIFF, GIF, and BMP image files, as well as PostScript Level 1 files, can be converted to AFPDS format and printed on IPDS printers configured AFP(*YES).
- Support for ASCII printers
TIFF, GIF, and BMP image files, as well as PostScript Level 1 files, can be converted to PCL-5 and PostScript Level 1 format and printed on ASCII printers supporting these languages.

Note: You cannot convert PostScript to PostScript using the image print transform function. When the input and output data streams are PostScript, the data is sent directly to the output destination without conversion.

- Customized printer support

Image configuration objects are used with the image print transform function to specify certain characteristics of the converted data streams. When associated with the device description information for a printer connected to an iSeries server, an image configuration object acts as a template for the converted data stream. Attributes such as data stream format, color, and resolution are all specified in the image configuration object.

- Additional capabilities

In addition to converting data from one format to another, other functions can be performed by the image print transform function. Among these are the ability to reduce color, compress data, and change photometricity. For more information about the features of the image print transform function, consult the System API Reference topic in the iSeries Information Center.

Note: You cannot perform functions that your printer does not support. For example, you cannot print in landscape orientation when your printer only supports portrait orientation.

Printing with image print transform function

The image print transform function works with ASCII printers as well as IPDS printers that have AFP(*YES) specified in the configuration. When the image print transform function is used, the transform doesn't take place until after the data stream is spooled. Then, when the spooled file is printed or sent to a remote output queue, it is first sent to the image print transform function to be transformed. Printing with the image print transform function is done automatically when:

- A printer device is created with the host printer transform function enabled.
- The device or remote output queue has an image configuration object defined.

For more information about creating a device with HPT enabled, see Chapter 13, "Working with the host print transform function," on page 89.

Printing to an ASCII printer

To enable the image print transform function when printing to an ASCII printer, do the following:

- Ensure that the spooled file is a *USERASCII spooled file.
- Verify that the printer device description has the TRANSFORM field set to *YES.
- Verify that the printer device description has the IMGCFG field set to a valid value other than *NONE.

The TRANSFORM field and the IMGCFG field can be set when the device description is created with the Create Device Desc (Printer) (CRTDEVPRT) command, or changed after the device description was created with the Change Device Desc (Printer) (CHGDEVPRT) command.

Printing to an IPDS printer

To enable the image print transform function when printing to an IPDS printer that has AFP(*YES) specified in the configuration, do the following:

- Ensure that the spooled file is a *USERASCII spooled file.
- Verify that the printer device description has the IMGCFG field set to a valid value other than *NONE.

The IMGCFG field can be set either when the device description is created with the Create Device Desc (Printer) (CRTDEVPRT) command, or changed after the device description was created with Change Device Desc (printer) (CHGDEVPRT) command.

Printing with remote output queues

To enable the image print transform function when printing or sending spooled files to a remote output queue, do the following:

- Ensure that the spooled file is a *USERASCII spooled file.
- Verify that the output queue has the TRANSFORM field set to *YES.

- Verify that the output queue has the IMGCFG field set to a valid value other than *NONE.

You can set the TRANSFORM field and the IMGCFG field when you create the output queue with the Create Output Queue (CRTOUTQ) command. You can change both fields after creating the output queue with the Change Output Queue (CHGOUTQ) command.

How output attributes are derived

The following output attributes are derived from the image configuration object.

- Data stream format
- Photometric interpretation
- Resolution units
- Horizontal resolution
- Vertical resolution
- Compression type
- Bits per sample
- No print borders (left, right, top, bottom)

Note: If any of the above attributes are specified in the user defined data attribute of the spooled file with the convert image API, then only those attributes that are not specified will be derived from the image configuration object.

The output paper size attribute is derived from the printer device description if the output data stream format is AFPDS and the printer is an IPDS printer that has AFP(*YES) specified in the configuration.

The Paper Size attribute is derived from the printer file (i.e. spooled file attributes) if the output data stream format is not AFPDS and the printer is not an IPDS printer that has AFP(*YES) specified in the configuration.

Determining if input data stream is in final form

You can use the output data stream format to determine if an input data stream is in final form. Once the input data stream is in final form, no transform is needed. If the input data stream format matches the output data stream format, all other output attributes are ignored. No conversion is done and the spooled file is sent as is. Currently, this is only available for a PostScript data stream.

Printing with convert image API

The convert image API provides the same transform capabilities as the image print transform function. In addition, printing with the convert image API gives the user more control over how the output will look than the image print transform function does. It gives the user the ability to immediately transform a data stream when delaying the transform is not desired. It also has more options regarding the type of input object and output object. The convert image API supports input from and output to an Integrated File System (IFS) file, a spooled file or main storage. The convert image API can also generate a spooled file which can then be transformed with the image print transform function. When this is done, the convert image API stores all the values needed to do the transform in the user defined data attribute of the spooled file for later use by the image print transform function. For more information on how to use the convert image API, see the System API Reference topic in the iSeries Information Center.

Image configuration objects

An image configuration object contains various printer characteristics that the image print transform function and the convert image API use when creating output. An image configuration object is a list of characteristics that is supported by the printer it represents, acting as a template which guides the transform process. Each image configuration object has values for the following:

- Data stream format
- Photometric interpretation
- Resolution units
- Horizontal resolution
- Vertical resolution
- Compression type
- Bits per sample
- No-print borders (left, right, top, bottom)

All of these fields can be overridden by using the convert image API and specifying a value for the field of the same name.

Special values of image configurations

The following values are allowed for the image configuration (IMGCFG) field of the CRTDEVPRT, CHGDEVPRT, CRTOUTQ and CHGOUTQ commands. You can also use these values when using the convert image API. For more information on how to use these values, see the System API Reference book. Each value is described in terms of the data streams that are supported, the maximum resolution in dots per inch (dpi), and whether the printer has color or supports compression.

Printers supporting PCL data streams

- ***IMGA01**
PCL 300-dpi printer
- ***IMGA02**
PCL 600-dpi printer
- ***IMGA03**
PCL 1200-dpi printer
- ***IMGA04**
PCL 300-dpi color printer
- ***IMGA05**
PCL 600-dpi color printer
- ***IMGA06**
PCL 1200-dpi color printer
- ***IMGA07**
PCL 75-dpi printer (No compression)
- ***IMGA08**
PCL 600-dpi color printer with larger no-print border
- ***IMGA09**
PCL 300-dpi printer (No compression)

Printers supporting PostScript data streams

- ***IMGB01**
PostScript 300-dpi printer
- ***IMGB02**
PostScript 600-dpi printer
- ***IMGB03**
PostScript 1200-dpi printer

- ***IMGB04**
PostScript 300-dpi color printer
- ***IMGB05**
PostScript 600-dpi color printer
- ***IMGB06**
PostScript 1200-dpi color printer
- ***IMGB07**
PostScript 600x300-dpi color printer
- ***IMGB08**
PostScript 1200x300-dpi color printer
- ***IMGB09**
PostScript 360-dpi color printer
- ***IMGB10**
PostScript 720-dpi color printer
- ***IMGB11**
PostScript 1440x720-dpi color printer
- ***IMGB12**
PostScript 400-dpi printer
- ***IMGB13**
PostScript 800-dpi color printer
- ***IMGB14**
PostScript 600-dpi color printer with larger no-print border
- ***IMGB15**
PostScript 300-dpi color printer with larger no-print border

Printers supporting IPDS data streams

- ***IMGC01**
IPDS 240-dpi printer
- ***IMGC02**
IPDS 300-dpi printer
- ***IMGC03**
IPDS 600-dpi printer
- ***IMGC04**
IPDS 1200-dpi printer
- ***IMGC05**
IPDS 240-dpi printer with no-print border
- ***IMGC06**
IPDS 300-dpi printer with no-print border
- ***IMGC07**
IPDS 600-dpi printer with no-print border
- ***IMGC08**
IPDS 1200-dpi printer with no-print border
- ***IMGC09**
IPDS 240-dpi printer (IM/1 image)

***IMGC10**
IPDS 240-dpi printer (IM/1 image) with no-print border

***IMGC11**
IPDS 240-dpi printer (CCITT G4)

Printers supporting PCL and PostScript data streams

***IMGD01**
PCL/PostScript 300-dpi printer

***IMGD02**
PCL/PostScript 600-dpi printer

***IMGD03**
PCL/PostScript 1200-dpi printer

***IMGD04**
PCL/PostScript 300-dpi color printer

***IMGD05**
PCL/PostScript 600-dpi color printer

***IMGD06**
PCL/PostScript 1200-dpi color printer

***IMGD07**
PCL 300-dpi/PostScript 600-dpi printer

***IMGD08**
PCL 300-dpi/PostScript 1200-dpi printer

***IMGD09**
PCL 600-dpi/PostScript 300-dpi printer

***IMGD10**
PCL 600-dpi/PostScript 1200-dpi printer

***IMGD11**
PCL/PostScript 600-dpi color printer with larger no-print border

The recommended image configuration objects are listed below for some common printers.

***IMGD01**
Compaq Pagemarc 20

***IMGA01**
Epson EPCL-4 Printer

***IMGA02**
Epson EPCL-5 Printer

***IMGB10**
Epson Stylus Photo with PostScript

***IMGB11**
Epson Stylus Color 600, 800 with PostScript

***IMGA04**
HP Color Laserjet 5

***IMGD04**
HP Color Laserjet 5M

***IMGA04**
HP Deskjet 560C, 820C, 1200C

- ***IMGA01**
HP Deskjet 500, 600, 1200
- ***IMGA04**
HP Deskjet 1600C, 1600CN
- ***IMGD04**
HP Deskjet 1600CM
- ***IMGA09**
HP Laserjet II, IID, IIP
- ***IMGB01**
HP Laserjet II, IID, IIP with PostScript
- ***IMGA01**
HP Laserjet III, IIID, IIISi, 4L
- ***IMGD01**
HP Laserjet III, IIID, IIISi, 4L with PostScript
- ***IMGA02**
HP Laserjet 4, 4P, 4V, 4Si, 4 Plus
- ***IMGD02**
HP Laserjet 4M, 4MP, 4MV, 4Si MX, 4M Plus
- ***IMGA02**
HP Laserjet 5, 5P, 5Si
- ***IMGD02**
HP Laserjet 5M, 5MP, 5Si MX
- ***IMGA02**
HP Laserjet 6, 6P, 6L
- ***IMGD02**
HP Laserjet 6M, 6MP
- ***IMGD02**
IBM 3112, 3116 Page Printer with IPDS feature
- ***IMGA02**
IBM 3112, 3116 Page Printer (ASCII/LAN)
- ***IMGD02**
IBM 3112, 3116 Page Printer with PostScript
- ***IMGC01**
IBM 3130, 3160-1 AF Printer (240-pel mode)
- ***IMGC02**
IBM 3130 AF Printer (300-pel mode)
- ***IMGC09**
IBM 3825, 3827, 3828 AF Printer
- ***IMGC01**
IBM 3825, 3827, 3828 AF Printer (with AFIG)
- ***IMGC01**
IBM 3829 AF Printer
- ***IMGC10**
IBM 3835-001 AF Printer

- *IMGC05**
IBM 3835-001 AF Printer (with AFIG)
- *IMGC05**
IBM 3835-002, 3900 AF Printer
- *IMGA01**
IBM 3912, 3916 Page Printer (ASCII/LAN)
- *IMGC06**
IBM 3912, 3916 Page Printer with IPDS feature (twinax)
- *IMGA01**
IBM 3930-03 Page Printer
- *IMGD01**
IBM 3930-03 Page Printer with PostScript
- *IMGC02**
IBM 3935 AF Printer
- *IMGA09**
IBM 4019 LaserPrinters (HP mode)
- *IMGB01**
IBM 4019 LaserPrinters with PostScript
- *IMGC06**
IBM 4028 LaserPrinters
- *IMGA01**
IBM 4029 LaserPrinters
- *IMGB02**
IBM 4029 LaserPrinters with PostScript
- *IMGA01**
IBM 4039 LaserPrinters
- *IMGD07**
IBM 4039 LaserPrinters with PostScript
- *IMGA02**
IBM 4049 LaserPrinters
- *IMGD02**
IBM 4049 LaserPrinters with PostScript
- *IMGB09**
IBM 4079 Color Jetprinter PS
- *IMGB05**
IBM 4303 Network Color Printer
- *IMGC06**
IBM 4312, 4317, 4324 NP with IPDS feature (twinax)
- *IMGC06**
IBM 4312, 4317, 4324 NP with IPDS feature (LAN)
- *IMGA02**
IBM 4312, 4317, 4324 NP (ASCII/LAN)
- *IMGD02**
IBM 4312, 4317, 4324 NP with PostScript (ASCII/LAN)

- ***IMGC03**
IBM Infoprint 60
- ***IMGC05**
IBM Infoprint 62 Model 2
- ***IMGC06**
IBM Infoprint 62 Model 3
- ***IMGB05**
IBM InfoColor[®] 70
- ***IMGC05**
IBM Infoprint 4000
- ***IMGC06**
IBM Infoprint 4000 High Resolution
- ***IMGB02**
Lexmark 4039Plus
- ***IMGD11**
Lexmark Optra C Color Printer
- ***IMGA02**
Lexmark Optra E, E+
- ***IMGD02**
Lexmark Optra N
- ***IMGD02**
Lexmark Optra R+, Rx+, Lx+, Lxn+
- ***IMGD02**
Lexmark Optra S Printers
- ***IMGD05**
Lexmark Optra SC Color Printer
- ***IMGA01**
Okidata OL400 LED Page Printer
- ***IMGA02**
Okidata OL800, OL810 LED Page Printers
- ***IMGB12**
QMS 2025, 3225
- ***IMGD04**
QMS Magicolor CX
- ***IMGB09**
Tektronix Phaser 140
- ***IMGB04**
Tektronix Phaser 300
- ***IMGB05**
Tektronix Phaser 400[®]
- ***IMGB05**
Tektronix Phaser 540, 550
- ***IMGB06**
Tektronix Phaser 560

- ***IMGA01**
Xerox 4219/MRP
- ***IMGA02**
Xerox 4220/MRP
- ***IMGA02**
Xerox 4230 DocuPrinter
- ***IMGA02**
Xerox 4512, 4517 Network Printer
- ***IMGB13**
Xerox 4520mp Printer
- ***IMGD04**
Xerox 4700 II Color Document Printer
- ***IMGB08**
Xerox 4915 Color Laser Printer
- ***IMGB05**
Xerox 4920, 4925 Color Laser Printer

Converting postscript data streams

Converting PostScript data streams is performed differently from converting image data streams. PostScript conversion may require font files in order to rasterize the data. You can also find more debugging and message information if the PostScript file does not convert correctly.

Fonts

In order to convert PostScript files effectively, PostScript fonts are required to convert text and symbols into bit-mapped images. Below are lists of fonts supplied by IBM for use with the image print transform function. Each set of fonts is located in the IFS in the specified directory. For each font name, there is a corresponding font file containing rasterization information. This mapping information is stored in the *psfonts.map* file.

Note: DO NOT alter the IBM supplied font files or the psfonts.map file shipped with OS/400. Changing a font file or font mapping can cause unpredictable results.

Table 11 shows the Latin Fonts that are stored in the following directory:

/QIBM/ProdData/OS400/Fonts/PSFonts/Latin

Table 11. Latin Fonts.

<i>Font</i>	<i>Associated file</i>
TimesNewRoman	TNR.PFB
TimesNewRoman-Bold	TNRB.PFB
TimesNewRoman-BoldItalic	TNRBI.PFB
TimesNewRoman-Italic	TNRI.PFB
Helvetica	HEL.PFB
Helvetica-Bold	HELB.PFB
Helvetica-BoldItalic	HELBI.PFB
Helvetica-Italic	HELI.PFB
Courier	COU.PFB
Courier-Bold	COUB.PFB

Table 11. Latin Fonts. (continued)

Courier-BoldItalic	COUBI.PFB
Courier-Italic	COUI.PFB

Table 12 shows the symbol fonts that are stored in the following directory:

/QIBM/ProdData/OS400/Fonts/PSFonts/Symbols

Table 12. Symbol Fonts.

Font	Associated file
CourierSymbols	COU_S.PFB
CourierSymbols-Bold	COU_SB.PFB
HelveticaSymbols	HEL_S.PFB
HelveticaSymbols-Bold	HEL_SB.PFB
TimesNewRomanSymbols	TNR_S.PFB
TimesNewRomanSymbols-Bold	TNR_SB.PFB

User supplied fonts

To enhance the capabilities of the image print transform function when converting PostScript data streams, you can add your own font files to be used in conjunction with the IBM supplied fonts shipped with OS/400. These fonts are called user supplied fonts. The user supplied font mapping file, *psfonts.map*, is stored in the directory as /QIBM/UserData/OS400/Fonts.

It behaves the same way as the *psfonts.map* file that is shipped with OS/400. An important difference is that the image print transform function will search for fonts by looking first at the user supplied font mapping file, and then at the OS/400 font mapping file.

To add a user supplied font, do the following:

1. Use an ASCII text editor to open the *psfonts.map* file located in /QIBM/UserData/OS400/Fonts. If this file does not exist, you need to create it.
2. Add a new line to the file to include the new font name AND associated path and file name. For example:

```
font MyNewFont /QIBM/UserData/OS400/Fonts/PSFonts/MNF.PFB
```

where MyNewFont is the name of the font, and MNF.PFB is the associated font file.

3. Save the new *psfonts.map* file.
4. Copy the font file into the directory specified in the line added to the *psfonts.map* file.

To delete a user supplied font, simply remove the line mapping the font name to its associated file in the *psfonts.map* file, and remove the font file from OS/400.

Font substitutions

When a font requested within a PostScript data stream is not available on OS/400, a font substitution can be defined if there is a similar font available. A font substitution is the mapping of a font name to a font that is available and very similar (in terms of its rasterization properties) to the font file being replaced. You can also specify a font substitution if an existing font mapping is producing undesirable output.

Table 13 shows the font substitution mappings that are defined for Latin Fonts.

Table 13. Latin Fonts.

<i>Font</i>	<i>Associated file</i>
Times-Roman	TNR.PFB
Times-Bold	TNRB.PFB
Times-BoldItalic	TNRBL.PFB
Times-Italic	TNRI.PFB
Helvetica-BoldOblique	HELBI.PFB
Helvetica-Oblique	HELL.PFB
Courier-BoldOblique	COUBI.PFB
Courier-Oblique	COUI.PFB

The following font symbol substitution is also defined.

Table 14. Latin Fonts.

<i>Font</i>	<i>Associated file</i>
Symbol	TNR_S.PFB

To define a font substitution, do the following:

1. Use an ASCII text editor to open the *psfonts.map* file that is located in
QIBM/UserData/OS400/Fonts

If this file does not exist, you need to create it.

2. Add a new line to the file to include the font name AND the path and file name of the font file you want to use as a substitute. For example:

```
font Courier /QIBM/UserData/OS400/Fonts/PSFonts/HEL.PFB
```

3. Save the new *psfonts.map* file.

PostScript data streams

PostScript data streams are converted by using a separate job named QIMGSERV. The QIMGSERV job runs in the QSYSWRK subsystem, and uses the QIMGJOB job description with a priority of 5. The QIMGSERV job is started by either the writer job or the job which calls the convert image API. The QIMGSERV job and the job that starts the QIMGSERV job communicate with each other so that control is automatic.

How page size is determined

Page size is determined by the output data stream format and the printer device type. Depending on these values, the page size may be derived from various places. If the page size is not specified with the convert image API, you can use the following guidelines to determine from where the page size is derived:

- If the output data stream format is not AFPDS and the printer device is not an IPDS printer configured as AFP(*YES), the paper size from Paper Source 1 of the device description is used.
- If the output data stream format is not AFPDS and the printer device is an IPDS printer configured as AFP(*YES), a default value of letter is used.
- If the output data stream format is AFPDS, the page size is calculated from the values in the specified printer file.

Troubleshooting

The following are answers to questions that may arise when you use the image print transform function or convert image API:

- Why does it take longer to process PostScript data streams?

One reason why PostScript data streams take a long time to process is the amount of information that needs to be transformed. Color documents especially require large amounts of memory and many data conversions, which means longer processing times.

Note: If the photometricity of the converted data stream is not requested, it is assumed by default to be RGB, or color. However, if you know you do not want RGB, or the input data stream is not color, specify an image configuration object that only supports black and white output. This will greatly increase the throughput of the image print transform function, and speed up PostScript processing.

- Why is the converted data stream positioned incorrectly on or off the page? Why is it not centered?

The resolution specified in the image configuration object is probably not supported by the printer the object is configured with. When this happens, an incorrect no print border is retrieved from the image configuration object and the data is consequently positioned incorrectly on the output page. The printer may also be set up to automatically add a no print border, which will cause the output generated by the image print transform function to be shifted on the page. Verify that the correct image configuration object is being used with the printer, and that the printer has been set up properly and has been physically calibrated.

- Why didn't the PostScript data stream generate a new data stream?

Chances are that the PostScript data stream did not contain any printable data. To verify this, start the image print transform function and check the job log of the writer. Look for a message that indicates that there was no printable data found. If no message exists, an error may have occurred processing the file. Refer to the job log of the corresponding QIMGSERV job.

- Why is the printed image three times the original size when converted from color or gray scale to black and white?

When a color image or gray scale image is converted to black and white, a dithering process takes place. In this process, a single color or gray scale pixel is transformed into a 3x3 matrix of pixels. Each pixel within this matrix will be either black or white, depending on the color being rendered.

Chapter 15. Other printing functions provided by the OS/400 program

The OS/400 program contains the Advanced Function Presentation (AFP) support, discussed in Part 3, “Advanced Function Presentation (AFP)” of this guide. It also contains these printing functions:

- PrintManager/400
- Data Description Specifications (DDS)
- Advanced Printer Function (APF)
- Graphical Data Display Manager (GDDM)
- QWP4019 Program

PrintManager/400

PrintManager is the collective name of a group of IBM licensed programs or operating system functions designed to provide common access to printing, including Advanced Function Presentation (AFP), across the supported environments. PrintManager/400 provides the PrintManager functions within the OS/400 operating system and IBM SAA[®] PrintManager provides those functions in the VM and MVS operating systems.

PrintManager/400 consists of the following:

- The OS/400 implementation of the PrintManager Interface, an element of the IBM Systems Application Architecture[®] (SAA) common programming interface (CPI). This implementation allows you to write portable applications for sending spooled files to an output queue for printing.
Among other benefits, the PrintManager Interface allows you to specify and validate print-option values from within an application in a form that is consistent across the supported environments. Applications that use the PrintManager Interface, therefore, are portable because they can be developed for one environment and used with little or no modification in another environment.
- An application programming interface (API) that allows you to create print descriptors that can contain common information about printer routing, printer capabilities, and printer and job defaults.
Applications that use the PrintManager Interface can use print descriptors created by the API. To create and maintain print descriptors, you write C language applications using the API verbs.

PrintManager/400 provides C programming language support for the API, and C, COBOL, and RPG programming language support for the PrintManager Interface.

PrintManager defines a set of print options that are consistent across the supported environments, and it allows you to specify these print options within the application. PrintManager also provides the ability to:

- Select AFP resources from a system library on the printing system
- Package AFP resources with the print job (inline) when you send the job from one system to another.

These print options, combined with the ability to create common, portable applications and printing definitions (with print descriptors), make possible easy and consistent access to printing across your organization. With PrintManager/400 you can use the PrintManager Interface and API to create batch applications or installation-specific end-user interfaces for printing.

For more information about the PrintManager Interface, refer to *Systems Application Architecture Common Programming Interface PrintManager Reference*, S544-3698. For more information about the API, refer to *PrintManager Application Programming Interface Reference* S544-3699.

Data Description Specifications (DDS)

The DDS Reference topic in the iSeries Information Center contains detailed instructions for coding the data description specifications (DDS) for printer files that are described externally.

This allows the programmers to add more flexibility in defining how their printed output will look.

Advanced Printer Function

The advanced printer function is intended for system and application programmers to use in designing changed-to-tailor forms.

The advanced printer function utility (APF) allows you to create and maintain changed-to-tailor forms by using special print capabilities available on the 5224 Models 1 and 2 and 5225 Models 1, 2, 3, and 4 dot matrix printers. APF can create the background information needed to make it appear as though you are using a preprinted form or a printer with a variety of special fonts.

Functions of APF

APF provides support to allow you to:

- Design the layout of a form
- Specify fields on a form that will contain special features
- Design special features for a form
- Produce blank copies of a form
- Merge spooled data with a predefined form

The special features you can design with APF include:

- Logos, special symbols, or large characters
- Bar codes ⁴
- Bar charts
- Constant fields, such as column headings
- Vertical and horizontal lines, that can be used to form boxes
- Highlighted fields
- Underlined fields

Graphical Data Display Manager (GDDM)

GDDM lets you add color and pictures to application programs by having your application programs pull in user-created GDDM routines.

GDDM routines perform basic graphics tasks, such as drawing a line from point A to point B. Also, GDDM routines are called in an application program to start and stop the graphics environment, set color and width of a line, send the picture to the work station, and so forth.

GDDM works with the following high-level languages (HLL):

- BASIC
- COBOL/400[®]
- RPG/400[®]

4. The bar codes that this utility prints are representations of Code 3 of 9, EAN (8 digit and 13 digit), changed PLESSEY (MSI), and UPC (versions A and E) bar codes. Test all bar codes you print on the 5224 Printer or 5225 Printer to make sure the wanding or scanning devices you use can read the codes created. Nonglossy paper is recommended.

- PL/I

Required iSeries Server Hardware

You can write and run GDDM application programs using any model of the iSeries and AS/400 server that has the Operating System/400 program installed.

Although you can write and compile the programs on any work station that has been described to the system, only the following devices can be used to display graphics:

- IBM Personal Computer with work station function
- IBM Personal Computer with work station emulation
- 5292 Model 2
- IBM Personal Computer with 5250 emulation

In this manual the term “graphics work station” means one of these devices.

On the IBM Personal Computer and IBM Personal System/2, the graphics configuration of the device is determined by the hardware capability and the virtual device interface (VDI) driver that is loaded in the CONFIG.SYS file on the personal computer or Personal System/2. The following table describes the capabilities of each VDI driver:

VDI Driver	Resolution	Colors	Gray Levels
VDIDY004	320 x 200	4	
VDIDY006	640 x 200		2
VDIDY00D	320 x 200	8	4
VDIDY00E	640 x 200	8	4
VDIDY00F	640 x 350		4
VDIDY010	640 x 350	4/8	2/4
VDIDYPGD	640 x 480	8	8
VDIDYA11	640 x 480		2
VDIDYA12	320 x 200	8	8
VDIDY011	640 x 480		2
VDIDY012	640 x 480	8	8
VDIDY013	320 x 200	8	8
VDIDYAF1	1024 x 768	8	8
VDIDYAF2	1024 x 768	8	8

These plotters can be attached to graphics work stations:

- IBM 6180 Plotter
- IBM 7371 Plotter
- IBM 7372 Plotter

Graphics can be printed on these SNA character string (SCS) devices:

- IBM 4214 Printer
- IBM 4234-2 Printer
- IBM 5224 Printer
- IBM 5225 Printer

or these Intelligent Printer Data Stream (IPDS) devices:

- IBM 3112 Printer with IPDS feature
- IBM 3116 Printer with IPDS feature
- IBM 3812 Printer
- IBM 3816 Printer

- IBM 3912 Printer with IPDS feature
- IBM 3916 Printer with IPDS feature
- IBM 4028 Printer
- IBM 4224 Printer
- IBM 4230 Printer
- IBM 4234-8, or 4234-12 Printer
- IBM 4312 Printer with IPDS feature
- IBM 4317 Printer with IPDS feature
- IBM 4324 Printer with IPDS feature
- IBM 6400 Printer with IPDS feature
- IBM 6408 Printer with IPDS feature
- IBM 6412 Printer with IPDS feature

It is also possible to send a graphics data format (GDF) file (the internal data GDDM interprets to draw the picture) to other systems. The device receiving the graphics data must have the software necessary to interpret the data.

Required OS/400 Software

Besides having the OS/400 program installed, you must have a compiler for one of the following high-level languages:

BASIC

IBM AS/400 BASIC Version 2, Program 5738-BA1

RPG/400

IBM SAA AD/Cycle* RPG/400 Version 2, Program 5738-RG1

COBOL/400

IBM SAA AD/Cycle® COBOL/400 Version 2, Program 5738-CB1

PL/I IBM AS/400 PL/I Version 2, Program 5738-PL1 (with library QGDDM in your library list)

Required Knowledge

To write graphics application programs for the iSeries server, you must know OS/400 application programming in one of the four high-level languages.

QWP4019 Program

QWP4019 is an IBM-supplied program that you can call to set flags on and off in a printer device description. Setting the flags on enables functions not accessible through the Create Device Description (Printer) (CRTDEVPRT) or Change Device Description (Printer) (CHGDEVPRT) commands.

The QWP4019 program allows you to take advantage of functions available on an attached printer but not supported by the emulator you are using.

Note: The QWP4019 program was designed to make the 4019 fonts available for the IBM LaserPrinter 4019 printer using emulation. Additional parameters can be specified to enable functions in the SCS printers. Most of these parameters are only valid for printers considered as a 5219 or 3812.

QWP4019 Parameter Names and Functions

The following list contains the QWP4019 parameter names and explains the function provided when they are called.

Parameter

Function Provided

- *ON** This parameter sets a flag in the printer device description that:
- Indicates to OS/400 that the 4019 fonts are to be used instead of the 5219 or 3812 fonts. See Table 22 on page 201 to view the font mapping and substitution for the 4019 printer.
 - Enables manual paper feed selection if the value in the form feed (FORMFEED) parameter is *CUT.
 - Prevents the value of *COR in the page rotation (PAGRRT) parameter from being sent to a 3477 InfoWindow display that has an attached printer configured as a 5219. This is important because the 3477 does not support computer output reduction (COR). Without this flag, the PAGRRT(*COR) value in the printer file cannot be used for these printers.
- *OFF** This parameter sets the *ON flag off. Also, if the *SIC or *COR flags were set on, using the *OFF parameter sets them off.
- *CHECK**
This parameter asks how the printer appears to the iSeries server (as a 3812, 5219, or 4019).
If the value 4019 is returned, it indicates that the QWP4019 program has been called with the *ON parameter.
- *CNT** This parameter sets a flag in the printer device description that tells the iSeries server that the printer has a continuous form feed device. The flag is used by the system to determine whether forms alignment is possible for printers that are configured as a 3812 printer. The 3812 printer does not support continuous forms.

This flag can only be set for printers that are configured as a 3812 printer.
- *CNTOFF**
This parameter sets the *CNT flag off.
- *IMP** This parameter sets a flag in the printer device description that allows a print quality selection other than draft when:
- The value in the page rotation (PAGRRT) parameter of the printer file is *AUTO.
 - The printer is attached to an emulator (for example, a 3477 InfoWindow display) that supports page rotation.
- For automatic page rotation to be done by an actual 3812 SCS printer, the print quality control sent to the printer must specify draft quality. Therefore, without the *IMP flag on, the iSeries server sends controls to the printer for draft selection. Because the 3812 SCS printer supports only one level of print quality, printed output is not affected by print quality selection.
- With the *IMP flag set on, the iSeries server sends the value in the print quality (PRTQLTY) parameter of the printer file directly to the emulator. This is done instead of changing the print quality to draft when the value of the page rotation (PAGRRT) parameter is *AUTO.
- *IMPOFF**
This parameter sets the *IMP flag off.
- *SIC** This parameter sets a flag in the printer device description that sends an ASCII Set Initial Conditions command to the printer. This command turns off the font intervention messages for a 4019 or 4029 printer.

The 4019 or 4029 printer must be attached to a 3477 InfoWindow display and be configured as a 5219 printer.

The *ON flag must be set in the 4019 or 4029 device description.
- Note:** Do not attempt to turn this flag on for any device other than a 4019 or 4029 attached to a 3477 InfoWindow display.

***SICOFF**

This parameter sets the *SIC flag off.

***COR** This parameter sets a flag in the printer device description that enables computer output reduction (value of *COR in the page rotation (PAGRIT) parameter of the printer file.)

*COR is only needed if the *ON flag is set.

The printers must be attached to a 348x InfoWindow, configured as a 5219, and have the *ON flag set in the printer device description.

To the iSeries server, printers configured as 5219 appear the same whether they are attached to a 3477 or to a 348x InfoWindow display.

The *ON flag prevents computer output reduction from being done on printers attached to the 348x or 3477. This is because the 3477 does not support computer output reduction. Therefore, if the *ON flag is set, the *COR flag must be set on to enable computer output reduction for printers configured as 5219 and attached to a 348x InfoWindow display.

***COROFF**

This parameter sets the *COR flag off.

***RST** This parameter sets a flag in the printer device description that causes the writer to reset the printer at the beginning of each spooled file. In most environments, this may cause a noticeable decrease in performance because of the SNA overhead involved in doing the reset. This flag can be set for any SCS printer.

***RSTOFF**

This parameter sets the *RST flag off.

***ON5256**

This parameter causes the operating system to configure the printer as a 5256 printer

***ON5262**

This parameter causes the operating system to configure the printer as a 5262 printer

***OFF52**

This parameter turns off the *ON5256 and *ON5262 flags in the device description.

***ON4214**

This parameter causes the operating system to configure the printer as a 4214 printer.

***OF4214**

This parameter turns off the *ON4214 flag in the device description.

How Does the QWP4019 Program Work?

The QWP4019 program sets flags in the printer device description through calls to the program with certain parameters specified. For example,

```
CALL QWP4019 (PRT01 *CNT)
```

sets *CNT on and tells the iSeries server that PRT01 has a continuous form feed device.

Flags are set off by calling QWP4019 with certain parameters specified. For example,

```
CALL QWP4019 (PRT01 *OFF)
```

sets the 4019 flag off in the device description for PRT01.

Since the flags are stored in the device description, QWP4019 only needs to be run once for each printer and each function. The flags can be changed only by running QWP4019 or deleting the device description. To make sure the flag is set, it is recommended that the printer writer for that printer be restarted after the QWP4019 program has been called.

QWP4019 Program Examples

Following are examples that show how to use the QWP4019 program.

Example 1

Setting the 4019 flag on and then off in the device description for PRT01.

QWP4019 CALL	Result
CALL QWP4019 (PRT01 *ON)	Sets the 4019 flag on in the device description for PRT01.
CALL QWP4019 (PRT01 *CHECK)	The system returns 4019 because the 4019 flag is set on.
CALL QWP4019 (PRT01 *OFF)	Sets the 4019 flag off in the device description for PRT01. Note: This CALL also sets flags *SIC and *COR off.
CALL QWP4019 (PRT01 *CHECK)	The system returns 5219 or 3812 because the 4019 flag is off.

Example 2

Enabling COR and the 4019 fonts for a 4019 printer attached to a 348x InfoWindow display.

QWP4019 CALL	Result
CALL QWP4019 (PRT01 *ON)	Sets the 4019 flag on in the device description for PRT01. This supplies the 4019 fonts but disables computer output reduction.
CALL QWP4019 (PRT01 *COR)	Sets the *COR flag on in the device description. This enables computer output reduction for PRT01.

Example 3

Enabling near letter quality (NLQ) print quality for a IBM Personal Printer Series II 2390 printer attached to a 3477 InfoWindow display.

QWP4019 CALL	Result
CALL QWP4019 (PRT01 *IMP)	Turns the *IMP flag on in the device description for PRT01.
CALL QWP4019 (PRT01 *CHECK)	The system returns 5219 or 3812 because the 4019 flag is off. There is no check for *IMP, *SIC, or *COR flags.

The following table provides a summary of the QWP4019 parameters, the call used to set flags on, and the call used to set flags off.

Table 15. QWP4019 Parameter Names and Calls

Parameter Name	Call to Set Flag On	Call to Set Flag Off
*ON	CALL QWP4019 (PRT01 *ON)	CALL QWP4019 (PRT01 *OFF) ¹
*IMP	CALL QWP4019 (PRT01 *IMP)	CALL QWP4019 (PRT01 *IMPOFF)
*SIC	CALL QWP4019 (PRT01 *SIC)	CALL QWP4019 (PRT01 *SICOFF)
*COR	CALL QWP4019 (PRT01 *COR)	CALL QWP4019 (PRT01 *COROFF)
*CNT	CALL QWP4019 (PRT01 *CNT)	CALL QWP4019 (PRT01 *CNTOFF)
*RST	CALL QWP4019 (PRT01 *RST)	CALL QWP4019 (PRT01 *RSTOFF)
*ON5256	CALL QWP4019 (PRT01 *ON5256)	CALL QWP4019 (PRT01 *OFF52)
*ON5262	CALL QWP4019 (PRT01 *ON5262)	CALL QWP4019 (PRT01 *OFF52)
*ON4214	CALL QWP4019 (PRT01 *ON4214)	CALL QWP4019 (PRT01 *OF4214)

Table 15. QWP4019 Parameter Names and Calls (continued)

Parameter Name	Call to Set Flag On	Call to Set Flag Off
Note:		
¹	Using the CALL QWP4019 (PRT01 *OFF) command sets the *SIC, *COR, and *ON flags off.	

Chapter 16. Other printing functions provided by licensed programs and iSeries server hardware

Printing functions are provided by the following IBM licensed programs:

- Advanced Function Printing Utilities/400
- Business Graphics Utility (BGU)
- iSeries Access for Windows
- TCP/IP Connectivity Utilities/400

A **licensed program** is a separately orderable program, supplied by IBM, that performs functions related to processing user data.

Printing functions are provided by these IBM products:

- IBM InfoWindow* 3477
- ASCII Work Station Controller

Advanced Function Printing Utilities/400

What is AFP Utilities/400?

The IBM Advanced Function Printing Utilities/400 is a licensed program (Program 5722-AF1). It provides utilities that work together to reduce the cost of printing text and images on paper when using Advanced Function Presentation (AFP) on the iSeries server.

The AFP Utilities make the most efficient use of an IPDS-capable printer, provide a display screen editor that allows you to see the actual position-by-position design of the overlay, and are supported on all displays that attach to the iSeries server. The following make up the AFP Utilities:

- Overlay utility
- Print format utility
- Resource management utility

The information in this guide identifies and describes the major elements of the AFP Utilities.

Overlay utility

The overlay utility allows you to design electronic form overlays.

You can use overlays to reduce or eliminate the use of preprinted paper forms.

The overlay can be composed of text, image (page segments), lines, boxes, and bar codes. All of the environmental data (font references, location on the page, and so on) is defined as a part of the overlay definition.

The following diagram is an example of an overlay you can create using the AFP Utilities.

Electronically Stored Form Overlay

POWER 					
NAME-SERVICE ADDRESS					SERVICE PERIOD
					FROM
					TO
ACCOUNT NO.					
RATE	METER READINGS		MULT.	K.W.H. USED	AMOUNT
	PRESENT	PREVIOUS			
CITY		STATE	FRANCHISE	TOTAL TAX	
PAY THIS AMOUNT					

Variable Page Data

JOHN JONES
1225 STONE STREET
ANY TOWN, STATE
65432

1030-7617-2

10 0134 1944 10 1:100 \$1.86

2.27 .12 2.49
\$4.35

10/02/90
11/01/90

→ Merge ←

Finished Product

POWER 					
NAME-SERVICE ADDRESS					SERVICE PERIOD
JOHN JONES 1225 STONE STREET ANY TOWN, STATE 65432					FROM
					TO
ACCOUNT NO. 1030-7617-2					
RATE	METER READINGS		MULT.	K.W.H. USED	AMOUNT
	PRESENT	PREVIOUS			
10	0134	1944	10	1:100	\$1.86
CITY		STATE	FRANCHISE	TOTAL TAX	
		2.27	.12	2.49	
PAY THIS AMOUNT					\$4.35

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Element descriptions

The overlay created by the AFP utilities is composed of any combination of the following elements:

- Text

Text can be placed at a specified position on the overlay. The text attribute may also be specified to describe the text characteristics such as font selection, format and highlighting of underline, overstrike, color, degree of rotation, and character enlargement.

Note: If underlining or overstriking are used in an overlay generated by AFP Utilities/400, that overlay will not print on a System/390 system. The Print Services Facility (PSF) support on the System/390 does not recognize the commands in the overlay which generate the underline and overstrike functions.

- Line

The line is any straight line vertically or horizontally connecting two points. You may select the type of line (such as dotted, dashed, or solid) and the width of the line.

- Box

The box can be placed on the overlay by specifying two diagonally opposite corners. You can select the shade pattern inside the box, the type of box line (dotted, dashed, or solid), and the width of the line. Also, you may define the text inside the box. The text may be justified inside the box.

- Bar Code

A bar code can be placed at a specified position on the overlay. You can specify the following bar code data: position to be placed on overlay, type of bar code, size, color, and whether or not to print Human Readable Interpretation (HRI).

- Page Segment

You can include a page segment that is in the AFP resource library. You can refer to this page segment by its name and specify print position to define it as an overlay element. You can include the same page segment repeatedly in an overlay. A page segment contains an image, such as a logo, a picture, or a map.

- Graphics

A graphic can be placed at a specified position on the overlay.

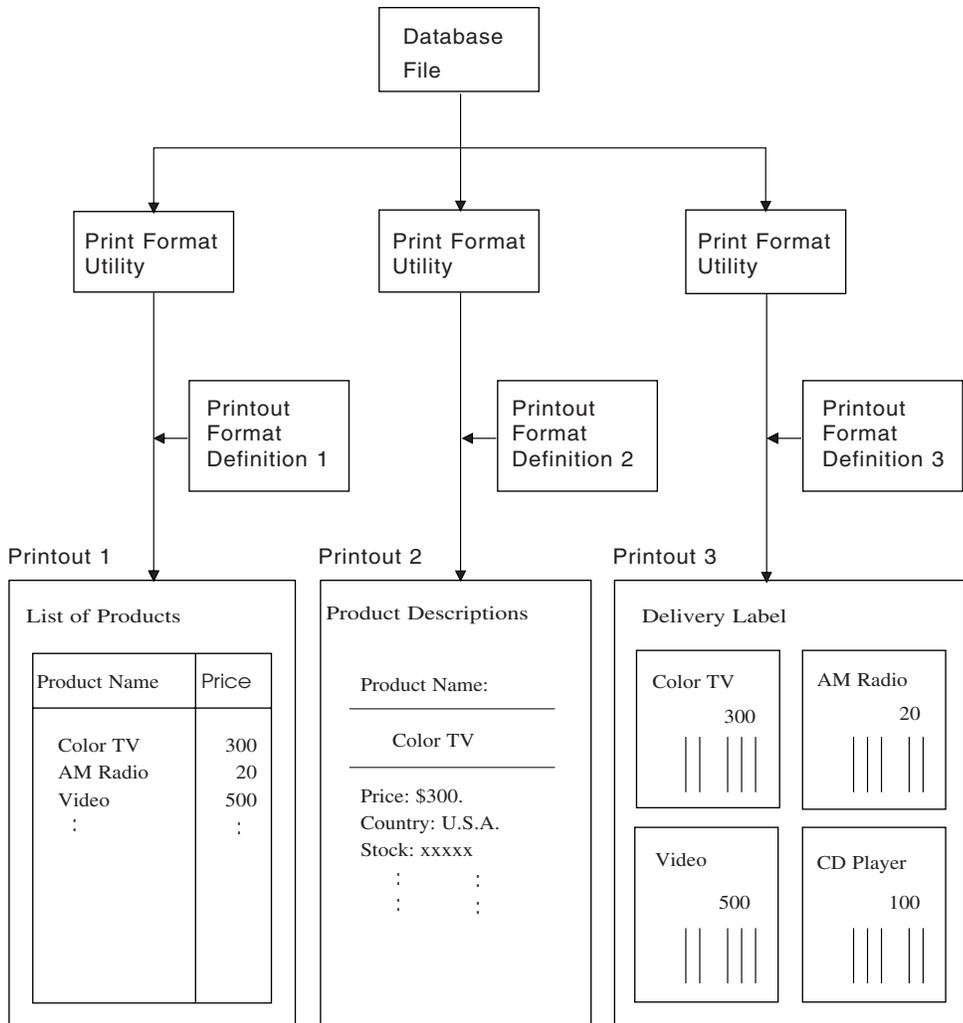
Print format utility

The print format utility allows you to print data from database file members, which are created by application programs or utilities, in various forms such as text or bar codes, and in various formats on IPDS printers.

With the AFP Utilities, the forms and formats for printing are designed by defining a **printout format definition** instead of writing your own application programs.

In addition to the data from database file members, you can print fixed data, such as a logo or a title.

The following diagram is an example of what you can print using the print format utility.



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Creating the printout format definition

The following list identifies the things you can specify when you create a printout format definition using the Print Format Utility.

- Printout format definition specifications
- Printout format definition fonts
- Name of database file, library, and record format
- Record layout elements (text, images, lines, boxes, or bar codes)
- Page layout elements (record layout, text, images, lines, boxes, or bar codes)
- Record selection
- Printout specifications

Resource management utility

The resource management utility allows you to manage AFP resources such as overlay objects or page segment objects.

The resource management utility has the following functions:

- Creating page segments

- Working with overlays
- Working with page segments

Creating page segments

This function allows you to convert or transform a page segment from an OS/400 database file member or a PC document that contains image data stream data. If the page segment is from a PC document, it can be stored in an OS/400 folder using the iSeries Access for Windows shared folders function.

Working with overlays

This function allows you to:

- Copy an overlay object in a library.
- Delete an overlay object in a library.
- Print an overlay in a library on an IPDS printer. You can also specify that your overlay be printed over the top of a grid. The appearance of the grid under the overlay provides you with an excellent tool for detailed design of an overlay.
- Display the description of an overlay object.
- Put an overlay into a file.
- Change the description of an overlay object.

Working with page segments

This function allows you to:

- Copy a page segment object in a library
- Delete a page segment object in a library
- Print a page segment object in a library on an IPDS printer
- Display the description of a page segment
- Put a page segment into a file.
- Change the description of a page segment

Advanced DBCS printer support/400

The IBM Advanced DBCS Printer Support/400 program (5722-AP1) is designed for users who have DBCS printers. This program provides DBCS support with five utilities:

- Advanced printer writer (APW)
- Advanced page printer writer (APPW)
- Kanji printer function (KPF)
- Print form description and symbol migration aid
- Printer function control (PFC)

The advanced printer writer utility supports printers that are capable of printing Japanese, Korean, Traditional Chinese, and Simplified Chinese including the following:

- Work station printers 4028, 4216, 5317, 5553, 5557, 5563, 5575, 5577, and 5587
- Floor-standing printers 5227 (Models 1, 2, 3, and 5) and 5327 (Models 1, 2, and 3)

The advanced page printer writer utility supports the Japanese 5337 page printer. The Kanji printer function utility supports the Japanese 5583 page printer.

The print form description/symbol migration aid utility converts the form descriptions and symbol files of the System/36™ advanced printer writer and Kanji printer function to equivalent form descriptions and symbol files for the iSeries server.

The printer function control utility gives users the capability of printing user data with user-defined single-byte character set (SBCS) fonts.

The following manuals contain more detailed information about Advanced DBCS Printer Support/400:

- *ILE C/C++ for AS/400 MI Library Reference.*
- *Advanced Print Writer.*
- *IBM 5583 Kanji Print Function User's Guide, N:SH18-2179.*
- *System/36 APW/KPF Migration Utilities User's Guide, N:SH18-2234.*

Business graphics utility (BGU)

What is BGU?

The IBM Application System/400® Business Graphics Utility (BGU) is a licensed program (Program 5738-DS1) that allows you to create, change, store, display, print, and plot charts representing data. You can also store, retrieve, delete, change, rename, and copy charts using the *Manage existing chart formats* option. All OS/400 graphics hardware devices are supported.

The following lists the functions and features of BGU.

- Menu-driven interface to powerful business graphics functions.
- Extensive options for creating and changing chart formats.
Use BGU to create new charts or change existing charts. When you create a chart, you see a series of menus where you can specify the appearance of the chart, including its type, headings, axis definition, margins, legend position and attributes, line types, fill patterns, and colors. Once the chart format is defined, data can be supplied. Because data is handled separately, any suitable data can be displayed or printed with a chart format.
- Varied chart types, including:
 - Bar charts
 - Line graphs
 - Surface charts
 - Histograms
 - Pie charts
 - Venn diagrams
 - Text charts
- Support for missing values.
- Convenient storage, retrieval, copying, renaming, deleting, and changing functions.
- Ability to display charts from the control language (CL) application programs using the Display Chart (DSPCHT) command.
- Ability to save charts in the form of a graphics data file (GDF).
- Option to display, print, or plot a GDF with BGU.
- Charts saved in a GDF can be displayed, printed, or plotted using the Display Graphics Data File (DSPGDF) command.
- Access to IBM graphics hardware for iSeries servers:
 - Display terminals
 - IBM Personal System/2 (PS/2) Models 50, 60, and 80 with IBM work station emulation
 - IBM Personal Computer or PS/2 Models 25 and 30 with Enhanced 5250 Display Station Emulation
 - IBM Personal Computer or PS/2 (all models) with work station function
 - IBM 5292 Model 2 Color Display Station
 - Plotters
 - IBM 7372 six-pen Plotter

- IBM 7371 two-pen Plotter
- IBM 6180 Plotter configured as an IBM 7372 or 7371
- Printers
 - IBM 3112 Printer with IPDS feature
 - IBM 3116 Printer with IPDS feature
 - IBM 3812 IPDS Printer
 - IBM 3816 IPDS Printer
 - IBM 3912 Printer with IPDS feature
 - IBM 3916 Printer with IPDS feature
 - IBM 4028 Printer
 - IBM 4214 Printer
 - IBM 4224 IPDS Color Printer
 - IBM 4230 Printer
 - IBM 4234 Model 2 Printer
 - IBM 4234 Model 12 Printer
 - IBM 4312 Printer with IPDS feature
 - IBM 4317 Printer with IPDS feature
 - IBM 4324 Printer with IPDS feature
 - IBM 5152 Model 2 Printer
 - IBM 5224 Printer
 - IBM 6400 Printer with IPDS feature
 - IBM 6408 Printer with IPDS feature
 - IBM 6412 Printer with IPDS feature
 - IBM 5225 Printer

Data access capability

Data values can be typed or taken from a database file. Charts displayed from typed data allow for graphing and manipulation of data. Charts using database files for data input offer on-demand charts to display the most current user data.

Data retrieved from database files can also be changed from a keyboard, allowing the user to manipulate data from analysis, such as “what if” conditions.

iSeries Access for Windows

The iSeries server is well suited to support personal computers and personal computer printers (hereafter called personal printers). In your daily operations you may have need for data that is created and stored on your personal computers to be printed on system printers. Conversely, you may have requirements for data created and stored on your iSeries server to be printed on personal printers.

Network printer function

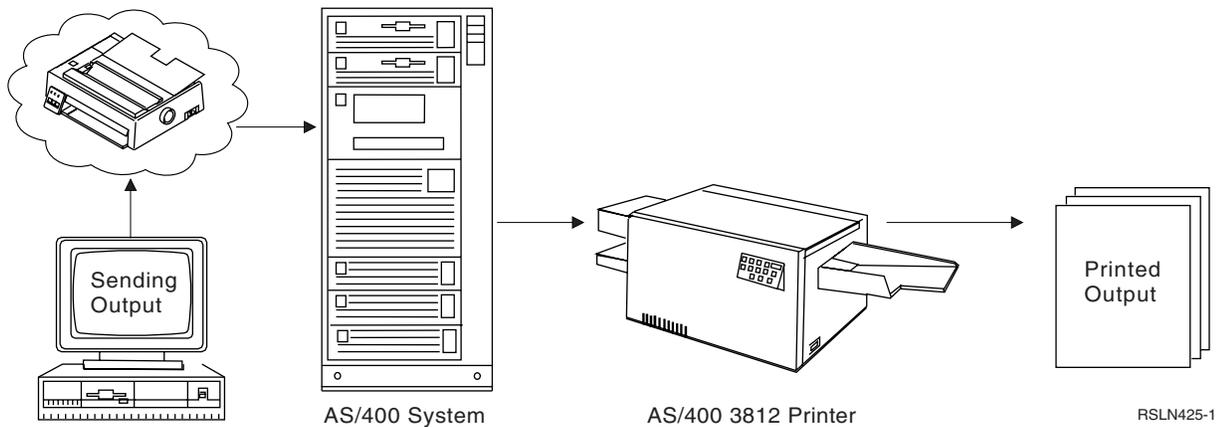
The network printer function is one of the functions available with the licensed program iSeries Access for Windows, which runs on both your iSeries server and your personal computer.

You use the network printer function to print data from your PC application programs on iSeries server printers. The **network printer function** allows you to use a printer attached to the host system as though the printer were directly attached to a personal computer.

The PC data could be as simple as a personal computer print screen, or as complicated as a word processing document.

There are several reasons why you might want to use the network printer function. For example, you can take advantage of the faster speed or better quality of the large iSeries server printers. Additionally, if your personal computer work station does not have a personal printer attached, you could print your PC data on iSeries server printers.

The diagram below provides an example of the network printer function concept.



For this example, you will need to set up your PC application programs as if they were sending output to an IBM Proprinter, Model 4201. The network printer function intercepts and routes the PC output to an OS/400 spooled file. Since iSeries server printers like the 3812 are not designed to print data from personal computers, the network printer function converts the PC data to SNA character string (SCS) data.

Personal computer operating systems

The network printer function can run on the DOS, OS/2, or Windows operating systems.

Windows and Advanced Function Presentation (AFP) using the network printer function

The iSeries Access for Windows network printer function provides an AFP printer driver for users of Microsoft Windows 3.0 or later and one for users of OS/2 2.0 or later. Using either of these printer drivers, OS/400 users can print their application output on AFP-configured IPDS printers.

The printer driver converts the standard print format generated by Windows or OS/2 applications to an all-points-addressable raster format, suitable for printing on AFP-configured IPDS printers.

The AFP-capable IPDS printers must be configured DEVTYPE(*IPDS) and AFP(YES). This is done in the printers device description. The format generated by the printer drivers will not drive the IPDS printers at rated speed. Examples of IPDS printers that support AFP are: 3812, 3816, 3820, 3825, 3827, 3828, 3829, 3835, and 4028.

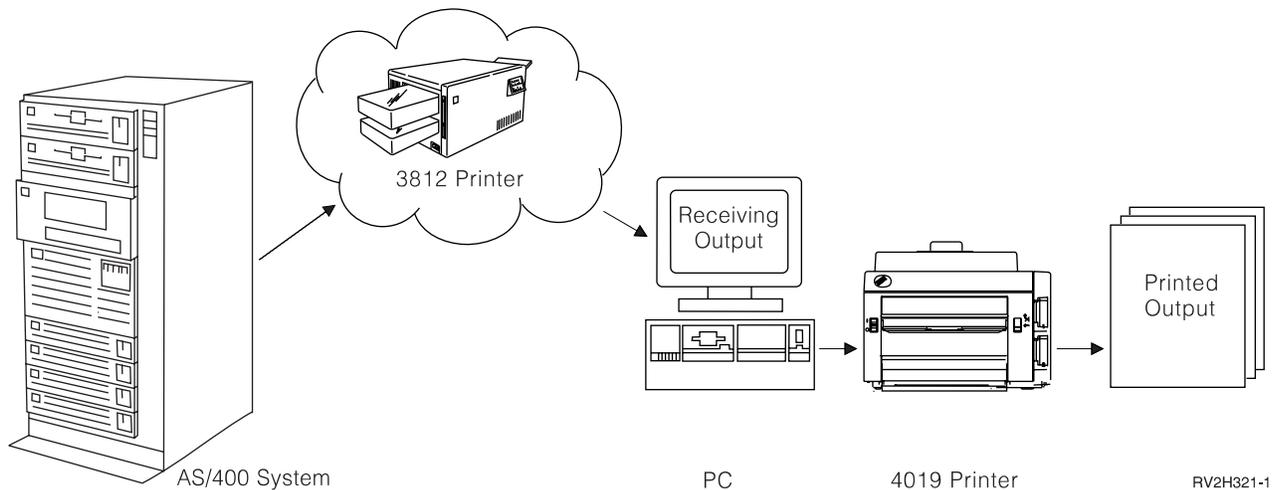
The printer drivers also have an option to convert the Windows or OS/2 print format into AFP page segment or overlay resource objects. These AFP resource objects can then be moved to the iSeries server using the iSeries Access for Windows transfer function, to be used by applications printing on AFP-configured IPDS printers.

Printer emulation

Printer emulation is the printing of data from a host (iSeries server, S/36) to personal printers connected to personal computers (PC). Host applications generate print jobs that can be printed on host attached

printers, or printers attached to PCs. Where they actually print is transparent to the host application. iSeries Access for Windows is a recommended Emulator; Personal Communications and Rumba are popular, also. There is a wide and growing list of PC printers with laser printers being quite popular. IBM4019, IBM4039, HPLJ_IV, and various DESKJET printers are examples.

Print emulation is the receiving of data in HOST format or languages and converting it to PRINTER format and languages. PC host printer languages include PCL, Postscript, and IBM PPDS. iSeries Access for Windows emulates the SCS language, converting that to any printer language. A wide range of formatting is available.



Personal computer operating systems

Printer emulation can run on the DOS, OS/2, or Windows operating systems.

To assist you in working with printer emulation using OS/2, the following products are available:

- Communications Manager/2
- RUMBA/400

Contact your IBM representative for more information on these products. If you already have these products, consult the documentation that accompanies them.

OS/400 host print transform function

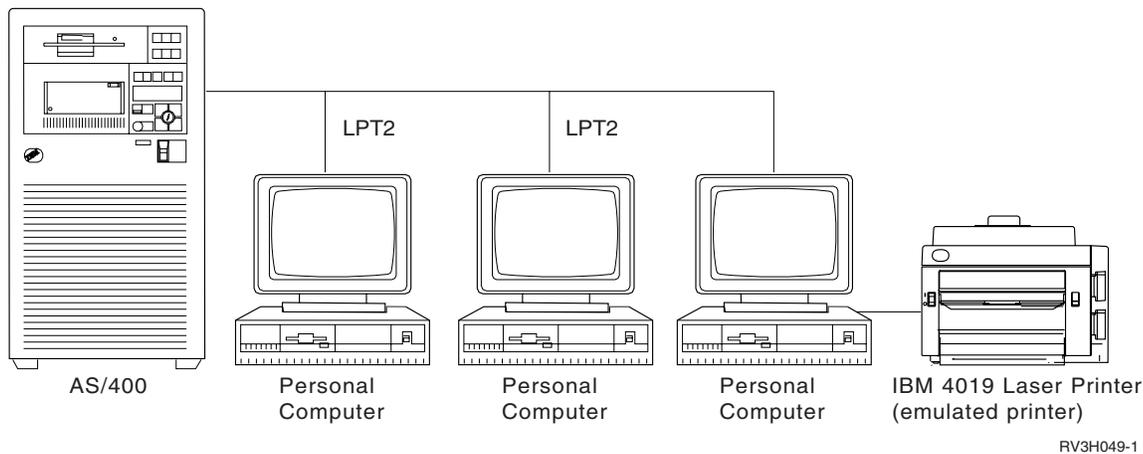
The host print transform function can also be used to print data on personal printers. When this function is enabled, SCS data or AFP is transformed to ASCII data and passed through emulators to the specified ASCII printer. If the data stream is ASCII, the data is sent directly to the printer, and not converted by one of the emulators. For more details on using the host print transform function, see Chapter 13, "Working with the host print transform function," on page 89.

Introducing sharing personal printers

You can share a personal printer among several personal computer work stations. Sharing personal printers is a special case of the network printer function used in conjunction with printer emulation.

The personal computers are attached to the iSeries server using either iSeries Access for Windows, OS/2 with Communications Manager/2, or RUMBA/400. Each personal computer work station that shares the personal printer uses the network printer function of iSeries Access for Windows.

The diagram below shows how you can share personal printers using the specific example of attaching the IBM 4019 LaserPrinter to your iSeries server as a iSeries Access for Windows work station performing printer emulation.



Your PC application programs are set up as if they are sending output to the IBM 4019 LaserPrinter that you are sharing. The network printer function is set up with the ASCII data type. The network printer function intercepts and routes the output to an OS/400 spooled file. Since the PC data is going to print on a personal printer, the IBM 4019 LaserPrinter, the network printer function does not convert the PC data.

IBM InfoWindow 3477, 3486, 3487, and 3488 printer support

The IBM InfoWindow* display station can be locally attached to the iSeries server or remotely attached to the IBM 5294 or 5394 Remote Control Unit via twinaxial cable. The InfoWindow has a printer port that can support attachment of most IBM personal printers. Examples of such personal printers are:

- IBM LaserPrinter, Model 4019
- IBM Quietwriter[®] III, Model 5202
- IBM Quickwriter, Model 5204
- IBM Proprinter II, Model 4201

The attached printer can be used either as a local screen printer or as a system printer to print OS/400 spooled jobs (for example, printing an OfficeVision document or a job generated on a personal computer using the network printer function).

There are several advantages to using personal printers that attach to the InfoWindow. The lower cost and smaller size of personal printers makes it convenient to put personal printers at your display stations that are attached to your iSeries server.

Note: If you specify local for the type style option for printer setup on a 3477, 3486, 3487, or 3488 InfoWindow display, font selection or substitution by the printer may give you unpredictable results.

For further information about attachment of personal printers to the 3477, see the following manuals:

- *IBM InfoWindow 3477 User's Guide*, GA18-2923
- *Connecting Personal Printers to IBM Systems*, S544-4209

ASCII work station controller

The ASCII Work Station Controller provides the ability to attach ASCII displays, ASCII printers, and personal computers to the iSeries server through the RS232 or RS422 interface. The work station controller supports attachment of a wide range of printers. Examples of such personal printers are:

- IBM Proprinter II, Model 4201
- IBM LaserPrinter, Model 4019
- IBM Quickwriter, Model 5204
- IBM 4234, Model 13

The work station controller also provides the ability to attach a personal computer running iSeries Access for Windows work station function. A personal printer attached to the personal computer can be used as an iSeries server printer

For further information about attachment of printers to the work station controller, see the following manuals:

- *ASCII Work Station Reference*
- *Connecting Personal Printers to IBM Systems , S544-4209*

Sending and printing files with TCP/IP

The TCP/IP Connectivity Utilities for OS/400 is a licensed program (5722-TC1) that provides connection services to other systems. Important to printing is the spooling and print support available with this licensed program.

You can request to have your spooled files sent and printed on any system in your TCP/IP network. The term often used by UNIX** TCP/IP software to describe this support is **line printer requester (LPR)**. The LPR is the sending, or client portion, of a spooled file transfer. On the iSeries server, the Send TCP/IP Spooled File (SNDTCPSPLF) command provides this function by allowing you to specify what system you want the spooled file printed on and how you want it printed. There is also a TCP/IP command, LPR, that provides the same parameters and function as the SNDTCPSPLF command. The LPR can also transform an SCS or AFPDS spooled file to ASCII by using the host print transform function before sending the file.

The printing of the file is done by the printing facilities of the destination system. The destination system must be running TCP/IP. On the iSeries server, the **line printer daemon (LPD)** is the process on the destination system that receives the file sent by the SNDTCPSPLF command. The LPD process places the spooled file on a local printer queue. To print the spooled file, the spooled file must be put on an output queue already started to an active printer writer or a writer must be started to that output queue.

For additional information about printing using TCP/IP, see the following manuals:

- TCP/IP Configuration and Reference
- *IBM AS/400 Printing III, GG24-4028*

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Chapter 17. Network Printing

This chapter covers some of the printing functions available on the iSeries server when it is part of a communications network.

The examples in this part of the guide are intended to show you different methods you can use to send data, within a network, to be printed on an iSeries server.

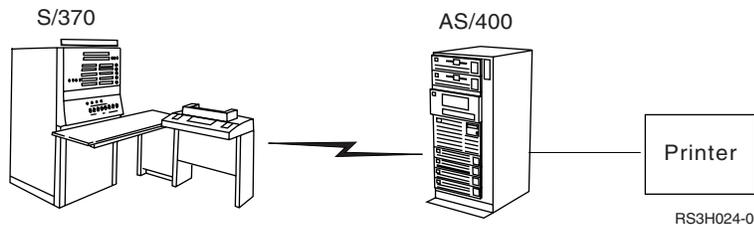


Figure 6. Communications Protocols Used by RJE

3270 Printer Emulation

When configuring 3270 printer emulation on OS/400, you must decide which communications line protocol to use. The iSeries server supports both binary synchronous communication (BSC) and Systems Network Architecture (SNA) 3270 printer emulation. Therefore, the choice is normally dictated by the protocol supported by the System/390 host communications software and controller.

BSC 3270 Printer Emulation

BSC 3270 printer emulation can be used with any System/390 host system that supports a 3274 control unit (Model 51C) in a BSC multipoint tributary network using a nonswitched line. BSC 3270 printer emulation supports the following features:

- Emulation on any line attached to an iSeries server.
- Ability to print information received from the host system on any printer normally supported by the iSeries server.
- Emulation of 3284, 3286, 3287, 3288, or 3289 host printers.

Configuring for BSC 3270 Printer Emulation

Details for configuring for BSC 3270 printer emulation are in Chapter 2 in the 3270 Device Emulation Support manual.

SNA 3270 Printer Emulation

SNA 3270 printer emulation enables the iSeries server to connect into any existing SNA 3270 network. Any printers attached to the system print information received from the System/390 host. The 3270 emulation session is linked to a printer file, which in turn is linked to a printer device. All 3270 printers are emulated as LU 3 printers with the exception of the 3287 and 3289 printers, which may be emulated as either LU 1 or LU 3 printers.

The difference between LU 1 and LU 3 printers is essentially the level of intelligence which the System/390 host expects to find at the printer device. If the printer is emulated as an LU 1 printer, an LU-LU session can be established with the host. Depending on the host applications, such a printer would be able to fully support SNA character string (SCS) data streams sent to it. If the iSeries server printer emulates an LU 3 printer, only an LU-PU session can be established between it and the System/390 system. This could cause unexpected results when using host print applications. For

example, if the host application was expecting to communicate with an LU 1 printer, the printed output would probably not be correctly formatted in terms of line spacing, page length, and so on.

For detailed information on printer emulation, see the 3270 Device Emulation Support manual.

RJE Printing

Remote job entry (RJE) allows an OS/400 user to use System/390-based applications and data in combination with OS/400 functions. RJE is part of the IBM Communications Utilities licensed program (5722-CM1), which runs on all iSeries servers with communications capabilities installed.

When using RJE, the iSeries server functions as a remote work station that submits jobs to a System/390 host for processing under one or more of the following systems:

- MVS/SP™ JES2 (SNA and BSC)
- MVS/SP JES3 (SNA and BSC)
- VM/SP RSCS (BSC only)
- DOS/VSE POWER/VSE (SNA only)
- OS/VS1 RES (SNA and BSC)

RJE can communicate with the host system using either of the following line protocols:

- Systems Network Architecture (SNA) over point-to-point switched or nonswitched connections
- Binary synchronous communications (BSC) over point-to-point switched or nonswitched connections

For BSC, multiple user-defined RJE subsystems may be used concurrently on different lines, each subsystem operating independently of the other. For SNA, multiple subsystems can share the same line.

A writer (printer or punch) output stream can be directed to one of the following:

- A printer file (spooled or nonspooled)
- A physical database file member
- A diskette file (spooled)
- A DDM file
- User program

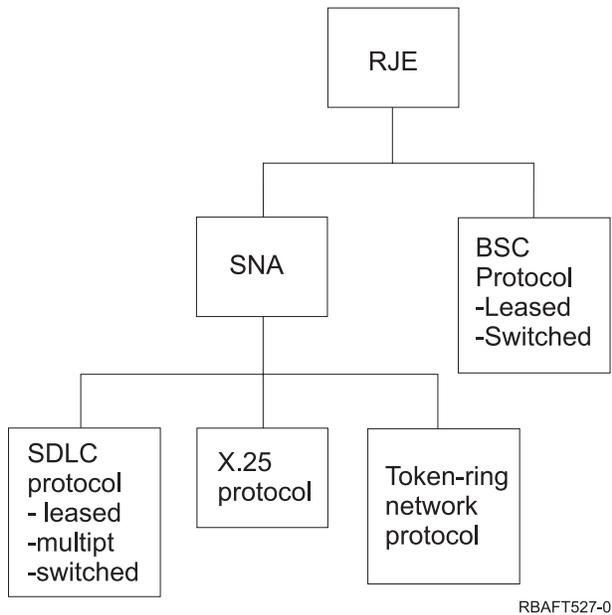
Configuring for RJE Printing

See the Remote Job Entry (RJE) Guide, chapters 2, 3, and 4, for detailed information on installing and configuring RJE. This task requires a knowledge of data communications.

Communications Line Protocols for RJE

A communications line physically connects an iSeries server to the host. It can be a remote link operating over a long distance, or a cable connecting them on a local area network. The protocol used depends on

whether you are in an SNA or a BSC environment, as shown in the following graphic.



The physical interfaces supported by RJE are shown in Table 16.

Table 16. Physical Interfaces Supported by RJE

	SDLC	X.25	Token-Ring Network	BSC
V.35	Yes	No	No	Yes
X.21bisV.35	Yes	Yes	No	Yes
RS232/V.24	Yes	Yes	No	Yes
X.21bisV.24	Yes	Yes	No	Yes
X.21	Yes	Yes	No	No
Medium Access Control (MAC) IEEE 802.5 / ISO 8802-5	No	No	Yes	No

Printer Files

A destination must be defined for each writer specified in the RJE session description. If a printer file is used, it must have a description that the iSeries server can use to transfer data to a device. The Create Remote Job Entry Configuration (CRTRJECFG) command uses the following command to create a printer file:

```

CRTPRTF FILE(&CFGLIB/QxxPRTFPRn); +
  CTLCHAR(*FCFC) +
  OUTQ(&OUTQ); +
  MAXRCDS(*NOMAX) +
  SCHEDULE(*FILEEND) +
  LVLCHK(*NO) +
  TEXT('RJE output file for Printer PRnn').
  
```

The destination for the writer data may be a device file (printer or diskette file), a physical database file, a DDM file, or a user program.

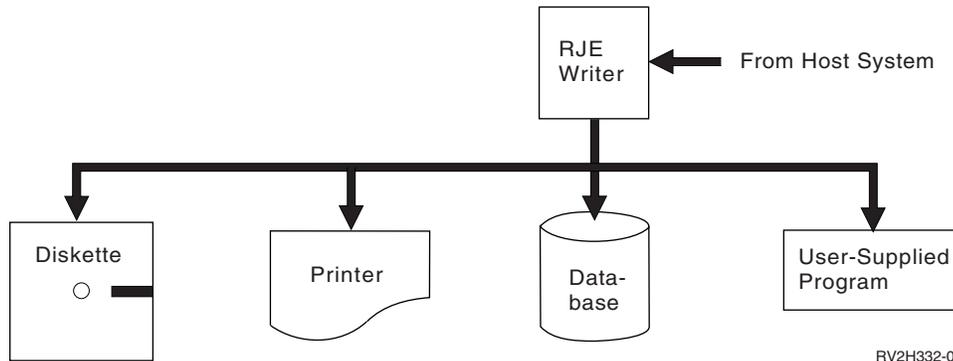
Notes:

1. RJE printer output streams received from the host system can be directed to a system printer.

- If these RJE printer files are used by any high-level language program, they have to be *program-described*. The term program-described means that the file was created without DDS source describing record formats and fields. Externally described printer files (with DDS source) are not supported under these conditions.

RJE Writer Function

The RJE writer function receives output streams from the host system and sends them to a printer, database file, diskette, or user program.



RJE supports up to seven independent printers for BSC, and up to fifteen independent printers for SNA. The actual number supported depends on the host. Printer output streams consist of printed data in extended binary-coded decimal interchange code (EBCDIC) character format. The output streams can be routed by:

- A writer entry in the session description
- Parameters specified in the Start RJE Writer (STRRJEWTR) command
- A forms entry in the FCT.

RJE Forms Control Table

The RJE forms control table (FCT) assigns special processing requirements for specific output streams received from the host system. The FCT functions as a routing table for sending data to a specific output file.

The FCT also functions as a translation table by converting the forms name or number used by the host system into a corresponding name or number more meaningful to the OS/400 user.

When the host system sends a peripheral data set information record (PDIR) (SNA), or a forms-mount message (BSC), the FCT is searched for the host-system-defined name or number. If the name or number is found, the corresponding OS/400 form name for that entry is sent in the forms mount message to the system operator. Both names must be placed in an FCT entry. For example:

```
ADDFCT  FCT(MYRJELIB/MYRJEFCT) +
        FORMTYPE(X2QH) +
        LCLFORM(INVOICE)
```

When a forms-mount message containing the name X2QH is received from the host system, the name INVOICE is used in the forms-mount message to the system operator. There is no limit to the number of FCTs that can be defined, but each RJE session uses only one at a time.

Controlling the FCT: The following commands are supplied with RJE:

CRTFCT

Create Forms Control Table

CHGFCT

Change Forms Control Table

DLTFCT

Delete Forms Control Table

WRKFCT

Work with Forms Control Table

ADDFCTE

Add Forms Control Table Entry

CHGFCTE

Change Forms Control Table Entry

RMVFCTE

Remove Forms Control Table Entry

The following is an example of FCT creation:

```
CRTFCT FCT(MYRJEFCT)
      AUT(*ALL)
      TEXT('User-defined forms control table')
```

The following is an example of adding an entry to the FCT:

```
ADDFCTE FCT(MYRJELIB/MYRJEFCT) +
      FORMTYPE(STD) +
      DEVTYPE(*PRT) +
      LCLFORM(*FORMTYPE) +
      FILE(*WTRE) +
      MBR(*WTRE) +
      FSN*WTRE) +
      DTAFMT(*WTRE) +
      CHLVAL(*FILE) +
      FORMSIZE(*FILE) +
      LPI(*FILE) +
      CPI(*FILE) +
      COPIES(*FILE) +
      PGM(*WTRE) +
      MSGQ(*WTRE)
```

Printing Using RJE

Starting Writers

The following commands can be used to start an RJE writer:

STRRJESSN

Start RJE Session: Starts the writers defined in the session description (when WTRS(*YES) is specified). If this command is used, the writer options cannot be selected: each writer starts with the defaults of the Start RJE Writer (STRRJEWTR) command.

STRRJEWTR

Start RJE Writer: Starts either individual writers or all writers defined in the session description. If this command is used, individual options can be selected for each writer.

WRKRJESSN

Work with RJE Session: Allows one or more writers defined in the session description to be started. If this command is used, the RJE session status of all writers and readers defined in the session is displayed on the screen.

Cancelling Writers

If writers are cancelled with OPTION(*IMMED), or if a session ends abnormally during processing, blocks of data may be lost. Each host system has the capability to save a backup of the data. Refer to the appropriate host system manual for details.

The following commands and control statements can be used to cancel an RJE writer:

- RJE control statements

..CANCEL

Cancel: Control statement that cancels a printer or punch. This control statement can be issued only from the RJE console. To issue it from the console, type it on the command line and press F10.

..END End: Control statement that ends the session in a controlled manner. This control statement can be issued only from the RJE console. To issue it from the console, type it on the command line and press F10.

- OS/400 commands

ENDRJESSN

End RJE Session: Command that cancels all writers that are active and defined in the session description.

CNLRJEWTR

Cancel RJE Writer: Command that cancels either individual writers or all writers that are active and defined in the session description. If this command is issued, the session does not end and the system continues to communicate with the host system.

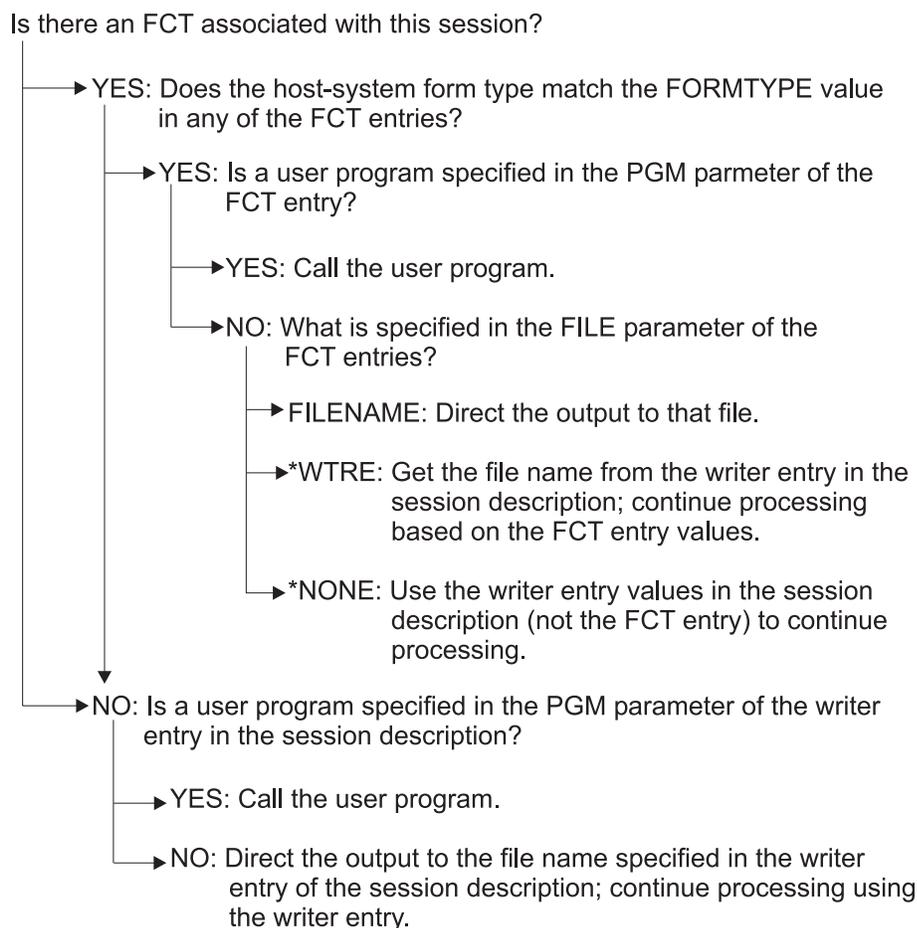
WRKRJESSN

Work with RJE Session: Command that permits one or more writers defined in the session description to be cancelled.

Receiving Printer Output from the Host System

When RJE receives an output stream from the host, it uses the host-system form type value to determine how that output stream should be processed. For SNA, the form type is in the peripheral data set information record (PDIR); for BSC, it is in the forms-mount message.

The host-system form type is compared with certain values at the iSeries server, and processing continues as shown in the following figure.



RBAFT528-0

Record Length of Output Data

In RJE, to determine the record length of output data, use the OUTRCLEN parameter of the CRTRJECFG, CRTSSND, CHGSSND, or CVTRJEDTA command. This parameter controls how RJE reblocks the output stream received from the host. It has two values: *FIXED and *FILE.

If you specify *FIXED, RJE reblocks the output stream according to its own defaults, which are as follows:

- When an RJE printer is processing the output stream:
 - If data is being written to a printer file, the record length is 132 bytes for 10 or fewer characters per inch (CPI), and 198 bytes when the CPI is greater than 10. You must specify *FCFC for the CTLCHAR parameter of either the Create Printer File (CRTPRTF) or Change Printer File (CHGPRTF) command.
 - If data is being written to a physical file, the record length is 132 bytes for data format, and 133 bytes for FCFC format. Physical files do not have any CPI value associated with them. The record length of the physical file must equal the record length of the output data (132 or 133 bytes) to prevent record misalignment.
- RJE punches reblock data as 80-byte records.
- For diskette files, the output stream is reblocked as 128-byte records. If the record length is greater than 128, data is truncated.

If you specify *FILE, RJE reblocks the output stream as follows:

- When an RJE printer is processing the output stream:
 - If data is being written to a printer file, the record length is determined by the page width of the printer file. You must specify *FCFC for the CTLCHAR parameter of either the Create Printer File (CRTPRTF) or Change Printer File (CHGPRTF) command.
 - If data is being written to a physical file, the record length of the output data is determined by the record length of that file. If the data is FCFC format, the record length of the file must include one extra byte for the FCFC code.
- When an RJE punch is processing the output stream:
 - If data is being written to a printer file, the record length is determined by the page width of the printer file.
 - If data is being written to a physical file, the record length of the output data is determined by the record length of that file.
- For diskette files, the output stream is reblocked as 128-byte records. If the record length is greater than 128, data is truncated.

The maximum record length that RJE supports, including carriage-control characters, is 255 bytes. To ensure record alignment, the record length of the output file must be greater than or equal to the logical record length of the data that is received from the host subsystem. If the record length of the output file is greater than the logical record length of the data received, the records are right-padded with blanks.

If you need to use both OUTRCLEN(*FILE) and OUTRCLEN(*FIXED) in one session, specify the former and then have it function as OUTRCLEN(*FIXED) by setting the record length of the output files to 80, 132, 133, or 198.

Example of Using OUTRCLEN(*FILE)

Assume that you want to send a report that has a record length of 144 bytes from a host to an iSeries server. To do this using OUTRCLEN(*FILE):

1. Create a physical file with a record length of 144 bytes using either the Create Physical File (CRTPF) or the Create Source Physical File (CRSRCPF) command. Specify *NOMAX for the MAXMBRS parameter to allow RJE to create as many members as needed in the file.
2. Change the writer or FCT entry FILE parameter to specify the new physical file. When the data is written to the file, it is reblocked to 144-byte records.

Printing Using FCFC

The host system sends output streams as 132- or 198-byte records with carriage-control characters that go before each record. RJE converts records containing host system carriage-control characters to records containing ANS FCFC codes (before printing) that are supported by the OS/400 program.

For SNA, carriage control is provided by the extended SNA character string (SCS) controls. These are shown in Table 17.

Table 17. SNA Character String (SCS) Controls

SCS	Meaning
CR	Carriage return
FF	Forms feed (page end)
IRS	Inter-record separator
NL	New line
SVF	Set vertical format
VCS	Vertical channel set

For BSC, carriage control is provided by carriage-control bytes (CCBs). These are shown in Table 18.

Table 18. BSC Carriage-Control Bytes

Code	Meaning
1010 00nn	Space immediately nn spaces (no printing)
1011 nnnn	Skip immediately to channel nnnn (no printing)
1000 00nn	Space nn lines after printing
1001 nnnn	Skip to channel nnnn after printing
1000 0000	Suppress space after printing

The ANS FCFC codes are shown in Table 19.

Table 19. ANS First-Character Forms Control (FCFC) Codes

Code	Meaning
	Space 1 line before printing (blank code)
0	Space 2 lines before printing
-	Space 3 lines before printing
+	Suppress space before printing
1	Skip to channel 1
2	Skip to channel 2
3	Skip to channel 3
4	Skip to channel 4
5	Skip to channel 5
6	Skip to channel 6
7	Skip to channel 7
8	Skip to channel 8
9	Skip to channel 9
A	Skip to channel 10
B	Skip to channel 11
C	Skip to channel 12

When you specify *FIXED for the OUTRCLEN parameter of the CRTRJECFG, CRTSSND, CHGSSND, or CVTRJEDTA command, the output stream is reblocked as follows:

- When an RJE printer is writing the output data to a printer file, the record length is 132 bytes for 10 or fewer cpi, and 198 bytes when the cpi is greater than 10. You must specify *FCFC for the CTLCHAR parameter of either the Create Printer File (CRTPRTF) or Change Printer File (CHGPRTF) command.
- When an RJE printer is writing the output data to a physical file, the record length is 132 bytes for data format, and 133 bytes for FCFC format. Physical files do not have any cpi value associated with them. The record length of the physical file must equal the record length of the output data (132 or 133 bytes) to prevent record misalignment.

When you specify *FILE for the OUTRCLEN parameter, the record length (page width) of the file that receives the data determines the record length of the output data.

Using a User Program to Receive Host-System Output

Three programs supplied with RJE can be called by user-written programs to receive data from the host system. See Chapter 8 of the Remote Job Entry (RJE) Guide.

3x74 Attached Printers

There is no 3270 emulation pass-through (*pipeline*) support for 3x74 remote-attached printers. Printing capability is limited to the LU 1 support. Printer data management and spool support is not provided for printers that use the 3270 Information Display System data-stream capability (DSC).

For OS/400 printing applications, the extent of the function is limited to that provided by a 3287 printer, regardless of the type and model of the printer actually attached. This is functionally equivalent to a 5256-003 printer. For example, a 4224 printer, which has all-points-addressable capability, only provides 3287 printer capability when attached to a 3x74 controller. However, if a 3284 printer is attached to the 3x74 controller, it does not provide the 6 or 8 LPI support of the 3287 printer because it is not equipped with the necessary hardware features.

When using a 3x74 remote-attached printer (for example, a 4224) configured as a 3287 printer, make sure that the page length set on the printer hardware switch matches the length of the forms that are in the printer. If the length of the forms loaded does not match the printer hardware switch setting, the application will still print correctly on the forms. However, when the spooled file completes printing, the 4224 uses the default page size set on the printer hardware switches.

For example, assume your page length set on the printer hardware switches is 11 inches, your actual forms are 3 inches long, the spooled file just completed printing, and you press the Page Eject key to get the last printed form. By pressing the Page Eject key, you may advance the forms 11 inches instead of the 3 inches your form takes up.

DBCS Printer Considerations

If the spooled file contains double-byte data (IGCDTA(*YES) specified on the printer file), it can be printed on printers attached to a 3x74 controller.

However, the following attributes or DDS keywords are ignored if the target printer is attached to a 3x74 controller.

- IGCCPI (DBCS attribute)
- IGCCHRRTT (DBCS attribute and DDS keyword)
- IGCEXNCHR (DBCS attribute)
- IGCCHRSIZ (DDS keyword)
- DFNLIN (DDS keyword)

The IGCSOSI printer file parameter is processed in the OS/400 program and not in the printer being used to print the spooled file.

Distributed Data Management (DDM) Printing

DDM enables users or application programs on the iSeries server to access data files that reside on remote systems and allows these remote systems to access data on the local system. This remote file access is transparent to the application program command or utility. Remote file requests are routed through a DDM file, which contains the name of the file on the remote system as well as the name of this system as it is known on the network.

There are, however, certain limitations to the DDM support, particularly where printing applications are concerned. For example:

- The iSeries Query licensed program does not support DDM files.
- It is not possible to print on a remote iSeries server using, for example, an OVRPRTF of QSYSPRT to the source DDM file because the print request is rejected by DDM, as shown by the following job log extract:

```
3 > OVRPRTF FILE(QSYSPRT) TOFILE(ITSCID03/DDMQSYSPRT)
DDM file DDMSRC in MYLIB uses remote file QSYS/QSYSPRT.
File DDMSRC in MYLIB not a data base file.
Cannot open DDM file DDMSRC in MYLIB.
Function check. CPF4207 unmonitored by QWSGET at statement *N,
instruction X'0F9D'.
A function check was received while opening the print file.
The print operation used the default printer device file.
```

One way in which data could be printed on a remote iSeries server using DDM is as follows:

1. Create a DDM file on the source system using the Create DDM File (CRTDDMF) command.

```
CRTDDMF FILE(MYLIB/DDMSRC) RMTFILE(QSYS/QSYSPRT)
RMTLOCNAME(B20) TEXT('DDM file for remote printing on B20').
```
2. Create a physical file of the appropriate record length to receive the spooled data (80 bytes for print screen output, 132 bytes for normal spooled output), using the Create Physical File (CRTPF) command.

```
CRTPF FILE(MYLIB/PFILE) RCDLEN(80) TEXT('CPYSPLF data file').
```
3. Create a similar file on the remote iSeries server using the Submit Remote Command (SBMRMTCMD) command.

```
SBMRMTCMD CMD('crtpf file (rlib/rfile) rcdlen(80)') DDMFILE(DDMSRC).
```
4. Copy the spool entry to the physical file using the Copy Spooled File (CPYSPLF) command, taking the defaults (no control character).

```
CPYSPLF FILE(QSYSPRT) TOFILE(MYLIB/PFILE)
JOB(003049/USER/DSP06).
```
5. Use the Copy File (CPYF) command to copy the data from this physical file to the remote physical file created in Step 3.

```
CPYF FROMFILE(MYLIB/PFILE) TOFILE(MYLIB/DDMSRC)
MBROPT(*ADD).
```
6. Use the SBMRMTCMD command once again to copy the data from the remote physical file to QSYS/QSYSPRT in order to create a spooled file on the remote iSeries server's default output queue.

```
SBMRMTCMD CMD('cpyf fromfile(rlib/rfile) tofile(qsysprt) mbropt(*add)')
DDMFILE(DDMSRC).
```

This procedure can be adapted to direct OS/400 printing to remote System/36 systems and System/38™ systems with DDM installed. See the Distributed Data Management book for details of the differences in DDM implementation on these other systems.

Object Distribution Printing

Object distribution provides the facility to send objects, messages, job streams, and spooled files across a suitably configured SNA link to another iSeries server or group of servers. File distribution (data, source, and spooled files) to System/36, System/38, and System/390 CICS* systems is also possible using OS/400 object distribution support. See the SNA Distribution Services book for details.

Chapter 18. The IBM Internet Printing Protocol (IPP) server for iSeries

This chapter provides information about the IBM Internet Printing Protocol (IPP) Server for iSeries and how to enable it to provide additional support for printers that are attached to an iSeries server.

What is the Internet Printing Protocol?

The Internet Printing Protocol (IPP) defines an industry standard method of delivering print jobs using Internet technologies. The IPP protocol was developed by the Printer Working Group, a consortium of the major companies involved in network printing.

IPP is transported over HTTP/1.1 using a message body whose content-type is "application/ipp". The well-known port 631 has been assigned to IPP.

Why use the IPP server?

IPP provides a single standard interface for submitting print jobs to iSeries servers. IPP works on any TCP/IP network, so you can use the same process to submit print jobs on your local area network, your intranet, or the Internet.

IPP allows business travelers, telecommuters, or anyone working remotely to submit and manage print jobs on a remote iSeries server.

What is supported by the IPP server?

The IPP server supports IPP version 1.1. The following required operations are supported:

- Print-job
- Validate-job
- Get-printer-attributes
- Get-jobs
- Cancel-job
- Get-job-attributes

Additionally, the following optional IPP operations are supported:

- Pause-printer
- Resume-printer
- Purge-jobs
- Hold-job
- Release-job
- Restart-job

The IPP server can be configured to provide security features for user authentication and encryption of print data.

Setting up the IPP server

You can administer and configure the IPP server using the IBM IPP Server Administrator for iSeries, a browser-driven graphical user interface. Before using the interface, verify that the IBM HTTP Server for iSeries is installed on your system. For upgrade to TLS, or SSL support, you must also have installed the Digital Certificate Manager and a Cryptographic Access Provider licensed program.

Setting up your Internet browser

To allow the administrator interface to function correctly, JavaScript™ must be enabled for your Internet browser. This can usually be enabled by accessing the preferences or options feature of your browser.

To select the display language for the administrator, access the language selection for your Internet browser, and select or enter a supported locale that is installed on your system. Normally, there is a list to choose from. If a list is not displayed, you can manually enter a locale. The locale is usually a two letter abbreviation that represents a language. For example, English is represented by the letters "en". Sometimes the locale may further be defined by a country or region. For example, French spoken in Switzerland is represented by "fr_CH". If the locale defined for the browser is not installed or supported by the administrator interface, the language associated with the user profile is used. If this language is not supported, English is used by default.

Using the Administrator Interface

To access the administrator interface, verify that the IBM HTTP Server for iSeries is installed and the *ADMIN server instance has been started. This is done so that your Internet browser can access the iSeries Tasks page.

To start the *ADMIN server instance, use the following command:

```
STRTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)
```

Use the following URL to access the iSeries Tasks page:

```
http://system:2001
```

where *system* is the name of the iSeries server. From the iSeries Tasks page, click on the icon for the IBM IPP Server.

You should now be presented with the IBM IPP Server Administrator interface. To use the administrator interface, you must have *IOSYSCFG authority, and you must have read and write access to the following property files:

- QIBM/UserData/OS400/Ipp/conf/qippsvr-cust.conf
- QIBM/UserData/OS400/Ipp/conf/printer.properties

In order to change preferences, you must have read and write access to the preference property file, QIBM/UserData/OS400/Ipp/conf/preferences.properties, if it exists.

From the IBM IPP Server Administrator interface, you can perform the following tasks:

- Configure the IPP server
- Display, create, change, and delete IPP printer configurations
- Set up preferences for using the browser interface
- Manage the IPP server

The administrator interface is divided into two main sections, a navigational frame on the left, and a form frame on the right. The form frame is further broken down into a form content frame, a button frame, and a message frame. The message frame, located at the bottom of the form frame, is the location where messages appear during normal operation of the browser interface.

To change navigational menus, use the navigation tabs located above the frames near the top of the browser window. The choices available are:

Administration

Provides a form for managing the IPP server.

Configuration

Provides forms for configuring the IPP server, including SSL, defining access log and error log protocol, and working with IPP printer configurations.

Other Links

Provides links to related Web sites.

There are two document links at the top of the browser interface as well. Each of the document links will display the selected document in a separate browser window. The document links are:

Getting Started

Provides information on using the interface.

Printer Device Programming Guide

Links directly to the online version of the Printer Device Programming book.

Configuring the IPP server

If SSL connections are desired for any IPP printer, you must first enable the IPP server to use SSL by specifying an SSL port. To enable SSL connections:

1. Click on the **Configuration** tab to load the configuration navigational menu.
2. Click on **Basic Configuration** to load the basic configuration form.
3. Select the **Enabled** radio button.
4. Fill in a valid port number in the **SSL Port** text field.
5. Click the **Apply** button.

The IPP server is automatically configured to port 631 for non-SSL data. To support upgrade to TLS on port 631, or to support SSL on a specified port, a digital certificate must be associated with the IPP server. To do this, use Digital Certificate Manager for iSeries (DCM) and associate a certificate with the IPP server, listed as server application QIBM_IPP_QIPPSVR.

To disable SSL connections, select the **Disabled** radio button on the form and click the **Apply** button.

Note: Whenever a change is made to the configuration of the IPP server, whether it is for SSL connections or logging information, the IPP server must be stopped and then started again for the change to become effective.

To configure how you want access logs created, written, and archived, follow these steps:

1. Click on the **Configuration** tab to load the configuration navigational menu.
2. Expand the **Logs and Errors** menu item.
3. Click on **Access Logs** to load the access logs form.
4. Fill in the form with the appropriate information.
5. Click the **Apply** button.

To configure how you want error logs created, written, and archived, perform the following steps:

1. Click on the **Configuration** tab to load the configuration navigational menu.
2. Expand the **Logs and Errors** menu item.
3. Click on **Error Logs** to load the error logs form.
4. Fill in the form with the appropriate information.

5. Click the **Apply** button.

Note: The IBM IPP Server Administrator and the IBM IPP Server are two different applications. However, error logging must be enabled for the IPP server to allow administrator interface error logging to be enabled. If an error occurs using the IPP server, check the IPP server error log, specified using the error log form of the administrator interface, to help locate the problem.

Creating an IPP Printer Configuration

To create an IPP printer configuration do the following:

1. Click on the **Configuration** tab to load the configuration navigational menu.
2. Expand the **Internet Printers** menu item.
3. Click on **Create configuration** to start the create task wizard.
4. Follow the task steps to create an IPP printer configuration.
5. Click the **Finished** button on the confirmation panel to create the configuration.

Changing an IPP Printer Configuration

To change an IPP printer configuration do the following:

1. Click on the **Configuration** tab to load the configuration navigational menu.
2. Expand the **Internet Printers** menu item.
3. Click on **Change configuration** to start the change task wizard.
4. Follow the task steps to change an IPP printer configuration.
5. Click the **Finished** button on the confirmation panel to change the configuration.

Viewing an IPP printer configuration

To view all of the IPP printers configured on the system:

1. Click on the **Configuration** tab to load the configuration navigational menu.
2. Expand the **Internet Printers** menu item.
3. Click on **Display Configurations**.

Deleting an IPP printer configuration

To delete an IPP printer configuration do the following:

1. Click on the **Configuration** tab to load the configuration navigational menu.
2. Expand the **Internet Printers** menu item.
3. Click on **Delete configuration** to display a list of configured IPP printers.
4. Select the IPP printer to delete.
5. Click the **Delete** button.

Managing the IBM IPP server

Using the Manage IBM IPP Server form, you can use the start, stop, and restart buttons to perform the given action for the IPP server. The current server status, along with the ports the server is listening on, is displayed in the table. At most, there will be two ports the IPP server will be listening on at any one time. Port 631 is for non-secure data and secure data provided by a connection upgrade to TLS. The other port is for secure data provided by an SSL connection. The last time the table information was updated is also displayed. The table can be refreshed by clicking the refresh button.

To manage the IPP server, do the following:

1. Click on the **Administration** tab to display the administration navigational menu.
2. Click on the **Manage IBM IPP Server** menu item.

The IPP server is initialized using a special configuration file. The file is named `QIBM/UserData/OS400/Ipp/conf/qippsvr-cust.conf`. Do not manually edit this file. The configuration file is changed via the IBM IPP Server Administrator browser interface.

Troubleshooting

If an error occurs using the IBM IPP Server Administrator, the message frame box will usually contain the error data and provide information on how to correct the problem. For additional information, internal tracing can be used. Tracing provides a mechanism for retrieving state information during execution of the administrator and the IPP server. To activate tracing, specify a valid error log file name using the **Error Logs** form. Then, select a logging level below **Critical**. Selecting a logging level of **Debug** will provide the maximum amount of tracing information. The trace log containing detailed information on the operation of the administrator is located in file `/QIBM/UserData/OS400/Ipp/Logs/qippcfg.log`. The trace log containing detailed information on the operation of the IPP server is located in file `/QIBM/UserData/OS400/Ipp/Logs/qippsvr.log`.

To stop internal tracing for the administrator and the IPP server, select a logging level above "Error" (ie, Critical, Alert, or Emergency) on the **Error Logs** form and click the **Apply** button.

Note: The trace files `/QIBM/UserData/OS400/Ipp/Logs/qippcfg.log` and `qippsvr.log` are deleted every time tracing/error logging is started. If you wish to trace, it is recommended that at regular intervals you stop tracing, archive the trace file, and start the tracing again.

Use the following table to help troubleshoot other problems you may encounter working with the IBM IPP Server Administrator or the IBM IPP Server.

Table 20. Troubleshooting

You do not have the correct authority to a file.	To modify any configuration files, IBM IPP Server Administrator browser interface users require at least *IOSYSCFG authority. Verify that you have the correct authority.
File does not exist or is corrupt.	Always make sure the following files exist on your system: <code>/QIBM/UserData/OS400/Ipp/conf/qippsvr.conf</code> <code>/QIBM/UserData/OS400/Ipp/conf/preferences.properties</code> <code>/QIBM/UserData/OS400/Ipp/conf/printer.properties</code> You should not manually edit these files unless you know exactly what you are doing. Modifying one file may require you to modify additional files. Manually changing these files could result in failure of server initialization.
The log file name is not valid.	Click the "?" help icon for the log file name field for more information on valid log file names.
You made changes to the IPP server configuration, but they do not appear to be recognized.	Stop the IPP server and start it again. Whenever a change is made to the server's configuration, the IPP server needs to be restarted in order for the change to become effective.
The browser interface is not being displayed in the language specified.	The language specified in the browser is not supported by the IBM IPP Server Administrator browser interface application.
You cannot find help for a field.	Click the "?" help icon for information concerning a particular field. You may also activate "verbose" for the form, which provides a more detailed overview of the entire form.

Table 20. Troubleshooting (continued)

<p>An internal error occurred using the browser interface.</p>	<p>Turn on tracing and examine the trace file to help locate the problem.</p>
<p>The IPP server does not start or stay running after you attempt to start it.</p>	<p>An error has probably occurred during initialization. Whenever the IPP server is started, an OS/400 fully-qualified job name is displayed in the message frame, in the form: JobNumber/JobUser/JobName</p> <p>If the IPP server fails to start do the following:</p> <ol style="list-style-type: none"> 1. Log on to the iSeries server. 2. WRKJOB JOB(JobNumber/JobUser/JobName) . 3. Select option 4, "Work with Spooled Files". 4. Using display option 5, view any spooled files to help locate the cause of the problem. <p>If you have manually edited the IPP server configuration file, a newly specified directive may be causing the IPP server to fail initialization. If this is the case, edit the configuration file and remove the directive in error.</p>
<p>The IPP server does not stop after you attempt to stop it.</p>	<p>An error has occurred on the iSeries server. To stop the IPP server manually:</p> <ol style="list-style-type: none"> 1. Log on to the iSeries server. 2. WRKACTJOB SBS(QHTTPSVR). 3. Find the QIPPSVR jobs. 4. Use option 4 and end the jobs immediately.
<p>When SSL is enabled, the IPP server does not stay running.</p>	<p>The IPP server may not have a valid certificate associated with it for SSL connections. Use Digital Certificate Manager for iSeries to create a certificate and associate it with the IPP server. (The IPP server itself should be registered with DCM automatically.) Associate the certificate with the application QIBM_IPP_QIPPSVR.</p>

Part 6. Appendixes

Appendix A. Examples of Working with Printing Elements

| The information in this appendix has been moved to the iSeries Information Center under the Printing
| topic.

Appendix B. CL Commands Frequently Used While Working with Printing Tasks

| The information in this appendix has been moved to the iSeries Information Center under the Printing
| topic.

Appendix C. Printer File Return Codes

This appendix contains descriptions of all major and minor return codes for printer files. These return codes are set in the I/O feedback area of the printer file. Return codes report the results of each operation. The appropriate return code is available to the application program that issued the operation. The program then checks the return code and acts appropriately. Refer to your high-level language manual for information about how to access these return codes.

The return code is a four-digit value: the first two digits contain the major code, and the last two digits contain the minor code. With some return codes, a message is also sent to the job log or the system operator message queue (QSYSOPR). You can refer to the message for additional information. Message IDs followed by an asterisk (*) may be received by applications while spooling output.

Note: Return codes that refer to a condition on the printer are available to the application program only when printing with SPOOL = *NO specified in the printer file. When SPOOL = *YES has been specified, the printer writer program is the program communicating with the printer, not your application program.

Major Code 00

Major Code 00 – Operation completed successfully.

Description: The operation issued by your program completed successfully.

Action: Continue with the next operation.

Code Description/Action

0000 **Description:** For output operations performed by your program, 0000 indicates that the last output operation completed successfully.

The notify messages are used after certain error conditions to give the operator the choice of continuing or canceling the printing of that file. If the reply is CANCEL, another message is issued with a nonzero return code.

Action: Your program may continue. One of the following diagnostic messages may have been issued to warn of an unusual condition that may be significant to your program even though it is not an error.

Messages:

CPA4001 (Inquiry)

CPA5341 (Inquiry)

CPA4003 (Inquiry)

CPA5342 (Inquiry)

CPA4004 (Inquiry)

CPA5343 (Inquiry)

CPA4005 (Inquiry)

CPA5344 (Inquiry)

CPA4007 (Inquiry)

CPA5347 (Inquiry)

CPA4008 (Inquiry)

CPA5348 (Inquiry)

CPA4009 (Inquiry)
CPD4005 (Diagnostic)

CPA4010 (Inquiry)
CPD4006 (Diagnostic)

CPA4011 (Inquiry)
CPD4007 (Diagnostic)

CPA4012 (Inquiry)
CPD4008 (Diagnostic)

CPA4013 (Inquiry)
CPD4069 (Diagnostic)

CPA4014 (Inquiry)
CPD4071 (Diagnostic)*

CPA4015 (Inquiry)
CPD4072 (Diagnostic)

CPA4017 (Inquiry)
CPF4032 (Diagnostic)

CPA4019 (Inquiry)
CPF4033 (Diagnostic)

CPA4037 (Inquiry)
CPF4056 (Diagnostic)

CPA4038 (Inquiry)
CPF4057 (Diagnostic)

CPA4039 (Inquiry)
CPF4239 (Escape)

CPA4040 (Inquiry)
CPF4245 (Escape)

CPA4042 (Inquiry)
CPF4249 (Escape)

CPA4043 (Inquiry)
CPF4260 (Escape)*

CPA4046 (Inquiry)
CPF4420 (Diagnostic)

CPA4047 (Inquiry)
CPF4421 (Diagnostic)

CPA4048 (Inquiry)
CPF4905 (Notify)*

CPA4065 (Inquiry)
CPF4913 (Diagnostic)

CPA4066 (Inquiry)
CPF4914 (Diagnostic)

CPA4072 (Inquiry)*
CPF4916 (Notify)*

CPA4073 (Inquiry)
CPF4918 (Notify)*

CPA4074 (Inquiry)
 CPF4919 (Notify)*

CPA4075 (Inquiry)
 CPI4015 (Informational)

CPA4076 (Inquiry)
 CPI4016 (Informational)

CPA4251 (Inquiry)
 CPI4017 (Informational)

CPA4256 (Inquiry)
 CPI4018 (Informational)

CPA5335 (Inquiry)
 CPI4019 (Informational)

CPA5339 (Inquiry)
 CPI4020 (Informational)

CPA5340 (Inquiry)
 CPI4024 (Informational)

Major Code 80

Major Code 80 – Permanent system or file error (nonrecoverable).

Description: A nonrecoverable file or system error occurred. Recovery is unlikely until the problem causing the error has been corrected.

Action: The following general actions can be taken by your program for each 80xx return code. Other specific actions are given in each return code description.

- Continue processing without the printer.
- Close the printer file and open the file again.
- End.

Code Description/Action

8081 Description: The operation was not successful because a system error condition was detected.

Action: Your printer may need to be varied off and then on again. Your program can either:

- Continue processing without the printer.
- Close the device file and open the file again.
- End.

Messages:

CPF4182 (Escape)*
 CPF5409 (Escape)

CPF4289 (Escape)
 CPF5410 (Escape)

CPF4510 (Escape)*
 CPF5414 (Escape)

CPF4516 (Escape)
 CPF5416 (Escape)

CPF4552 (Escape)
 CPF5418 (Escape)

CPF4591 (Escape)
CPF5423 (Escape)

CPF5159 (Escape)
CPF5429 (Escape)

CPF5196 (Escape)
CPF5431 (Escape)*

CPF5246 (Escape)
CPF5433 (Escape)

CPF5257 (Escape)*
CPF5434 (Escape)

CPF5261 (Escape)
CPF5447 (Escape)

CPF5262 (Escape)*
CPF5453 (Escape)

CPF5401 (Escape)
CPF5507 (Escape)

CPF5408 (Escape)

8082 Description: The operation attempted was not successful because the printer is unusable. This may occur because:

- A cancel reply has been taken to an error recovery message for the device.
- A cancel reply was returned to a maximum records reached inquiry message.
- The printer has been held by a Hold Communications Device (HLDCMNDEV) command.

No operations should be issued to the device.

Action: Communications with the printer cannot be resumed until the device has been reset to a varied-on state. If the device has been held, use the Release Communications Device (RLSCMNDEV) command to reset the device. If the device is in an error state, vary the device off and then on again. Once the device is reset, normal operation can be started again by reopening the printer file.

Messages:

CPF4502 (Escape)
CPF5104 (Escape)
CPF5116 (Escape)*
CPF5269 (Escape)

80B3 Description: The open operation was not successful because the printer file or printer device is not available.

Action: The printer file cannot be opened again until the necessary resources are available. Your program can wait for the resources to become available, then issue another open operation. Otherwise, you may continue other processing or end the program. The Work with Configuration Status (WRKCFGSTS) command may be used to determine whether the printer device is in use or not varied on. If the device is in use, the WRKCFGSTS command will also identify the job that is using it.

Consider increasing the WAITFILE parameter with the Change Printer File (CHGPRTF) or Override with Printer File (OVRPRTF) command to allow more time for the file resources to become available.

Messages:

CPF4128 (Escape)*
CPF9808 (Diagnostic)*

80C0 Description: A nonrecoverable error has occurred on the printer device.

Action: Your printer may need to be varied off and then on again. Your program can either:

- Continue processing without the printer.
- Close the printer file and open the file again.
- End.

Messages:

CPF4262 (Escape)
CPF5413 (Escape)

CPF4509 (Escape)
CPF5419 (Escape)

CPF5103 (Escape)
CPF5420 (Escape)

CPF5247 (Escape)
CPF5430 (Escape)

CPF5412 (Escape)
CPF5437 (Escape)

80EB Description: An open operation was not successful because an open option that was not valid or an invalid combination of options was specified in your program, in the printer file, or in an override command.

Action: Close the printer file, correct the problem, and issue the open operation again. See the individual messages to determine what options are not valid.

Messages:

CPD4012 (Diagnostic)
CPF4209 (Escape)

CPD4013 (Diagnostic)*
CPF4214 (Escape)*

CPD4020 (Diagnostic)
CPF4217 (Escape)

CPD4021 (Diagnostic)*
CPF4219 (Escape)

CPD4023 (Diagnostic)
CPF4224 (Escape)

CPD4024 (Diagnostic)
CPF4237 (Escape)*

CPD4025 (Diagnostic)
CPF4238 (Escape)

CPD4033 (Diagnostic)
CPF4263 (Escape)*

CPF411E (Escape)
CPF4264 (Escape)*

CPD4034 (Diagnostic)*
CPF4295 (Escape)*

CPD4036 (Diagnostic)*
CPF4296 (Escape)*

CPD4037 (Diagnostic)*
CPF4335 (Escape)

CPD4038 (Diagnostic)*
CPF4336 (Escape)

CPF4133 (Escape)
CPF4337 (Escape)

CPF4138 (Escape)*
CPF4338 (Escape)

CPF4139 (Escape)*
CPF4339 (Escape)*

CPF4148 (Escape)
CPF4340 (Escape)

CPF4156 (Escape)
CPF4345 (Escape)

CPF4157 (Escape)*
CPF4352 (Escape)

CPF4159 (Escape)*
CPF4637 (Escape)

CPF4162 (Escape)
CPF5370 (Escape)

CPF4181 (Escape)*

CPF4196 (Escape)*

CPF4206 (Escape)*

80ED Description: An open operation was not successful because the record format descriptions in the printer file have changed since your program was compiled.

Action: Close the printer file and end the program. Determine whether the changes affect your application program. If they do, then recompile the program. If the changes do not affect your program, the file should be changed or overridden to LVLCHK(*NO). When LVLCHK(*NO) is specified, the system does not compare the record format descriptions.

Messages:

CPF4131 (Escape)*

80EF Description: An open operation was not successful because your program is not authorized to the printer device.

Action: Close the file, correct the problem, then issue the open operation again. Obtain authority to the device from your security officer or the device owner.

Messages:

CPF4104 (Escape)*

80F8 Description: An operation was not successful because the file is marked in error.

Action: Close the file. Refer to messages in the job log to determine what errors occurred. Take the appropriate recovery action for those errors.

Messages:

CPF4132 (Escape)*

CPF5129 (Escape)*
CPF5293 (Escape)*
CPF5427 (Escape)*

Major Code 81

Major Code 81 – Permanent device error (nonrecoverable).

Description: A nonrecoverable device-related error occurred during an I/O operation. Any attempt to continue using this printer device will probably fail again until the cause of the problem is found and corrected.

Action: The following general actions can be taken for each 81xx return code. Other specific actions are given in each return code description.

- Continue processing without the printer device.
- Close the file, correct the problem, and open the file again. If the operation is still unsuccessful, try it again only a limited number of times. (The number of times should be specified in your program.)
- End.

Several return codes indicate that an error condition must be corrected by varying the device off and on again.

Code Description/Action

8181 **Description:** A system error condition was detected during an I/O operation to the printer device.

Action: Close the file. You may need to vary the device off and on again to clear the error. Determine the cause of the failure from the accompanying message. Check for any system operator messages indicating that additional corrective action must be performed. Open the file again to continue.

Messages:

CPF4289 (Escape)
CPF4552 (Escape)
CPF4553 (Escape)
CPF5105 (Escape)
CPF5159 (Escape)
CPF5507 (Escape)

8191 **Description:** The operation was not successful because a permanent line error occurred, and the system operator took a recovery option in response to the line error message. (You can find out what type of line error occurred by asking the system operator.) The device has been marked unusable.

Action: Close the file. Vary the device off and on again to clear the error. Open the file again to continue.

Messages:

CPF4146 (Escape)
CPF4193 (Escape)
CPF4526 (Escape)
CPF4542 (Escape)
CPF5128 (Escape)
CPF5198 (Escape)

8197 **Description:** A nonrecoverable error condition was detected at the device.

Action: Close the file. Vary the device off and on again to clear the error. Refer to the accompanying error message for additional information regarding the source of the specific error detected. Open the file again to continue.

Messages:

CPF4149 (Escape)

CPF4583 (Escape)

CPF4192 (Escape)

CPF5106 (Escape)

CPF4197 (Escape)

CPF5143 (Escape)

CPF4216 (Escape)

CPF5199 (Escape)

CPF4524 (Escape)

CPF5201 (Escape)

CPF4533 (Escape)

CPF5268 (Escape)

CPF4538 (Escape)

CPF5360 (Escape)

81C2 Description: The operation issued by your program was not successful because the Systems Network Architecture (SNA) session with the printer is not active.

Action: Close the file. Vary the device off and on again to clear the error. Open the file again to continue.

Messages:

CPF5422 (Escape)

Major Code 82

Major Code 82 – Open operation failed.

Description: An attempt to open the printer file was not successful. The error may be recoverable or permanent, but is limited to the printer device. Recovery is unlikely until the problem causing the error has been corrected.

Action: The following general actions can be taken for each 82xx return code. Other specific actions are given in each return code description. You can either:

- Continue processing without the device.
- Close the file, correct the problem, and open the file again. A subsequent operation could be successful if the error occurred because of some temporary condition such as the device being in use at the time.

If the operation is still unsuccessful, try it again only a limited number of times. (The number of times should be specified in your program.)

- End.

Several return codes indicate that an error condition must be corrected by changing a value in the file. To change a parameter value for the file, use the Change Printer File (CHGPRTF) or the Override with Printer File (OVRPRTF) command.

Code Description/Action

8281 Description: A system error condition was detected on an open operation that was not successful. The printer file may previously have been in error, or the printer file could not be opened due to a system error.

Action: Your printer may need to be varied off and then on again to clear the error. Your program can either:

- Continue processing without the printer.
- Close the file, correct the problem, and open the file again.
- End.

Determine the cause of the failure from the accompanying message.

Messages:

CPF4168 (Escape)*

8282 Description: The open operation was not successful because the printer device is unusable. This may occur because a cancel reply has been taken to an error recovery message for the printer or because the printer has been held by a Hold Communications Device (HLDCMNDEV) command. No operations should be issued to the device.

Action: Close the file. Communications with the printer cannot be resumed until the device has been reset to a varied-on state. If the device has been held, use the Release Communications Device (RLSCMNDEV) command to reset the device. If the device is in an error state, vary the device off and then on again. Once the device is reset, normal operation can be started by opening the printer device file again.

Messages:

CPF4110 (Escape)

CPF4298 (Escape)

CPF4354 (Escape)

8291 Description: A permanent line error occurred on an open operation. The printer device has been marked unusable.

Action: Close the file. Vary the device off and on again to clear the error. Open the file again to continue.

Messages:

CPF4179 (Escape)

CPF4291 (Escape)

82A6 Description: The open operation failed because of a Systems Network Architecture (SNA) protocol violation.

Action: Ensure that the printer with which your program is communicating is configured properly. Refer to the device response codes in the accompanying error message for additional information regarding the specific error detected.

Messages:

CPF4124 (Escape)

CPF4533 (Escape)

CPF4190 (Escape)

CPF5103 (Escape)

CPF4192 (Escape)

CPF5143 (Escape)

CPF4527 (Escape)

CPF5453 (Escape)

82AA Description: The open operation was not successful because the printer device description was not found.

Action: Your program can continue without the printer, attempt to use a different printer, or end.

Verify that the name of the printer was correctly specified in the DEV parameter on the CRTPRTE, CHGPRTF, OVRPRTF, or CRTPRTF command.

Messages:

CPF4103 (Escape)*

82B3 Description: The open operation was not successful because the printer you requested is in use in another file in your job.

Action: Close both of the printer device files, then open the one that you want to use again.

Messages:

CPF4106 (Escape)

82EE Description: An open operation was attempted to a device that is not supported for a printer file. Your program is attempting to open a device that is not a valid printer.

Action: Your program can continue without the printer, attempt to use a different printer, or close the file and end.

Verify that the name of the printer was specified correctly on the CHGPRTF or OVRPRTF command.

Messages:

CPF4105 (Escape)

82EF Description: An open operation was attempted for a device that the user is not authorized to, or that is in service mode.

Action: Your program can continue without the printer, attempt to use a different printer, or end.

Close the file, correct the problem, and then issue the open operation again.

For authority errors, obtain authority to the device from your security officer or device owner. If the device is in service mode, the system service tools (SST) function is currently using the device. Wait until the device is available to issue the operation again.

Messages:

CPF4104 (Escape)*

CPF4186 (Escape)

CPF9802 (Diagnostic)*

Major Code 83

Major Code 83 – Device error occurred (recoverable).

Description: An error occurred during an I/O operation, but the printer device is still usable. Recovery within your program might be possible.

Action: The following general actions can be taken for each 83xx return code. Other specific actions are given in each return code description.

- Continue processing without the printer device.
- Correct the problem and continue processing with the printer device. If the attempt to recover from the operation is unsuccessful, try it again only a limited number of times. (The number of times should be specified in your program.)
- End.

Several return codes indicate that an error condition must be corrected by changing a value in the file. To change a parameter value for the file, use the Change Printer File (CHGPRTF) or Override with Printer File (OVRPRTF) command.

Code Description/Action

8319 **Description:** A negative response was received to the last printer operation attempted by your program. The error may have been caused by the user pressing the Cancel key on the printer.

Action: Your program can try a different operation, or close the file and end. Refer to the device response code in the accompanying message to determine why the operation was rejected. Correct the error in your program before attempting to try the operation again.

Messages:

CPF4158 (Escape)

CPF4531 (Escape)

CPF5050 (Escape)

831D **Description:** The operation just attempted by your program was rejected because a parameter was not valid, out of limits, or missing.

Action: Your program can bypass the failing step and continue, or close the file and end. Refer to the accompanying message to determine what parameter was incorrect. Correct the error in your program before attempting to try the operation again.

Messages:

CPD4016 (Diagnostic)*

CPF5275 (Escape)

CPD4017 (Diagnostic)*

CPF5276 (Escape)*

CPD4027 (Diagnostic)*

CPF5288 (Escape)*

CPD4028 (Diagnostic)*

CPF5289 (Escape)*

CPD4029 (Diagnostic)*

CPF5324 (Escape)*

CPD4030 (Diagnostic)*

CPF5359 (Escape)*

CPD4041 (Diagnostic)*

CPF5363 (Escape)

CPF4909 (Notify)*
CPF5366 (Escape)*

CPF5108 (Escape)*
CPF5367 (Escape)*

CPF5148 (Escape)*
CPF5368 (Escape)*

CPF5273 (Escape)*

831E Description: The operation just issued by your program was not valid or an invalid combination of operations was specified.

Action: Your program can bypass the invalid operation and continue, or close the file and end. Refer to the accompanying message to determine why the operation was rejected. Correct the error in your program before attempting to try the failing operation again.

Messages:

CPD4015 (Diagnostic)*
CPF5290 (Escape)*

CPD4018 (Diagnostic)*
CPF5320 (Escape)*

CPD4031 (Diagnostic)
CPF5321 (Escape)*

CPF4915 (Notify)*
CPF5322 (Escape)*

CPF5149 (Escape)*
CPF5323 (Escape)*

CPF5185 (Escape)*
CPF5325 (Escape)*

CPF5245 (Escape)*
CPF5362 (Escape)*

831F Description: A length that is not valid was specified on the operation.

On an output operation, your program has tried to send a data record having a length that exceeds the maximum record length allowed for the printer or the page size defined for the file. If you are using direct I/O, you have exceeded the maximum number of bytes allowed per page. The data has been truncated.

Action: Issue the output operation again with a smaller output length. The record length for a program-described printer file cannot exceed the page size. The record length for any printer file must be no greater than 32 767 characters.

Messages:

CPF4906 (Notify)*
CPF5160 (Escape)

8343 Description: The designated page overflow line number has been reached.

Action: Your program should take whatever application dependent action is appropriate. This may include printing page totals or a running foot line.

Messages:

CPF5004 (Status)*

83E0 Description: Your program attempted to issue an operation using a record format that was not defined for the printer file, or omitted the record format name.

Action: Check the name of the record format in your program to be sure it is correct. Then check that the record format is defined properly in the DDS for the file.

Messages:

CPF5186 (Escape)*

CPF5187 (Escape)*

83F6 Description: Your program sent invalid data to the printer. The data type may be incorrect for the field in which it is used.

Action: Check the name of the record format in your program to be sure it is correct. Verify that the data definition statements in your program match the output record defined in the DDS for the file. Correct the error in your program before attempting to repeat the failing operation.

Messages:

CPD4014 (Diagnostic)*

CPF5075 (Notify)*

CPD4022 (Diagnostic)*

CPF5234 (Escape)*

CPD4026 (Diagnostic)*

CPF5246 (Escape)

CPD4035 (Diagnostic)*

CPF5261 (Escape)

CPD4516 (Informational)

CPF5297 (Escape)*

CPD4591 (Escape)

CPF5364 (Escape)

CPF4634 (Escape)

CPF5365 (Escape)

CPF4635 (Escape)

CPF5369 (Escape)

CPF4636 (Escape)

CPF5372 (Escape)

CPF4642 (Escape)

CPF5373 (Escape)

CPF4643 (Escape)

CPF5374 (Escape)

CPF4644 (Escape)

CPF5375 (Escape)

CPF4645 (Escape)

CPF5376 (Escape)

CPF4646 (Escape)

CPF5377 (Escape)

CPF4647 (Escape)

CPF5411 (Escape)

Appendix D. Working with Fonts, Font Character Sets, Code Pages, CHRIDs, and Coded Fonts

- | The following fonts are included in OS/400. Other font products, such as the AFP Font Collection, are available and can be purchased separately.
- | • TrueType and OpenType fonts (Option 43 - Additional fonts)
- | • AFP compatibility fonts (Option 8 - AFP compatibility fonts)
- | These fonts can be supplemented by installing IBM licensed programs that provide additional fonts, creating your own fonts on the iSeries server, or purchasing them from other companies.

TrueType and OpenType fonts

- | OpenType is an enhanced form of TrueType technology that is designed with Unicode in mind.
- | OpenType is the font technology that IBM is using to support presentation of Unicode. TrueType fonts contain characters to support language and scripts from around the world. Presently, over 52,000 glyphs are contained in a single type style. Subsets of this data are also available to allow a smaller file size to support certain geographic areas.
- | TrueType fonts are supplied to the iSeries in option 43 ("Additional Fonts") of OS/400. They are provided as stream files in the TrueType (OpenType) format.
- | TrueType and OpenType fonts reside in one of two integrated file system directories on the iSeries:
 - | • /QIBM/ProdData/OS400/Fonts/TTFonts - for IBM supplied fonts.
 - | • /QIBM/UserData/OS400/Fonts/TTFonts - for user fonts.
- | When searching for fonts, the UserData path will be searched first followed by the ProdData path.

You must use the FONTNAME DDS keyword to select the TrueType fonts. Unlike the other supported font resources, the TrueType fonts are referred to not by the file or object name, but by their *full font name*.

The following font are supplied in option 43 ("Additional Fonts"):

- Monotype Sans WT
- Monotype Sans WT J
- Monotype Sans WT K
- | • Monotype Sans WT ME
- Monotype Sans WT SC
- Monotype Sans WT TC
- Monotype Sans Duospace WT
- Monotype Sans Duospace WT J
- Monotype Sans Duospace WT K
- | • Monotype Sans Duospace WT ME
- Monotype Sans Duospace WT SC

- | • Monotype Sans Duospace Ext B⁵
- | • Monotype Sans Duospace WT TC
- | • Times New Roman WT
- | • Times New Roman WT J
- | • Times New Roman WT K
- | • Times New Roman WT ME
- | • Times New Roman WT SC
- | • Times New Roman WT TC
- | • Thorndale Duospace WT
- | • Thorndale Duospace WT J
- | • Thorndale Duospace WT K
- | • Thorndale Duospace WT ME
- | • Thorndale Duospace WT SC
- | • Thorndale Duospace WT TC

TrueType fonts can be used only with printer files with a device type of *AFPDS.

| TrueType font considerations

| If you need the additional function provided by linked fonts or you want to capture fonts in the printer, then you will need the Infoprint Fonts for Multiplatforms V1.1 (5648-E77) licensed program (or equivalent). This product contains fonts as well as the font installer utility.

| When the Infoprint Fonts for Multiplatforms V1.1 (5648-E77) licensed program is installed, it changes the way that fonts are searched for and located. The Infoprint Fonts for Multiplatforms V1.1 (5648-E77) licensed program builds a resource access table. The resource access table contains a mapping of the full font name to a system specific file name. Fonts are now searched for based on the information contained in the resource access table.

| For more information on the Infoprint Fonts for Multiplatforms V1.1 (5648-E77) licensed program, see *IBM Infoprint Fonts: Introduction to Type Transformer and Utilities for Windows*, S544-5853.

AFP compatibility fonts

The iSeries server comes with a certain variety of fonts called the IBM-supplied compatibility fonts or the compatibility set. These fonts provide a range of font styles that support different types of printers that can be attached to the system.

Downloading

Downloading is the process of sending something (for example, character sets or code pages) to another computer or printer.

Some printers do not have fonts built into them. The host system can send (download) character sets and code pages to the printer with the document or ahead of time, to be stored for future use.

5. The Monotype Sans Duospace Ext B font is an extension of the Monotype Sans Duospace WT SC font. The Monotype Sans Duospace Ext B font is linked to the Monotype Sans Duospace WT SC font by the resource access table that is supplied with OS/400 Option 43 - Additional Fonts. This linking makes all the characters from both fonts available to documents that specify the Monotype Sans Duospace WT SC font name.

Considerations When Using 240- and 300-pel Fonts

Most printers support 240-pel font character sets. However, the 4028, and 3935 printers support only 300-pel font character sets. If printed output is sent to a combination of 4028 and other IPDS printers by applications that use font character sets that are downloaded from the iSeries server, some special considerations apply:

- Font name
The font character set used with the document must exist in both the 240- and 300-pel versions and have the same name. The application selects the font character set by name, not by pel density.
- Font character set selection
The system knows which pel density a printer supports and downloads the correct font character set to the printer.
- Libraries
Font character sets are font resource objects regardless of pel density. The 240-pel and 300-pel fonts must be stored in separate libraries.

When an application program calls for a particular element (font or code page), the system looks for it in the printer being used or in the iSeries server. If it cannot find the designated font or code page, a substitution or mapping takes place. Information concerning the substitution of fonts and code pages is contained in this appendix.

If you need to know more about fonts, font character sets, code pages, or coded fonts, read on. If not, you can skip to “Font Substitution Tables” on page 190 for information describing how fonts are substituted between printers and computers.

Font Character Sets and Font Global Identifiers (FGID)

Fonts are a family or assortment of characters. Three elements typically provide a font identity:

- Type Family
Courier is an example of a type family.
- Typeface
Style, weight (for example, italic or bold), and width (normal or expanded) define typeface.
Normal means the typical size of characters, while expanded means that the character is wider than normal.
- Type Size
Fonts can range from small (4 point) to large (72 point).

For example, a font could be identified as:

Type family
Sonoran Serif

Typeface
Roman medium normal

Type Size
10-point

Font Character Sets

Fonts are named in a number of ways. One way is with a character set name. These character sets are downloaded to the printer. Multiple code pages can be used with a single character set. For valid code pages that can be used with a character set, see the manual *About Type: IBM's Technical Reference for 240-Pel Digitized Type*, GS544-3516.

Some font character sets come with the iSeries server; some can be downloaded from a System/390 to an iSeries server; some can be received from another iSeries server; and some are available as licensed programs.

The following printers accept downloaded font character sets:

- 3112 (has resident fonts also)
- 3116 (has resident fonts also)
- 3130 (has resident fonts also)
- 3160 (has resident fonts also)
- 3812 (has resident fonts also)
- 3816 (has resident fonts also)
- 3820
- 3825
- 3827
- 3828 (MICR printer)
- 3829
- 3831
- 3835
- 3900–001
- 3900–AFCCU (has resident fonts also)
- Infoprint 3000 (has resident fonts also)
- Infoprint 4000 (has resident fonts also)
- 3912 (has resident fonts also)
- 3916 (has resident fonts also)
- 3930 (has resident fonts also)
- 3935 (has resident fonts also)
- 4028 (has resident fonts also)
- 4312 (has resident fonts also)
- 4317 (has resident fonts also)
- 4324 (has resident fonts also)
- Infoprint 20 (has resident fonts also)
- Infoprint 32 (has resident fonts also)

The use of font character sets provides consistent or similar fonts across printers. For example, a document created at one location using a specific font character set could be sent to a different location, printed on a different model printer, and still look the same.

With some exceptions, the above printers support font character sets that are 240 pels. The Infoprint 3000, Infoprint 4000, Infoprint 20, Infoprint 32, 4028, 3130, 3935, 4312, 4317, and 4324 printers support 300-pel fonts. A pel is a picture element, representing the number of dots in a square inch (for example, 240 across and 240 down).

The 3130, Infoprint 3000, and Infoprint 4000 printers support both 240 and 300 pel fonts. The operator can select which mode the printer is in through the printer operator panel.

Naming Convention for Font Character Sets: Font character set names on OS/400 can be up to 8 characters long. Each character or group of characters tells something about the font character set.

For example, in the font character set name C0D0GT10:

- C0** The **C0** means that this object is a font character set.
- D** The **D** indicates the origin of the font. In this example, C0D0GT10 is a font character set designed for Document Control Facility (DCF) for a 3800 Model 1 printer or a 3825 printer.
- 0** This **0** indicates that this font is for uniformly spaced and mixed-pitch font character sets.
- GT10** The **GT10** indicates the type family, typeface, and pitch for uniformly spaced and mixed-pitch fonts. In this example, the GT10 means that this font character set is a Gothic Text style and the characters are 10 pitch or 10 characters per inch.

For more information about font character sets, see the manual *About Type: IBM's Technical Reference for 240-Pel Digitized Type*, GS544-3516.

Selecting Font Character Sets: Selecting a font character set to use with an application program is done by specifying the 8-character font character set name as the value on the FNTCHRSET parameter of the printer file.

If you choose to use font character sets with your applications, you must also specify a code page (by providing a value for the CDEPAG parameter of the printer file being used).

Substituting Font Character Set: Substitution is determined by OS/400, based on which font character sets are specified in the application, the type of printer to be used, and the value assigned to the fidelity parameter of the printer file being used (*CONTENT or *ABSOLUTE).

Example 1: Assume:

- The application calls for font character set C0D0GB10 (Gothic Bold, 10 pitch).
- The printer supports only resident fonts.
- The fidelity parameter value is *CONTENT.

In this example, the spooled file will print, with substituted font ID 39 (Gothic Bold 10 pitch) because the fidelity parameter value is *CONTENT. If the fidelity parameter value had been *ABSOLUTE, the spooled file would be held on the output queue and it would not print.

Example 2: Assume:

- The application calls for FGID 51 (Matrix Gothic).
- The printer supports only downloaded font character sets.
- The fidelity parameter value is *CONTENT.

In this example, the spooled file will print. OS/400 substitutes a font character set (C0S0CR10, Courier Roman 10 pitch) for FGID 51. This is not an exact match. The system matched (as closely as possible) the font character to the FGID specified in the application.

Note: In this example, if the fidelity parameter was *ABSOLUTE, the spooled file would be HELD.

Font Global Identifiers (FGIDs)

Another method of naming a font is by a font global identifier (FGID). An FGID names a type family and a typeface.

FGIDs are identified by a number such as 3, 8, or 11.

There is a different FGID assigned for the same type family but different typeface. For example, a Courier Roman Medium 10 pitch (characters-per-inch) is FGID 11 and Courier Roman Bold 10 pitch (characters per inch) is FGID 46.

Below is an example of FGID 11. The text in the box represents how data would print if your application uses FGID 11.

```
FGID 11 is a monospaced courier font that  
will print 10 characters per inch.
```

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Printers with resident fonts use FGIDs to name the resident fonts. Depending on the technology used with the printer, resident fonts can be stored on font cards, diskettes, in the memory of the printer, or mechanically on a font element or daisy wheel.

The following printers have resident fonts:

- 3112 (can also accept downloaded fonts)
- 3116 (can also accept downloaded fonts)
- 3130 (can also accept downloaded fonts)
- 3160 (can also accept downloaded fonts)
- 3812 (can also accept downloaded fonts)
- 3816 (can also accept downloaded fonts)
- 3930
- 3912, 3916, or 4028 (can also accept downloaded fonts)
- 3935 (can also accept downloaded fonts)
- 4214
- 4224
- 4230
- 4234 Models 8 and 12
- 4247
- 4312 (can also accept downloaded fonts)
- 4317 (can also accept downloaded fonts)
- 4324 (can also accept downloaded fonts)
- 5219
- 5224
- 5225
- 6400
- 6408
- 6412
- 3900–AFCCU (can also accept downloaded fonts)
- Infoprint 20 (can also accept downloaded fonts)
- Infoprint 32 (can also accept downloaded fonts)
- Infoprint 3000 (can also accept downloaded fonts)
- Infoprint 4000 (can also accept downloaded fonts)

To find out which fonts are supported by a printer, check the reference manual for that printer.

Selecting Resident Fonts: Selecting a resident font to use with an application program is done by specifying an FGID value on the FONT parameter of the printer file.

Font Substitution: Substitution can be one FGID for another, an FGID for a font character set, or a font character set for an FGID.

Example 1: Assume:

- Your application calls for a font character set (FNTCHRSET specified on the printer file), for example, C0S0CR10 for Courier Roman medium 10 pitch.
- The printer is a 4224 and has resident fonts identified by FGIDs.
- FGID 11 will be substituted for C0S0CR10 and sent to the printer.

In this example, the system substitutes a font that is resident on that printer.

Example 2: Assume:

- Your application calls for a font (specified on the FONT parameter of the printer file). The font specified is font 26 (Gothic Matrix, Roman medium 10 pitch) and the printer is a 3812.
- You decide to print the document on a 4019 printer. Font 26 is not supported on the 4019.

In this example, the system substitutes font 11 (Courier, Roman medium 10 pitch)

You can figure out such substitutions by looking at Table 22 on page 201.

Example 3: Assume:

- Your application uses a font (specified on the FONT parameter of the printer file). The font specified is font 40 (Gothic, Roman medium 10 pitch).
- The printer you are going to print on supports only font character sets (for example, a 3827).

In this example, the system substitutes font character set C0D0GT10 (Gothic Text, Roman medium 10 pitch).

You can figure out such substitutions by looking at Table 25 on page 237.

Code Pages

Code pages come in two types:

- Code page (standalone)
- Character set and code page combination (referred to as a CHRID).

Code pages are groups of characters. Within a code page, there are unique hexadecimal identifiers assigned to each of the characters.

As you enter your text at a computer keyboard, each keyboard character is translated into a code point. When the text is printed, each code point is matched to a character ID on the code page you specified. The character ID is then matched to the image (raster pattern) of the character in the character set you specified.

Some of these characters can be repeated in different code pages and have a different hexadecimal identifier assigned to them. Conversely, the hexadecimal identifier can be the same, but the characters will be different. Therefore, if you have applications that use certain characters contained in only one particular code page, it is important to know which code page you are using.

Below is a diagram of two code pages: code page 37 and code page 285. They are printed in a 10-characters-per-inch (courier 10) font. Notice the different character that occurs at code point hex '5B'. One is a \$ sign and the other an English pound or currency sign. This example shows that different

characters will print depending on the code page you specify even though you are using an identical font style.

Code page 37 with courier 10

		Code point 5B															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
4			â	ä	à	á	ã	å	ç	ñ	ç	<	(+			
5	&	é	ê	ë	è	í	î	ï	ì	í	ß	!	\$	*)	;	-
6	-	/	Â	Ä	À	Á	Ã	Å	Ç	Ñ]	,	%	_	>	?	
7	ø	É	Ê	Ë	È	Í	Î	Ï	Ì	`	:	#	@	'	=	"	
8	Ø	a	b	c	d	e	f	g	h	i	«	»	đ	ý	þ	±	
9	°	j	k	l	m	n	o	p	q	r	ä	ö	æ	Æ	ª		
A	µ	~	s	t	u	v	w	x	y	z	ı	ı	Đ	Ÿ	İ	©	
E	\	S	T	U	V	W	X	Y	Z	²	ô	ö	ò	ó	õ		
F	0	1	2	3	4	5	6	7	8	9	³	û	ü	ù	ú		

Code page 285 with courier 10

		Code point 5B															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
4			â	ä	à	á	ã	å	ç	ñ	\$	<	(+			
5	&	é	ê	ë	è	í	î	ï	ì	í	ß	!	£	*)	;	-
6	-	/	Â	Ä	À	Á	Ã	Å	Ç	Ñ]	,	%	_	>	?	
7	ø	É	Ê	Ë	È	Í	Î	Ï	Ì	`	:	#	@	'	=	"	
8	Ø	a	b	c	d	e	f	g	h	i	«	»	đ	ý	þ	±	
9	°	j	k	l	m	n	o	p	q	r	ä	ö	æ	Æ	ª		
A	µ	~	s	t	u	v	w	x	y	z	ı	ı	Đ	Ÿ	İ	©	
E	\	S	T	U	V	W	X	Y	Z	²	ô	ö	ò	ó	õ		
F	0	1	2	3	4	5	6	7	8	9	³	û	ü	ù	ú		

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Standalone Code Pages

Code pages supply consistent or similar characters across systems. For example, a document created at one location using a specific code page could be sent to a different location, printed on a different model printer, and still look the same.

Code pages must be downloaded to the printer for use.

The following printers accept downloaded code pages:

- 3112 (has resident fonts also)
- 3116 (has resident fonts also)
- 3130 (has resident fonts also)
- 3160 (has resident fonts also)
- 3812 (has resident fonts also)
- 3816 (has resident fonts also)
- 3820
- 3825
- 3827
- 3828 (MICR printer)
- 3829
- 3831
- 3835
- 3900–001
- 3900–AFCCU (has resident fonts also)
- Infoprint 3000 (has resident fonts also)
- Infoprint 4000 (has resident fonts also)
- 3900
- 3912 (has resident fonts also)
- 3916 (has resident fonts also)
- 3930 (has resident fonts also)
- 3935 (has resident fonts also)
- 4028 (has resident fonts also)

- 4312 (has resident fonts also)
- 4317 (has resident fonts also)
- 4324 (has resident fonts also)
- Infoprint 20 (has resident fonts also)
- Infoprint 32 (has resident fonts also)

Naming Convention for Code Pages: Like character sets, code pages are named in a number of ways. One way is with a code page name. These code pages are downloaded to the printer. The code page name can be up to 8 characters long. Code page names are used with character set names for printing on printers such as the 3820, 3825, 3827, or 3835.

Another way is with a code page global identifier (CPGID). CPGIDs are printer-resident code pages and have numbers for names (for example, 259 or 500). Generally, printers with resident fonts use CPGIDs to name the printer-resident code pages. CPGIDs are also used within CHRIDs.

For example, in the code page name T1V10500:

T The **T** means that this object is a code page.

1 This always a 1.

V1 The **V1** means that this is version 1 of this code page.

0500 The **0500** is the code page name, number, or category. In this example 500 is the code page name.

Selecting Code Pages: Code pages are selected by specifying a certain value for the code page (CDEPAG) parameter of the printer file.

If you choose to use code pages with your applications, you must also specify a font character set (by providing a value for the FNTCHRSET parameter of the printer file being used).

Substituting Code Pages: Substitution of code pages occurs for the following reasons:

- The application specifies a code page that is resident on a printer and the printer being used does not have resident code pages.
- The application specifies a code page that is resident on the host system (iSeries server) and the printer being used has resident code pages (not capable of accepting downloaded code pages).
- The job requesting the code page is not authorized to it.
- The code page cannot be found.
- The job is not authorized to the library where the code page is stored.

Character Set and Code Page Combination (CHRIDs)

This type of code page is made up of a specific graphic character set and a specific code page and is referred to by a character identifier (CHRID).

These graphic character sets and code pages (CHRIDs) are used for fonts that are resident on the printer. They are used in conjunction with a font ID to obtain a resident font.

The following printers support CHRIDs:

- 3112
- 3116
- 3130
- 3160
- 3812
- 3816

- 3900–AFCCU
- 3912
- 3916
- 3930
- 3935
- 4028
- 4214
- 4224
- 4230
- 4234
- 4247
- 4312
- 4317
- 4324
- 5219
- 5224
- 5225
- 6400
- 6408
- 6412
- Infoprint 20
- Infoprint 32
- Infoprint 3000
- Infoprint 4000

Naming Convention for CHRIDs: The names of character identifiers (CHRIDs) are made up of two elements: graphic character set and code page. These two elements define a collection of characters. Below is an example of the multinational CHRID 697-500.

697 This is the name of the graphic character set.

Some graphic character sets identify a character set that is a subset of the code page. Others identify a character set that is equivalent to the code page.

500 This is the name of the code page.

Selecting CHRIDs: CHRIDs are selected by specifying a certain value for the character identifier (CHRID) parameter of the printer file. Additionally, a font ID value must be specified for the FONT parameter on the printer file.

Substituting CHRIDs: If the CHRID is not available on the printer your application is using, the system will substitute the CHRID that most closely matches the one requested by the application.

Coded Fonts

A coded font is the pairing of a font character set and a code page. Coded fonts allow users to specify a font character set and a code page with one value specified on the printer file.

Coded fonts available on the iSeries server can be viewed by using the Work with Font Resources (WRKFNTRSC) command.

Coded font names are read by the system and then translated to a font character set and a code page. These two elements are then sent to the printer.

Naming Convention for Coded Fonts: Unlike other uniformly spaced and mixed-pitch font components, coded font names are generally shortened by excluding the origin and reserved characters (the first two characters of their name). This is necessary because some Advanced Function Presentation (AFP) licensed programs accept only 6 characters for coded font names. However, some applications can use coded fonts named with 6 or 8 characters.

Coded font names on the iSeries server are 6 or 8 characters long. Each character or group of characters tells something about the coded font.

For example, in the coded font name X0GT10:

X0 The X0 means that this object is a coded font.

XZ The XZ means that this object is an outline coded font.

GT10 The **GT10** indicates the type family, typeface, and pitch for uniformly spaced and mixed-pitch fonts. In this example the **GT10** means that this font character set is a Gothic Text style and the characters are 10 pitch or 10 characters per inch.

To find out which font character set and code page make up a coded font name, use the Work with Font Resources (WRKFNTRSC) command. This command allows you to specify the font resource to be worked with, the library it is in, and the attribute (coded font).

Additional naming conventions have been adopted to more explicitly name the code page used with a character set.

For more information about coded fonts, see the manual *About Type: IBM's Technical Reference for 240-Pel Digitized Type*, GS544-3516.

Selecting Coded Fonts: A coded font is selected by specifying the coded font name as the value on the coded font (CDEFNT) parameter of the printer file.

You can use the Work with Font Resources (WRKFNTRSC) command to view the coded fonts that are available on the system.

Substituting Coded Fonts: No substitution of coded fonts takes place on the iSeries server. If the coded font is not available, the document will not print.

You can use the MAPIGCFNT on the CRTPSF CFG and CHGPSF CFG commands to specify coded font names of the form X0nnnnnn should be mapped to XZnnnnnn. If the XZnnnnnn coded font is found it is used, if it is not found the X0nnnnnn coded font will be used.

Font Capturing

Font capturing refers to the ability of a printer to dynamically capture a host downloaded font. In previous releases, downloaded fonts were saved across jobs, but not across instances of the printer writer. With PSF/400 V4R2, the printer can capture a host downloaded font, if it supports the font capturing function. The captured font then appears like a printer-resident font, even if the printer has been powered off and back on. On the next instance of the printer writer, the need for subsequent font downloads is eliminated. The amount of data sent through the network is thereby reduced.

Captured fonts remain on the printer for an indefinite amount of time. The printer retains captured fonts until the space they occupy is needed for something else. The decision to discard captured fonts is made by the printer and is not under the control of the host printer writer.

Note: Even though a font may have been captured, the host font must still remain on the system because the printer may discard fonts to free up space, and the font may need to be reloaded. In addition, users must still have authority to the font object on the host in order to use it.

Activating Font Capturing

To activate font capturing, set the FNTCAPTURE parameter in the PSF configuration object to *YES. For more information about using the CRTPSFCFG command, see “Creating a PSF configuration object” on page 57. Any fonts eligible to be captured will then be sent to the printer with an indication that the printer may capture the font. It is important to note that the printer determines whether to capture a font based on available memory and free disk space.

Making Character Sets and Code Pages Eligible for Capturing

To make a font eligible to be captured, specify the name of a font character set or code page, and select FNTCAPTURE(*YES) in the Change Font Resource (CHGFNTRSC) command or the Create Font Resource (CRTFNTRSC) command. This will insert information into the font that tells the printer writer that this font is eligible for capture as well as a time and date stamp. The process of making a font eligible for capture is also called marking a font in some IBM operating environments.

Fonts supplied with the IBM AFP Font Collection (5648-113) are eligible to be captured as is. There is no need to use the CHGFNTRSC command to make them eligible.

Fonts that are created with the OS/2 Type Transformer, can be made eligible for capture by selecting the Capture check box in the Typeface Descriptions dialog box.

Eligibility Rules

Some fonts, especially very old fonts and custom built fonts, contain a value of zero for the Graphic Character Set Global Identifier (GCSGID) and Font Global Identifier (FGID) (both from the Font Descriptor (FND) structured field). Non-zero values for these fields is necessary to allow capturing. In these cases, the CRTFNTRSC command, or theCHGFNTRSC command will fail with a message indicating that the font was not marked as eligible for capture. These fonts will continue to be downloaded to the printer as usual.

Inline Fonts: Font resources that are sent inline with the print job are not eligible for capture and will always be downloaded.

Raster Fonts: For raster technology fonts, both the character set and the code page must be eligible for capturing for capturing to occur. If either is marked ineligible, or does not contain sufficient information to uniquely identify it, then the font will be downloaded.

Outline Fonts: In contrast with raster technology fonts, outline technology font character sets and code pages are captured independently of each other. For example, a code page could be captured, while a character set that is marked ineligible would be downloaded.

Migrating Font Libraries from Other Operating Environments

If you migrate a font library from MVS and the font library has been marked with the MVS utility APSRMARK, there is no need remark the fonts. The eligible or not eligible for capture attribute is analogous to the public or private designation in APSRMARK. Creating the font using the FNTCAPTURE(*FILE) on the CRTFNTRSC command will cause the font to be created with the information already contained in the font.

Considerations

Before using the font capturing function, make sure that you understand the considerations that are discussed in this section. Failure to do so may cause unpredictable results, even for users of another system who may be sharing the printer.

How Captured Font Resources Are Identified: It is important to understand how font resources captured by the printer are distinguished from one another. The identity of a captured font resource is contained in the structured fields of the font resource itself. The source of this information is detailed below.

- Character sets

The identity of a character set is formed by combining the Graphic Character Set Global Identifier (GCSGID), the Font Global Identifier (FGID) (both from the Font Descriptor (FND) structured field), and the time and date stamp (from the Begin Font (BFN) structured field).

- Code pages

The identity of a code page is formed by combining the Graphic Character Set Global Identifier (GCSGID), the Code Page Identifier (CPGID) (both from the Code Page Descriptor (CPD) structured field), and the time and date stamp (from the Begin Code Page (BCP) structured field).

When the configuration object has FNTCAPTURE(*YES), PSF uses this identifying information from the font to query the printer to see if it has a font with the same identifiers.

Because the identity of a font resource is carried within the font structured fields, it is imperative that the modified or customized fonts be remarked to distinguish them from the original font resource. Renaming a modified font, or placing it into a different library does not change the identity of a font as far as font capture is concerned. If a code page or character set that is marked eligible for capture is modified, the resource must be remarked by using the CHGFNTRSC command so that a new time and date stamp will be inserted into the resource. Failing to do so will result in the modified font resource still having the exact same identifiers as the original font resource. Having more than one font resource with the same identifying information makes it impossible to predict which one of the two resources will actually be used. This is especially important when a font resource exists in more than one library on the system, and when a font resource exists on multiple systems.

How Host Downloaded Resources are Identified: In contrast to captured fonts, host downloaded fonts remain in the printer across job boundaries, but not across instances of the printer writer. With host downloaded fonts, the printer writer knows the name and library of the font resource object and can insure that font resources with the same name but from different libraries are not mistaken for each other.

Guidelines: When using font capturing, make sure you know where the font resources are coming from. Consider the following suggestions to reduce the chance of unwanted font resources being captured by the printer.

1. Run the CHGFNTRSC command to update the time and date stamp for all modified font resources. If a modified font resource is not appropriate for use by everyone, including users from another system who share the printer, it should be marked as not eligible for capture.
2. Treat font resources, and the commands that operate on them as system resources to be used only by those users who need them. Allowing users to make personal copies of font resources increases the risk of having different fonts with the same identifying information.
3. To prevent font resources in user libraries from being captured, the PSF configuration object may be configured with USRRSCLIBL(*NONE). This causes the printer writer to ignore the user resource library list and search only those libraries in the resource library list.
4. If you are concerned about modified font resources in user libraries, or are sharing a printer with another system, you can take the following steps to assure that the writer does not use captured fonts. This may be appropriate for critical production jobs.
 - a. Turn off the capturing function by setting FNTCAPTURE(*NO) in the PSF Configuration object. This prevents any fonts from being captured and also assures that no captured resources will be used in the printer writer.
 - b. Run the CHGFNTRSC command with FNTCAPTURE(*NO) against the font resources used by the production jobs. This assures that the font resource will be downloaded, and that a captured font resource is never used.

Sharing Printers among Systems: If you share a printer among systems, it is imperative that all systems control the font resources that are allowed to be captured by the printer. If user modified fonts are captured by the printer, they become available for use by any system that shares the printer. This may produce undesirable results, because the modified font resource from another system may not be what is intended for use.

Security: Do not mark sensitive fonts, such as signatures and MICR fonts, as eligible to be captured. This is because there is no means for the host to clear captured fonts from the printer, and it is possible that an unauthorized person could access the captured font, even from another system.

Font Substitution Tables

The following tables contain information on fonts, character identifiers and other printing characteristics.

Notes:

1. The iSeries server supports Font Object Content Architecture (FOCA) 2 font character sets. This means it does not support the font character sets used by the various models of the IBM 3800 printer. For more information on FOCA 2 fonts, see the *Font Object Content Architecture Reference*, S544-3285.
2. Font global identifier (FGID) is used interchangeably with font ID in these tables.

Font Attributes

Font attributes are characteristics about a font that combine to give a font identity. An example of a font attribute would be bold or italic.

Table 21 on page 193 is a list of OS/400-supported fonts and their attributes.

Font Substitution

Table 22 on page 201 contains font ID substitution information which identifies which fonts are supported by certain printers.

For example: if your application specified a certain font ID that your printer did not support, you could find out which printers support that font and route your printed output to a printer that supports that font ID. Also, this table provides information on what fonts are substituted if the font id is not supported by the printer the document is routed to.

Font Substitution by Font ID Range

Table 23 on page 210 divides font IDs into ranges. The ranges represent fonts of the same weight and size. A default font is selected in each range for substitution when a font is not found.

For example, one range in the table is all font IDs greater than 0 but less than or equal to 65. These fonts are all Roman medium, 10 pitch fonts. The default font is Courier Roman medium, 10 pitch.

By using this table, you can identify which font ID is substituted for any font ID that is not in Table 22 on page 201.

You need to use this table only if you cannot find your font ID in Table 22 on page 201.

Host Resident to Printer Resident Font Character Set Mapping

Table 24 on page 211 contains the substitutions made when your application specifies a font character set and you want to print the spooled file on an AFP-configured 4224, 4230, 4234, 4247, or 64xx printer.

These printers do not support downloading of font character sets. These printers use font IDs. When the printer writer program sends the spooled file to one of these printers, a substitution from font character sets to font global identifiers (FGIDs) takes place.

A substitution occurs if: the host resident font character set, or code page, cannot be found on the iSeries server, and your printer supports printer resident fonts as well as host resident fonts. The system substitutes from host resident font character set to FGID. This is true for the printers that are listed above except for the: 3112, 3116, 3130, 3160-001, 3812, 3816, 3912, 3916, 3930, 3935, 4028, 4312, 4317, and the 4324 printer. It is also true for the Infoprint 20, Infoprint 32, Infoprint 60, Infoprint 3000, and Infoprint 4000 printers. This is true of host resident code pages to CPGIDs as well.

Go to Table 24 on page 211 to find out which FGID is substituted for each font character set.

Printer Resident to Host Resident Font Character Set Mapping

Table 25 on page 237 contains the substitutions made when your application specifies an FGID or font ID and you want to print the spooled file on a 3820, 3825, 3827, 3829, 3831, 3835, or 3900 Model 1 printer. These printers support only host font the case of the 38820 character sets.

The font character sets reside on the iSeries server. When the printer writer program sends the spooled file to one of these printers, a substitution from FGIDs to font character sets takes place.

Go to Table 25 on page 237 to find out which host font character set is substituted for each FGID.

Printer Resident to Host Resident Code Page Mapping

Table 26 on page 253 contains the substitutions made when your application specifies an OS/400 code page global identifier (CPGID) and you want to print the spooled file on a 3820, 3825, 3827, 3829, 3831, 3835 or 3900 printer.

These printers support code page names, but not CPGIDs.

When the printer writer program sends the spooled file to one of these printers, a substitution from CPGID to code page name takes place.

Go to Table 26 on page 253 to find out which code page name is substituted for each CPGID.

Character Identifier (CHRID) Values Supported

Table 27 on page 257 contains the character identifier (CHRID) values and supported printers for the different language groups.

Host Resident to Printer Resident Code Page Mapping

Table 28 on page 265 contains the substitutions made when your application specifies a code page name and you want to print the spooled file on an AFP-configured 4224, 4230, 4234, 4247, 6408, or 6412 printer.

These printers support CPGIDs, but not code page names.

When the printer writer program sends the spooled file to one of these printers, a substitution from code page name to CPGID takes place.

A substitution occurs if: the host resident font character set, or code page, cannot be found on the iSeries server and your printer supports printer resident fonts as well as host resident fonts. The system substitutes from host resident font character set to FGID. This is true for the printers that are listed above except for the: 3112, 3116, 3130, 3160-001, 3812, 3816, 3912, 3916, 3930, 3935, 4028, 4312, 4317, and the 4324 printer. It is also true for the Infoprint 20, Infoprint 32, Infoprint 60, Infoprint 3000, and Infoprint 4000 printers. This is true of host resident code pages to CPGIDs as well.

Go to Table 24 on page 211 to find out which FGID is substituted for each font character set.

Go to Table 28 on page 265 to find out which CPGID is substituted for each code page name.

Lines Per Inch (LPI) Values Supported

Table 29 on page 267 contains the lines per inch (LPI) values supported for certain printers.

Characters Per Inch (CPI) Values Supported

Table 30 on page 268 contains the characters-per-inch (CPI) values supported for certain printers.

4019 Printer Information

Table 31 on page 269 contains specific information about the 4019 printer.

4234 Compressed Font Substitution

Table 32 on page 272 contains information about font substitution on 4234 printers when printing with a lines per inch (LPI) value greater than or equal to 8.

Font Attributes: Font attributes are the characteristics or properties that combine to give a font identity. For example: attributes can be 14 point (height of the font), bold, and italic.

Types of Fonts: The following diagram identifies the types of fonts and gives examples of each type:

- Mixed pitch fonts which simulate proportionally spaced fonts.
Characters in the font have a limited number of widths. Overall spacing is about 12 characters per inch. Examples are Document or Essay fonts.
- Uniformly spaced fonts which are similar to typewriter fonts.
Characters in the font are all the same width. Examples are Courier and Gothic Text fonts. Some uniformly spaced fonts and many typographic fonts are scalable. For scalable fonts, specify a point size to indicate the size of the font. For example a 12 point uniformly spaced font corresponds to 10 CPI. An example of such a font is font 416, Courier Roman Medium. If no point size is specified when using scalable fonts, 10 point is defaulted.
- Typographic fonts
Typographic fonts have variable height, measured in points (1 point = 1/72 inch). Therefore, a 36-point font has characters that are 1/2 inch high. Typographic fonts have variable widths. Width is part of the design and varies on a character-by-character basis. Examples are Sonoran Serif and Century Schoolbook.

Mixed Pitch



Uniformly Spaced



Typographic

Printing on the AS/400	6 pt Century Schoolbook
Printing on the AS/400	8 pt Century Schoolbook
Printing on the AS/400	10 pt Century Schoolbook

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The legend and table below provide information about each font. This information could save you time in trial-and-error testing when choosing a font for your application.

Table Legend	
FGID	Font Global Identifier
Name	Name of Font
Font Type	U = Uniformly Spaced M = Mixed Pitch T = Typographic
Attributes	Blank = Roman b = Bold i = Italics s = Second Strike w = Double Wide

Table Legend	
Point	Point size (Blank for uniformly spaced & mixed pitch fonts) S = Scalable
Pitch	Characters per inch (For example, 17) S = Scalable

Table 21. Font Information

FGID	Name	Type of Font	Attributes	Point	Pitch (CPI)
2	Delegate	U			10
3	OCR-B	U			10
5	Rhetoric/Orator	U			
8	Scribe/Symbol	U			10
10	Cyrillic 22	U			10
11	Courier	U			10
12	Prestige	U			10
13	Artisan	U			10
18	Courier Italic	U	I		10
19	OCR-A	U			10
20	Pica	U			10
21	Katakana	U			10
25	Presentor	U			10
26	Matrix Gothic	U			10
30	Symbol	U			10
31	Aviv	U			10
36	Letter Gothic	U			10
38	Orator Bold	U	b		10
39	Gothic Bold	U	b		10
40	Gothic	U			10
41	Roman Text	U			10
42	Serif	U			10
43	Serif Italic	U	i		10
44	Katakana Gothic	U			10
46	Courier Bold	U	b		10
49	Shalom	U			10
50	Shalom Bold	U	b		10
51	Matrix Gothic	U			10
52	Courier	U			10
55	Aviv Bold	U	b		10
61	Nasseem	U			10

Table 21. Font Information (continued)

FGID	Name	Type of Font	Attributes	Point	Pitch (CPI)
62	Nasseem Italic	U	i		10
63	Nasseem Bold	U	b		10
64	Nasseem Italic Bold	U	bi		10
66	Gothic	U		12	
68	Gothic Italic	U	i		12
69	Gothic Bold	U	b		12
70	Serif	U			12
71	Serif Italic	U	i		12
72	Serif Bold	U	b		12
74	Matrix Gothic	U			12
75	Courier	U			12
76	APL	U			12
78	Katakana	U			12
80	Symbol	U			12
84	Script	U			12
85	Courier	U			12
86	Prestige	U			12
87	Letter Gothic	U			12
91	Light Italic	U	i		12
92	Courier Italic	U	i		12
95	Adjutant	U			12
96	Old World	U			12
98	Shalom	U			12
99	Aviv	U			12
101	Shalom Bold	U	b		12
102	Aviv Bold	U	b		12
103	Nasseem	U			12
109	Letter Gothic Italic	U	i		12
110	Letter Gothic Bold	U	b		12
111	Prestige Bold	U	b		12
112	Prestige Italic	U	i		12
154	Essay	M			12
155	Boldface Italic	M	bi		12
157	Title	M			12
158	Modern	M			12
159	Boldface	M	b		12
160	Essay	M			12
162	Essay Italic	M	i		12
163	Essay Bold	M	b		12
164	Prestige	M			12

Table 21. Font Information (continued)

FGID	Name	Type of Font	Attributes	Point	Pitch (CPI)
167	Barak	M			12
168	Barak Bold	M	b		12
173	Essay	M			12
174	Gothic	M			12
175	Document	M			12
178	Barak	M			18
179	Barak Bold	M	b		18
180	Barak	M			15
181	Barak Mixed Bold	M	b		15
182	Barak	M			5
183	Barak Bold	M	b		5
186	Press Roman	M			12
187	Press Roman Bold	M	b		12
188	Press Roman Italic	M	i		12
189	Press Roman Italic Bold	M	bi		12
190	Foundry	M			12
191	Foundry Bold	M	b		12
194	Foundry Italic	M	i		12
195	Foundry Italic Bold	M	bi		12
203	Data 1	U			13
204	Matrix Gothic	U			13
205	Matrix Gothic	U			13
211	Shalom	U			15
212	Shalom Bold	U	b		15
221	Prestige	U			15
222	Gothic	U			15
223	Courier	U			15
225	Symbol	U			15
226	Shalom	U			15
229	Serif	U			15
230	Gothic	U			15
232	Matrix Gothic	U			15
233	Matrix Courier	U			15
234	Shalom Bold	U	b		15
244	Courier Double Wide	U	w		5
245	Courier Bold Double Wide	U	wb		5
247	Shalom Bold	U	b		17
248	Shalom	U			17
249	Katakana	U			17
252	Courier	U			17

Table 21. Font Information (continued)

FGID	Name	Type of Font	Attributes	Point	Pitch (CPI)
253	Courier Bold	U	b		17
254	Courier	U			17
255	Matrix Gothic	U			17
256	Prestige	U			17
258	Matrix Gothic	U			18
259	Matrix Gothic	U			18
279	Nasseem	U			17
281	Gothic Text	U			20
282	Aviv	U			20
283	Letter Gothic	U			20
285	Letter Gothic	U			25
290	Gothic Text	U			27
300	Gothic	U		S	17, S
304	Gothic Text	U		S	S
305	OCR-A	U		S	S
306	OCR-B	U		S	S
307	APL	U		S	S
318	Prestige Bold	U	b	S	S
319	Prestige Italic	U	i	S	S
322	APL Bold	U	b	S	S
400	Gothic	U		S	17, S
404	Letter Gothic Bold	U	b	S	S
416	Courier Roman Medium	U		S	S
420	Courier Roman Bold	U	b	S	S
424	Courier Roman Italic	U	i	S	S
428	Courier Roman Italic Bold	U	bi	S	S
432	Prestige	U		S	S
434	Orator Bold	U	b		8
435	Orator Bold	U	b		6
751	Sonoran Serif	T		8P.	27
752	Nasseem	T		12P	18
753	Nasseem Bold	T	b	12P	18
754	Nasseem Bold	T	b	18P	12
755	Nasseem Bold	T	b	24P	9
756	Nasseem Italic	T	i	12P	18
757	Nasseem Bold Italic	T	bi	12P	18
758	Nasseem Bold Italic	T	bi	18P	12
759	Nasseem Bold Italic	T	bi	24P	9
760	Times Roman	T		6P	36
761	Times Roman Bold	T	b	12P	18

Table 21. Font Information (continued)

FGID	Name	Type of Font	Attributes	Point	Pitch (CPI)
762	Times Roman Bold	T	b	10P	15
763	Times Roman Italic	T	i	12P	18
764	Times Roman Bold Italic	T	bi	10P	21
765	Times Roman Bold Italic	T	bi	12P	18
1051	Sonoran Serif	T		10P	21
1053	Sonoran Serif Bold	T	b	10P	21
1056	Sonoran Serif Italic	T	i	10P	21
1351	Sonoran Serif	T		12P	18
1653	Sonoran Serif Bold	T	b		13
1803	Sonoran Serif Bold	T	b	18P	12
2103	Sonoran Serif Bold	T	b	24P	9
2304	Helvetica Roman Medium	T		S	S
2305	Helvetica Roman Bold	T	b	S	S
2306	Helvetica Roman Italic	T	i	S	S
2307	Helvetica Roman Italic Bold	T	bi	S	S
2308	Times New Roman Medium	T		S	S
2309	Times New Roman Bold	T	b	S	S
2310	Times New Roman Italic	T	i	S	S
2311	Times New Roman Italic Bold	T	bi	S	S
4407	Sonoran Serif	T		8P	*27
4407	Sonoran Serif	T		10P	*21
4407	Sonoran Serif	T		12P	*18
4427	Sonoran Serif Bold	T	b	10P	*21
4427	Sonoran Serif Bold	T	b	16P	*13
4427	Sonoran Serif Bold	T	b	24P	*9
4535	Sonoran Serif Italic	T	i	10P	*21
4919	Goudy	T		6P	*36
4919	Goudy	T		8P	*27
4919	Goudy	T		10P	*21
4919	Goudy	T		12P	*18
4939	Goudy Bold	T	T	10P	*21
4939	Goudy Bold	T	b	14P	*15
4939	Goudy Bold	T	b	18P	*12
5047	Goudy Italic	T	i	10P	*21
5067	Goudy Bold Italic	T	bi	10P	*21
5687	Times Roman	T		6P	*36
5687	Times Roman	T		8P	*27
5687	Times Roman	T		10P	*21
5687	Times Roman	T		12P	*18
5707	Times Roman Bold	T	b	10P	*21

Table 21. Font Information (continued)

FGID	Name	Type of Font	Attributes	Point	Pitch (CPI)
5707	Times Roman Bold	T	b	12P	*18
5707	Times Roman Bold	T	b	14P	*15
5707	Times Roman Bold	T	b	18P	*12
5707	Times Roman Bold	T	b	24P	*12
5815	Times Roman Italic	T	i	10P	*21
5815	Times Roman Italic	T	i	12P	*18
5835	Times Roman Italic Bold	T	bi	10P	*21
5835	Times Roman Italic Bold	T	bi	12P	*18
5943	University	T		12P	*18
5943	University	T		14P	*15
5943	University	T		18P	*12
6199	Palatino	T		6P	*36
6199	Palatino	T		8P	*27
6199	Palatino	T		10P	*21
6199	Palatino	T		12P	*18
6219	Palatino Bold	T	b	10P	*21
6219	Palatino Bold	T	b	14P	*15
6219	Palatino Bold	T	b	18P	*12
6327	Palatino Italic	T	i	10P	*21
6347	Palatino Italic Bold	T	bi	10P	*21
8503	Baskerville	T		6P	*36
8503	Baskerville	T		8P	*27
8503	Baskerville	T		10P	*21
8503	Baskerville	T		12P	*18
8523	Baskerville Bold	T	b	10P	*21
8523	Baskerville Bold	T	b	14P	*15
8523	Baskerville Bold	T	b	18P	*12
8631	Baskerville Italic	T	i	10P	*21
8651	Baskerville Italic Bold	T	bi	10P	*21
8759	Nasseem	T		12P	*18
8779	Nasseem Bold	T	b	12P	*18
8779	Nasseem Bold	T	b	18P	*12
8779	Nasseem Bold	T	b	24P	*9
8887	Nasseem Italic	T	i	12P	*18
8907	Nasseem Italic Bold	T	bi	12P	*18
8907	Nasseem Italic Bold	T	bi	18P	*12
8907	Nasseem Italic Bold	T	bi	24P	*9
12855	Narkisim	T		8P	*27
12855	Narkisim	T		10P	*21
12855	Narkisim	T		18P	*12

Table 21. Font Information (continued)

FGID	Name	Type of Font	Attributes	Point	Pitch (CPI)
12855	Narkisim	T		24P	*9
12875	Narkisim Bold	T	b	8P	*27
12875	Narkisim Bold	T	b	10P	*21
12875	Narkisim Bold	T	b	12P	*18
16951	Century Schoolbook	T		6P	*36
16951	Century Schoolbook	T		8P	*27
16951	Century Schoolbook	T		10P	*21
16951	Century Schoolbook	T		12P	*18
16971	Century Schoolbook Bold	T	b	10P	*21
16971	Century Schoolbook Bold	T	b	14P	*15
16971	Century Schoolbook Bold	T	b	18P	*12
17079	Century Schoolbook Italic	T	i	10P	*21
17099	Century Schoolbook Italic Bold	T	bi	10P	*21
20224	Boldface	T	b	S	S
33335	Optima	T		6P	*36
33335	Optima	T		8P	*27
33335	Optima	T		10P	*21
33335	Optima	T		12P	*18
33355	Optima Bold	T	b	10P	*21
33355	Optima Bold	T	b	14P	*15
33355	Optima Bold	T	b	18P	*12
33463	Optima Italic	T	i	10P	*21
33483	Optima Italic Bold	T	bi	10P	*21
33591	Futura	T		6P	*36
33591	Futura	T		8P	*27
33591	Futura	T		10P	*21
33591	Futura	T		12P	*18
33601	Futura Bold	T	b	10P	*21
33601	Futura Bold	T	b	14P	*15
33601	Futura Bold	T	b	18P	*12
33719	Futura Italic	T	i	10P	*21
33729	Futura Italic Bold	T	bi	10P	*21
34103	Helvetica	T		6P	*36
34103	Helvetica	T		8P	*27
34103	Helvetica	T		10P	*21
34103	Helvetica	T		12P	*18
34123	Helvetica Bold	T	b	10P	*21
34123	Helvetica Bold	T	b	14P	*15
34123	Helvetica Bold	T	b	18P	*12

Table 21. Font Information (continued)

FGID	Name	Type of Font	Attributes	Point	Pitch (CPI)
34231	Helvetica Italic	T	i	10P	*21
34251	Helvetica Italic Bold	T	bi	10P	*21
37431	Old English	T		12P	*18
37431	Old English	T		14P	*15
37431	Old English	T		18P	*12
41783	Coronet Cursive	T		12P	*18
41803	Coronet Cursive Bold	T	b	14P	*15
41803	Coronet Cursive Bold	T	b	18P	*12

Note: Pitch or CPI column for typographic fonts indicates the width of the space character between printed characters. Width, pitch, and CPI of other space characters will vary.

Font Substitution: Font substitution is done by the iSeries server when the application specifies a font ID that is not supported by the designated printer or cannot be downloaded from the system to the designated printer.

Table 22 on page 201 lists many fonts (by FGID number) and printers that are supported. A blank in any column indicates that the font ID is supported by that printer, and no substitution takes place. However, if your application specifies a font ID that is not in the table, you need to refer to Table 23 on page 210. Table 23 on page 210 provides the substituted FGID for font IDs in ranges such as FGID 0 through FGID 65.

How To Use the Font Substitution Charts: Following are three examples to familiarize you with font substitution on the iSeries server.

- Example one shows how to verify whether or not your font ID is supported by a certain printer.
- Example two shows how to find out what font ID the system substitutes if the printer you want to use does not support your font ID.
- Example three shows how to find out what font ID the system substitutes if your font ID is not available on the system or on the printer.

Example One: If you want to verify that a font ID is supported by a certain printer, locate the font ID in Table 22 on page 201. For example, locate font ID 112. Font ID 112 is supported by the 3812 and 3816 SCS and IPDS printers and the 4028 printer (this is indicated by blanks in those spaces). The 4019 printer supports font ID 112 on a font card resident in the 4019 printer. The 4224, 4234, and 5219 printers substitute font ID 87 or 86.

Note: A font card is a hardware card that can have many font character sets resident on it. Font cards can be installed in printers to provide additional fonts.

Example Two: If your application uses a font ID that is not supported on all printers, you can determine the substitution by looking in Table 22 on page 201. For example, locate font ID 30. The table shows that font ID 30 is supported on the 3812 and 3816 SCS and IPDS printers. However, if you are using any of the other printers listed in the table, font ID 11 is substituted for font ID 30.

Example Three: Let us say your application calls for font ID 4 and you want to print the spooled file on a 4224 printer. To determine if font ID 4 is a supported font or one that is substituted for, read through the following steps:

Step 1 Look in Table 22 on page 201 to see if font ID 4 is listed. Font ID 4 is not in Table 22 on page 201.

Step 2 Next, look in Table 23 on page 210. The table shows that font ID 11 is substituted for fonts 0 through 65.

Step 3 Return to Table 22 and locate font ID 11. This table shows that font ID 11 is supported on the 4224 printer.

Step 4 The result of the font ID substitution is that your application will print using font ID 11.

Changing Font IDs: To permanently change the font ID, you could, in your application, specify a different font ID or use the Change Printer File (CHGPRTF) command to specify a new font ID for the printer file. Information in Table 21 on page 193 ID.

To temporarily change the font ID for your application, you could override the font selection in your printer file by using the Override with Printer File (OVRPRTF) command before the application runs.

Font Substitution and the 4019 Printer: The 4019 printer is supported by the iSeries server, as an emulated printer (usually 3812 or 5219). The system treats the device as a physical 3812 or 5219. Therefore, the font support and font substitution of the emulated printer is used. This emulation limits access to some of the 4019 fonts.

To access most of the 4019-supported fonts, an IBM-supplied program named QWP4019 is available. QWP4019 sets a flag in the emulated printer's device description to inform the system to use the 4019 font tables.

For more information and examples on how the QWP4019 program works, see Table 15 on page 123.

Note to Reader:

An asterisk is used in the following chart to indicate that the substituted font may have a different pitch. When the substituted font is scalable, the pitch is the same.

Table 22. Font Substitution

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
2	11	11	11	11	11	11 ²		11
3					11			
5	11	26				11 ²		11
8	11	11	11	11	11	11		11
10	11	11	11	11	11	11		*416
11								
12	11	26						
13	11	11				11	11	11
18	11	26			11			
19					11			
20	11	26				11	11	*432
21	11	11	11	11	11	11		*304

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
25	11	11	11	11	11	11 ²		11
26						11	11	11
30	11	11			11	11	11	11
31	26	26	26		26	11	11	*416
36	11	11	11	11	11	11 ²		*400
38	11	26			11	46	46	46
39	26	26			11	46	46	46
40	26	26			11	11	11	*304
41	11	26			11	11	11	11
42	11	26			11	11	11	11
43	11	26			11	18	11	18
44	11	11			11	11	11	*304
46	11	26			11			
49	26	26	26		26	11		*416
50	26	26			26	46		*420
51	26				26	11	11	11
52	11				11	11	11	11
55	26	26	26		26	46	46	*420
61	11	11	11	11	11	11		*416
62	11	11	11	11	11	18		*424
63	11	11	11	11	11	46		*420
64	11	11	11	11	11	46		*428
66	87	87			87	85	85	*304
68	87	87			87	92	85	92
69	87	87			87	111	85	111
70	87	87			87	85	85	85
71	87	87			87	92	85	92
72	87	87			87	111	85	111
74	87		87	87	87	85	85	85
75	85		85	85	85	85	85	85
76	85	85	85	85	85			
78	85	85	85	85	85	85		*304
80	87	87				85		85
84	87	87				85 ²		85

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
85								
86	87	87						
87						85 ²		*400
91	87	87				92 ²		92
92	85	85	85	85	85			
95	85	85	85	85	85	85 ²		85
96	85	85	85	85	85	85 ²		85
98	87	87	87		87	85		*416
99	87	87	87		87	85	85	*416
101	87	87	87		87	111	85	*416
102	87	87	87		87	111	85	*420
103	85	85	85	85	85	85		*416
109	85	85	85	85	85	92 ²		92
110	87	87			87	11 ²		*404
111	87	87			86			
112	87	87			86			
154	85		160	160	160	164	159	159
155	160	160			160	159 ²		159
157	160	160	160	160	160	164 ²		159
158	160	160				164 ²		159
159	160	160						
160						164 ²		159
162	160	160				164 ²		159
163	160	160			160	159	159	159
164	160	160	160	160	160			159
167	160	160	160		160	164		*416
168	160	160	160		160	159	159	*420
173	160	160			160	164	159	159
174	160	160	160	160	160	164	159	159
175	160	160			160	164	159	159
178	*400	*258	*281		*222	*281	*254	*416
179	*400	*258	*281		*222	*281	*254	*420
180	*222	*222	*230		*222	*223	*254	*416
181	*222	*222	*230		*222	*223	*254	*420

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
182	*11	*11	*244		*11	*11	*11	*416
183	*11	*11	*244		*11	*46	*46	*420
186	160	160	160	160	160	164 ²		159
187	160	160	160	160	160	159 ²		159
188	160	160	160	160	160	164 ²		159
189	160	160	160	160	160	159 ²		159
190	160	160	160	160	160	164 ²		159
191	160	160	160	160	160	159 ²		159
194	160	160	160	160	160	164 ²		159
195	160	160	160	160	160	159 ²		159
203	*222	204	204	204	*222		*254	*416
204	*222				*222	*223	*254	*304
205	*222		204	204	*222	*223	*254	*416
211	222	222	230		222	223	*254	*416
212	222	222	230		222	223	*254	*420
221	222	222						
222			230	230		223 ²		*304
223								
225	222	222				223	*254	223
226	222	222	230		222	223		*416
229	222	222			222	223	*254	223
230	222	222			222	223	*254	*304
232	222		230	230	222	223	*254	*223
233	223		230	230	223	223	*254	223
234	222	222	230		222	223	*254	*420
244	*11	*26			*11	*11		*416
245	*11	*26			*11	*46		*420
247	*400	*258	252		*222	254	254	*420
248	*400	*258	252		*222	254	254	*416
249	*400	*258	252	252	*222	254		*304
252	*400	*258			*222	254	254	254
253	*400	*258			*222	254	254	*420
254	*400	*258			*222.			
255	*400	*258	252	252	*222	254		254

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
256	*400	*258	252	252	*222.			
258	*400		*281	*281	*222	*281	*254	*416
259	*400		*281	*281	*222	*281	*254	*416
279	*400	*258	252	252	*222	254		*416
281	*400	*258			*222			
282	*400	*258	281		*222	281		*416
283	*400	*258	281	281.	*222	281		*400
285	*400	*258	*290	*290	*222	281 ²		*400
290	*400	*258			*222		*254	*416
300	400		*252	*252	*222	*254	*254	*416
304	*26	*26	*26	*26	*26	*11	*11	
305	*19	*19	*19	*19	*11	*19	*19	
306	*3	*3	*3	*3	*11	*3	*3	
307	*85	*85	*85	*85	*85	*76	*76	
318	*11	*26	*12	*12	*12	*12	*12	
319	*11	*26	*12	*12	*12	*12	*12	
322	*85	*85	*85	*85	*85	*76	*76	
400			*252	*252	*222	*254	*254	
404	*26	*26	*39	*39	*11	*46	*46	
416	*11	*11	*11	*11	*11	*11	*11	
420	*11	*26	*46	*46	*11	*46	*46	
424	*11	*26	*18	*18	*11	*18	*18	
428	*11	*26	*18	*18	*11	*18	*18	
432	*11	*26	*12	*12	*12	*12	*12	
434	*11	*11	*11	*11	*11	46 ²		*420
435	*11	*11	*11	*11	*11	46 ²		*420
751	*400	*258			*222.		*254	
752	*400	*258	*281	*281	*222		*254	*2308
753	*400	*258	*281	*281	*222		*254	*2309
754	*85	*85	*85	*85	*85		*85	*2309
755	*11	*11	*11	*11	*11		*46	*2309
756	*400	*258	*281	*281	*222		*254	*2310
757	*400	*258	*281	*281	*222		*254	*2311
758	*85	*85	*85	*85	*85		*85	*2311

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
759	*11	*11	*11	*11	*11		*46	*2311
760	*400	*258	*290	*290	*222		*254	
761	*400	*258	*281	*281	*222		*254	
762	*222	*222	*230	*230	*222		*254	
763	*400	*258	*281	*281	*222		*254	
764	*400	*258	*290	*290	*222		*254	
765	*400	*258	*281	*281	*222		*254	
1051	*400	*258			*222		*254	
1053	*400	*258			*222		*254	
1056	*400	*258			*222		*254	
1351	*400	*258			*222		*254	
1653	*222	*222			*222		*254	*2309
1803	*85	*85	*85	*85	*85		*85	
2103	*11	*11			*11		*46	
2304	*400	*258	*290	*290	*222	*760	*254	
2305	*400	*258	*281	*281	*222	*761	*254	
2306	*400	*258	*281	*281	*222	*763	*254	
2307	*400	*258	*280	*290	*222	*764	*254	
2308	*400	*258	*290	*290	*222	*760	*254	
2309	*400	*258	*281	*281	*222	*761	*254	
2310	*400	*258	*281	*281	*222	*763	*254	
2311	*400	*258	*290	*290	*222	*764	*254	
4407 (8P)	*400	*258			*222	5687 ²	*254	*2308
4407 (10P)	*400	*258			*222	5687 ²	*254	*2308
4407 (12P)	*400	*258			*222	5687 ²	*254	*2308
4427 (10P)	*400	258			*222	5687 ²	*254	*2309
4427 (16P)	*222	*222			*11	*5707	*254	*2309
4427 (24P)	*11	*11			*11	5707 ²	*254	*2309
4535 (10P)	*400	*258			*222	5687 ²	*46	*2310
4919 (6P)	*400	*258	*290	*290	*222	5687 ²		*2308
4919 (8P)	*400	*258	*751	*751	*222	5687 ²		*2308
4919 (10P)	*400	*258	*1051	*1051	*222	5687 ²		*2308
4919 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
4939 (10P)	*400	*258	*1053	*1053	*222	5707 ²		*2309

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
4939 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2309
4939 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2309
5047 (10P)	*400	*258	*1056	*1056	*222	5687 ²		*2310
5067 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2311
5687 (6P)	*400	*258	*290	*290	*222			
5687 (8P)	*400	*258	*751	*751	*222			
5687 (10P)	*400	*258	*1051	*1051	*222			
5687 (12P)	*400	*258	*1351	*1351	*222			
5707 (10P)	*400	*258	*1053	*1053	*222			
5707 (12P)	*400	*258	*1351	*1351	*222		*254	
5707 (14P)	*222	*222	*1351	*1351	*222			
5707 (18P)	*85	*85	*1653	*1653	*85			
5707 (24P)	*11	*11	*2103	*2103	*11			
5815 (10P)	*400	*258	*1056	*1056	*222			
5815 (12P)	*400	*258	*1351	*1351	*222		*254	
5835 (10P)	*400	*258	*1053	*1053	*222			
5835 (12P)	*400	*258	*1351	*1351	*222			
5943 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
5943 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2308
5943 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2308
6199 (6P)	*400	*258	*290	*290	*222	5687 ²		*2308
6199 (8P)	*400	*258	*751	*751	*222	5687 ²		*2308
6199 (10P)	*400	*258	*1051	*1051	*222	5687 ²		*2308
6199 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
6219 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2309
6219 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2309
6219 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2309
6327 (10P)	*400	*258	*1056	*1056	*222	5687 ²		*2310
6347 (10P)	*400	*258	*1053	*1053	*222	5686 ²		*2311
8503 (6P)	*400	*258	*290	*290	*222	5687 ²		*2308
8503 (8P)	*400	*258	*751	*751	*222	5687 ²		*2308
8503 (10P)	*400	*258	*1051	*1051	*222	5687 ²		*2308
8503 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
8523 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2309

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
8523 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2309
8523 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2309
8631 (10P)	*400	*258	*1056	*1056	*222	5687 ²		*2310
8651 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2311
8759 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
8779 (12P)	*400	*258	*1351	*1351	*222	5707 ²		*2309
8779 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2309
8779 (24P)	*11	*11	*2103	*2103	*11	5707 ²		*2309
8887 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2310
8907 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2311
8907 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2311
8907 (24P)	*11	*11	*2103	*2103	*11	5707 ²		*2311
12855 (8P)	*400	*258	*751		*222	5687 ²		*2308
12855 (10P)	*400	*258	*1051	*1051	*222	5687 ²		*2308
12855 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2308
12855 (24P)	*11	*11	*2103	*2103	*11	5707 ²		*2308
12875 (8P)	*400	*258	*751		*222	5687 ²		*2309
12875 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2309
12875 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2309
16951 (6P)	*400	*258	*290	*290	*222	5687 ²		*2308
16951 (8P)	*400	*258	*751	*751	*222	5687 ²		*2308
16951 (10P)	*400	*258	*1051	*1051	*222	5687 ²		*2308
16951 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
16971 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2309
16971 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2309
16971 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2309
17079 (10P)	*400	*258	*1056	*1056	*222	5687 ²		*2311
17099 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2311
20224	*160	*160	*159	*159	*159	*159	*159	
33335 (6P)	*400	*258	*290	*290	*222	5687 ²		*2308
33335 (8P)	*400	*258	*751	*751	*222	5687 ²		*2308
33335 (10P)	*400	*258	*1051	*1051	*222	5687 ²		*2308
33335 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
33355 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2309

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
33355 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2309
33355 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2309
33463 (10P)	*400	*258	*1056	*1056	*222	5687 ²		*2310
33483 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2311
33591 (6P)	*400	*258	*290	*290	*222	5687 ²		*2308
33591 (8P)	*400	*258	*751	*751	*222	5687 ²		*2308
33591 (10P)	*400	*258	*1051	*1051	*222	5687 ²		*2308
33591 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
33601 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2309
33601 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2309
33601 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2309
33719 (10P)	*400	*258	*1056	*1056	*222	5687 ²		*2310
33729 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2311
34103 (6P)	*400	*258	*290	*290	*222	5687 ²		*2304
34103 (8P)	*400	*258	*751	*751	*222	5687 ²		*2304
34103 (10P)	*400	*258	*1051	*1051	*222	5687 ²		*2304
34103 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2304
34123 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2305
34123 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2305
34123 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2305
34231 (10P)	*400	*258	*1056	*1056	*222	5687 ²		*2306
34251 (10P)	*400	*258	*1053	*1053	*222	5687 ²		*2307
37431 (12)	*400	*258	*1351	*1351	*222	5687 ²		*2308
37431 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2308
37431 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2308
41783 (12P)	*400	*258	*1351	*1351	*222	5687 ²		*2308
41803 (14P)	*222	*222	*1351	*1351	*222	5707 ²		*2309
41803 (18P)	*85	*85	*1653	*1653	*85	5707 ²		*2309

Table 22. Font Substitution (continued)

FGID	Printers							
	4224 4230 IPDS	4234 IPDS	3812 or 3816 SCS	3812 or 3816 IPDS	5219	3112 3116 3912 3916 4028 4312 4317 4324 Infoprint 20, Infoprint 32	4019 ¹	3130 3160 3935 Infoprint 3000 Infoprint 4000
Notes:								
¹	The 4019 printer has five resident fonts: FGID 11, 46, 85, 159, and 254. The iSeries server sends any of those FGIDs that do not show a substitution in Table 22 on page 201 to the emulator that the 4019 is attached to. The emulator may not support all of the FGIDs and may report an error or perform a substitution of its own.							
²	The 4028 performs the font substitution as shown unless a font card has been installed that contains that FGID. For example, if a font card with an FGID of 2 is installed, the iSeries server sends the FGID of 2 to the printer. However, if the font card is not installed, the system substitutes an FGID of 11.							

Font Substitution by Font ID Range: If your application specifies a font ID that is not found in Table 22 on page 201 or is not resident in the printer (font card), the system makes a substitution based on the font ID ranges in the following table. For example, if font ID 4 is specified in your application, the iSeries server substitutes font ID 11 as shown in the table below.

Table 23. Font Substitution by Font ID Range.

FGID	Substituted FGID
Fonts 0 through 65	11
Fonts 66 through 153	85
Fonts 154 through 200	160
Fonts 201 through 210	204
Fonts 211 through 239	223
Fonts 240 through 246	245
Fonts 247 through 257	252
Fonts 258 through 259	259
Fonts 260 through 273	434
Fonts 274 through 279	279
Fonts 280 through 284	281
Fonts 285 through 289	285
Fonts 290 through 299	290
Fonts 300 through 511	252
Fonts 512 through 2303	252

Table 23. Font Substitution by Font ID Range. (continued)

FGID		Substituted FGID
Fonts 2304 through 3839 or Fonts 4069 through 65279	Fonts with point size equal to 0 or not specified	252
	Fonts with point size greater than 0 but less than 7.6	5687-6p
	Fonts with point size greater than or equal to 7.6 but less than 9.6	5687-8p
	Fonts with point size greater than or equal to 9.6 but less than 11.6	5687-10p
	Fonts with point size greater than or equal to 11.6 but less than 13.6	5687-12p
	Fonts with point size greater than or equal 13.6 but less than 17.6	5707-14p
	Fonts with point size greater than or equal to 17.6 but less than 23.6	5707-18p
	Fonts with point size greater than or equal to 23.6	5707-24p
Fonts 3840 through 4095 (User-defined)		No Substitution
Fonts 65280 through 65534 (User-defined)		No Substitution

Host Resident to Printer Resident Font Character Set Mapping: If your application specifies a host resident font character set (fonts are stored on the iSeries server) and you want to print the spooled file on an AFP-configured 4224, 4230, 4234, or 64xx printer, the system must substitute a printer resident font character set (fonts stored on the printer).

The following table can help you determine what printer resident font character set is requested when your spooled file references a host resident font character set instead of a registered font identifier (ID). This font substitution is necessary because these printers do not support the downloading of 240-pel host resident font character sets. Depending upon the host resident font character set that is requested, the appropriate registered ID value, font width value, and font attributes are selected to match (as closely as possible) your font request.

The font width specifies the width of the blank character in 1440ths of an inch. This is an indicator of how many characters will fit per inch of space on the paper.

The Map Fidelity indicates whether or not the substituted printer resident font is considered to be an exact match to the font character set that is requested in your spooled file.

Table 24. Host Resident to Printer Resident Font Character Set Mapping

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0A053A0	33077	73	Normal	Exact
C0A053B0	33077	80	Normal	Exact
C0A053D0	33077	93	Normal	Exact
C0A053F0	33077	107	Normal	Exact
C0A053H0	33077	120	Normal	Exact
C0A053J0	33077	133	Normal	Exact
C0A053N0	33077	160	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0A053T0	33077	200	Normal	Exact
C0A053Z0	33077	240	Normal	Exact
C0A05300	33077	67	Normal	Exact
C0A05360	33077	40	Normal	Exact
C0A05370	33077	47	Normal	Exact
C0A05380	33077	53	Normal	Exact
C0A05390	33077	60	Normal	Exact
C0A055A0	33079	73	Normal	Exact
C0A055B0	33079	80	Normal	Exact
C0A055B1	33079	320	Normal	Exact
C0A055D0	33079	93	Normal	Exact
C0A055F0	33079	107	Normal	Exact
C0A055H0	33079	120	Normal	Exact
C0A055J0	33079	133	Normal	Exact
C0A055N0	33079	160	Normal	Exact
C0A055N1	33079	400	Normal	Exact
C0A055T0	33079	200	Normal	Exact
C0A055Z0	33079	240	Normal	Exact
C0A055Z1	33079	480	Normal	Exact
C0A05500	33079	67	Normal	Exact
C0A05560	33079	40	Normal	Exact
C0A05570	33079	47	Normal	Exact
C0A05580	33079	53	Normal	Exact
C0A05590	33079	60	Normal	Exact
C0A057A0	33081	73	Normal	Exact
C0A057B0	33081	80	Normal	Exact
C0A057D0	33081	93	Normal	Exact
C0A057F0	33081	107	Normal	Exact
C0A057H0	33081	120	Normal	Exact
C0A057J0	33081	133	Normal	Exact
C0A057N0	33081	160	Normal	Exact
C0A057T0	33081	200	Normal	Exact
C0A057Z0	33081	240	Normal	Exact
C0A05700	33081	67	Normal	Exact
C0A05760	33081	40	Normal	Exact
C0A05770	33081	47	Normal	Exact
C0A05780	33081	53	Normal	Exact
C0A05790	33081	60	Normal	Exact
C0A073A0	33097	73	Bold	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0A073B0	33097	80	Bold	Exact
C0A073D0	33097	93	Bold	Exact
C0A073F0	33097	107	Bold	Exact
C0A073H0	33097	120	Bold	Exact
C0A073J0	33097	133	Bold	Exact
C0A073N0	33097	160	Bold	Exact
C0A073T0	33097	200	Bold	Exact
C0A073Z0	33097	240	Bold	Exact
C0A07300	33097	67	Bold	Exact
C0A07360	33097	40	Bold	Exact
C0A07370	33097	47	Bold	Exact
C0A07380	33097	53	Bold	Exact
C0A07390	33097	60	Bold	Exact
C0A075A0	33099	73	Bold	Exact
C0A075B0	33099	80	Bold	Exact
C0A075B1	33099	320	Bold	Exact
C0A075D0	33099	93	Bold	Exact
C0A075F0	33099	107	Bold	Exact
C0A075H0	33099	120	Bold	Exact
C0A075J0	33099	133	Bold	Exact
C0A075N0	33099	160	Bold	Exact
C0A075N1	33099	400	Bold	Exact
C0A075T0	33099	200	Bold	Exact
C0A075Z0	33099	240	Bold	Exact
C0A075Z1	33099	480	Bold	Exact
C0A07500	33099	67	Bold	Exact
C0A07560	33099	40	Bold	Exact
C0A07570	33099	47	Bold	Exact
C0A07580	33099	53	Bold	Exact
C0A07590	33099	60	Bold	Exact
C0A077A0	33101	73	Bold	Exact
C0A077B0	33101	80	Bold	Exact
C0A077D0	33101	93	Bold	Exact
C0A077F0	33101	107	Bold	Exact
C0A077H0	33101	120	Bold	Exact
C0A077J0	33101	133	Bold	Exact
C0A077N0	33101	160	Bold	Exact
C0A077T0	33101	200	Bold	Exact
C0A077Z0	33101	240	Bold	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0A07700	33101	67	Bold	Exact
C0A07760	33101	40	Bold	Exact
C0A07770	33101	47	Bold	Exact
C0A07780	33101	53	Bold	Exact
C0A07790	33101	60	Bold	Exact
C0A153A0	33205	73	Italic	Exact
C0A153B0	33205	80	Italic	Exact
C0A153D0	33205	93	Italic	Exact
C0A153F0	33205	107	Italic	Exact
C0A153H0	33205	120	Italic	Exact
C0A153J0	33205	133	Italic	Exact
C0A153N0	33205	160	Italic	Exact
C0A153T0	33205	200	Italic	Exact
C0A153Z0	33205	240	Italic	Exact
C0A15300	33205	67	Italic	Exact
C0A15360	33205	40	Italic	Exact
C0A15370	33205	47	Italic	Exact
C0A15380	33205	53	Italic	Exact
C0A15390	33205	60	Italic	Exact
C0A155A0	33207	73	Italic	Exact
C0A155B0	33207	80	Italic	Exact
C0A155B1	33207	320	Italic	Exact
C0A155D0	33207	93	Italic	Exact
C0A155F0	33207	107	Italic	Exact
C0A155H0	33207	120	Italic	Exact
C0A155J0	33207	133	Italic	Exact
C0A155N0	33207	160	Italic	Exact
C0A155N1	33207	400	Italic	Exact
C0A155T0	33207	200	Italic	Exact
C0A155Z0	33207	240	Italic	Exact
C0A155Z1	33207	480	Italic	Exact
C0A15500	33207	67	Italic	Exact
C0A15560	33207	40	Italic	Exact
C0A15570	33207	47	Italic	Exact
C0A15580	33207	53	Italic	Exact
C0A15590	33207	60	Italic	Exact
C0A175A0	33227	73	Bold Italic	Exact
C0A175B0	33227	80	Bold Italic	Exact
C0A175B1	33227	320	Bold Italic	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0A175D0	33227	93	Bold Italic	Exact
C0A175F0	33227	107	Bold Italic	Exact
C0A175H0	33227	120	Bold Italic	Exact
C0A175J0	33227	133	Bold Italic	Exact
C0A175N0	33227	160	Bold Italic	Exact
C0A175N1	33227	400	Bold Italic	Exact
C0A175T0	33227	200	Bold Italic	Exact
C0A175Z0	33227	240	Bold Italic	Exact
C0A175Z1	33227	480	Bold Italic	Exact
C0A17500	33227	67	Bold Italic	Exact
C0A17560	33227	40	Bold Italic	Exact
C0A17570	33227	47	Bold Italic	Exact
C0A17580	33227	53	Bold Italic	Exact
C0A17590	33227	60	Bold Italic	Exact
C0BPOSA0	323	120	Normal	Exact
C0BPOSN	323	240	Normal	Exact
C0BPOSB0	323	168	Normal	Exact
C0BPOS91	323	144	Normal	Exact
C0B20CA0	335	73	Normal	Exact
C0B20CB0	335	80	Normal	Exact
C0B20CD0	335	93	Normal	Exact
C0B20CF0	335	107	Normal	Exact
C0B20CH0	335	120	Normal	Exact
C0B20CJ0	335	133	Normal	Exact
C0B20CN0	335	160	Normal	Exact
C0B20CT0	335	200	Normal	Exact
C0B20CZ0	335	240	Normal	Exact
C0B20C00	335	67	Normal	Exact
C0B20C50	335	33	Normal	Exact
C0B20C60	335	40	Normal	Exact
C0B20C70	335	47	Normal	Exact
C0B20C80	335	53	Normal	Exact
C0B20C90	335	60	Normal	Exact
C0B200A0	335	73	Normal	Exact
C0B200B0	335	80	Normal	Exact
C0B200D0	335	93	Normal	Exact
C0B200F0	335	107	Normal	Exact
C0B200H0	335	120	Normal	Exact
C0B200J0	335	133	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
COB200N0	335	160	Normal	Exact
COB200T0	335	200	Normal	Exact
COB200Z0	335	240	Normal	Exact
COB20000	335	67	Normal	Exact
COB20050	335	33	Normal	Exact
COB20060	335	40	Normal	Exact
COB20070	335	47	Normal	Exact
COB20080	335	53	Normal	Exact
COB20090	335	60	Normal	Exact
COB30CA0	337	73	Italic	Exact
COB30CB0	337	80	Italic	Exact
COB30CD0	337	93	Italic	Exact
COB30CF0	337	107	Italic	Exact
COB30CH0	337	120	Italic	Exact
COB30CJ0	337	133	Italic	Exact
COB30CN0	337	160	Italic	Exact
COB30CT0	337	200	Italic	Exact
COB30CZ0	337	240	Italic	Exact
COB30C00	337	67	Italic	Exact
COB30C50	337	33	Italic	Exact
COB30C60	337	40	Italic	Exact
COB30C70	337	47	Italic	Exact
COB30C80	337	53	Italic	Exact
COB30C90	337	60	Italic	Exact
COB300A0	337	73	Italic	Exact
COB300B0	337	80	Italic	Exact
COB300D0	337	93	Italic	Exact
COB300F0	337	107	Italic	Exact
COB300H0	337	120	Italic	Exact
COB300J0	337	133	Italic	Exact
COB300N0	337	160	Italic	Exact
COB300T0	337	200	Italic	Exact
COB300Z0	337	240	Italic	Exact
COB30000	337	67	Italic	Exact
COB30050	337	33	Italic	Exact
COB30060	337	40	Italic	Exact
COB30070	337	47	Italic	Exact
COB30080	337	53	Italic	Exact
COB30090	337	60	Italic	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0B40CA0	336	73	Bold	Exact
C0B40CB0	336	80	Bold	Exact
C0B40CD0	336	93	Bold	Exact
C0B40CF0	336	107	Bold	Exact
C0B40CH0	336	120	Bold	Exact
C0B40CJ0	336	133	Bold	Exact
C0B40CN0	336	160	Bold	Exact
C0B40CT0	336	200	Bold	Exact
C0B40CZ0	336	240	Bold	Exact
C0B40C00	336	67	Bold	Exact
C0B40C50	336	33	Bold	Exact
C0B40C60	336	40	Bold	Exact
C0B40C70	336	47	Bold	Exact
C0B40C80	336	53	Bold	Exact
C0B40C90	336	60	Bold	Exact
C0B400A0	336	73	Bold	Exact
C0B400B0	336	80	Bold	Exact
C0B400D0	336	93	Bold	Exact
C0B400F0	336	107	Bold	Exact
C0B400H0	336	120	Bold	Exact
C0B400J0	336	133	Bold	Exact
C0B400N0	336	160	Bold	Exact
C0B400T0	336	200	Bold	Exact
C0B400Z0	336	240	Bold	Exact
C0B40000	336	67	Bold	Exact
C0B40050	336	33	Bold	Exact
C0B40060	336	40	Bold	Exact
C0B40070	336	47	Bold	Exact
C0B40080	336	53	Bold	Exact
C0B40090	336	60	Bold	Exact
C0B50CA0	338	73	Bold Italic	Exact
C0B50CB0	338	80	Bold Italic	Exact
C0B50CD0	338	93	Bold Italic	Exact
C0B50CF0	338	107	Bold Italic	Exact
C0B50CH0	338	120	Bold Italic	Exact
C0B50CJ0	338	133	Bold Italic	Exact
C0B50CN0	338	160	Bold Italic	Exact
C0B50CT0	338	200	Bold Italic	Exact
C0B50CZ0	338	240	Bold Italic	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
COB50C00	338	67	Bold Italic	Exact
COB50C50	338	33	Bold Italic	Exact
COB50C60	338	40	Bold Italic	Exact
COB50C70	338	47	Bold Italic	Exact
COB50C80	338	53	Bold Italic	Exact
COB50C90	338	60	Bold Italic	Exact
COB500A0	338	73	Bold Italic	Exact
COB500B0	338	80	Bold Italic	Exact
COB500D0	338	93	Bold Italic	Exact
COB500F0	338	107	Bold Italic	Exact
COB500H0	338	120	Bold Italic	Exact
COB500J0	338	133	Bold Italic	Exact
COB500N0	338	160	Bold Italic	Exact
COB500T0	338	200	Bold Italic	Exact
COB500Z0	338	240	Bold Italic	Exact
COB50000	338	67	Bold Italic	Exact
COB50050	338	33	Bold Italic	Exact
COB50060	338	40	Bold Italic	Exact
COB50070	338	47	Bold Italic	Exact
COB50080	338	53	Bold Italic	Exact
COB50090	338	60	Bold Italic	Exact
COB60CA0	339	73	Reverse	Exact
COB60CB0	339	80	Reverse	Exact
COB60CD0	339	93	Reverse	Exact
COB60CF0	339	107	Reverse	Exact
COB60CH0	339	120	Reverse	Exact
COB60CJ0	339	133	Reverse	Exact
COB60CN0	339	160	Reverse	Exact
COB60CT0	339	200	Reverse	Exact
COB60CZ0	339	240	Reverse	Exact
COB60C00	339	67	Reverse	Exact
COB60C50	339	33	Reverse	Exact
COB60C60	339	40	Reverse	Exact
COB60C70	339	47	Reverse	Exact
COB60C80	339	53	Reverse	Exact
COB60C90	339	60	Reverse	Exact
COB600A0	339	73	Reverse	Exact
COB600B0	339	80	Reverse	Exact
COB600D0	339	93	Reverse	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0B600F0	339	107	Reverse	Exact
C0B600H0	339	120	Reverse	Exact
C0B600J0	339	133	Reverse	Exact
C0B600N0	339	160	Reverse	Exact
C0B600T0	339	200	Reverse	Exact
C0B600Z0	339	240	Reverse	Exact
C0B60000	339	67	Reverse	Exact
C0B60050	339	33	Reverse	Exact
C0B60060	339	40	Reverse	Exact
C0B60070	339	47	Reverse	Exact
C0B60080	339	53	Reverse	Exact
C0B60090	339	60	Reverse	Exact
C0C055A0	16951	73	Normal	Exact
C0C055B0	16951	80	Normal	Exact
C0C055D0	16951	93	Normal	Exact
C0C055F0	16951	107	Normal	Exact
C0C055H0	16951	120	Normal	Exact
C0C055J0	16951	133	Normal	Exact
C0C055N0	16951	160	Normal	Exact
C0C055T0	16951	200	Normal	Exact
C0C055Z0	16951	240	Normal	Exact
C0C05500	16951	67	Normal	Exact
C0C05560	16951	40	Normal	Exact
C0C05570	16951	47	Normal	Exact
C0C05580	16951	53	Normal	Exact
C0C05590	16951	60	Normal	Exact
C0C075A0	16971	73	Bold	Exact
C0C075B0	16971	80	Bold	Exact
C0C075D0	16971	93	Bold	Exact
C0C075F0	16971	107	Bold	Exact
C0C075H0	16971	120	Bold	Exact
C0C075J0	16971	133	Bold	Exact
C0C075N0	16971	160	Bold	Exact
C0C075T0	16971	200	Bold	Exact
C0C075Z0	16971	240	Bold	Exact
C0C07500	16971	67	Bold	Exact
C0C07560	16971	40	Bold	Exact
C0C07570	16971	47	Bold	Exact
C0C07580	16971	53	Bold	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0C07590	16971	60	Bold	Exact
C0C155A0	17079	73	Italic	Exact
C0C155B0	17079	80	Italic	Exact
C0C155D0	17079	93	Italic	Exact
C0C155F0	17079	107	Italic	Exact
C0C155H0	17079	120	Italic	Exact
C0C155J0	17079	133	Italic	Exact
C0C155N0	17079	160	Italic	Exact
C0C155T0	17079	200	Italic	Exact
C0C155Z0	17079	240	Italic	Exact
C0C15500	17079	67	Italic	Exact
C0C15560	17079	40	Italic	Exact
C0C15570	17079	47	Italic	Exact
C0C15580	17079	53	Italic	Exact
C0C15590	17079	60	Italic	Exact
C0C175A0	17099	73	Bold Italic	Exact
C0C175B0	17099	80	Bold Italic	Exact
C0C175D0	17099	93	Bold Italic	Exact
C0C175F0	17099	107	Bold Italic	Exact
C0C175H0	17099	120	Bold Italic	Exact
C0C175J0	17099	133	Bold Italic	Exact
C0C175N0	17099	160	Bold Italic	Exact
C0C175T0	17099	200	Bold Italic	Exact
C0C175Z0	17099	240	Bold Italic	Exact
C0C17500	17099	67	Bold Italic	Exact
C0C17560	17099	40	Bold Italic	Exact
C0C17570	17099	47	Bold Italic	Exact
C0C17580	17099	53	Bold Italic	Exact
C0C17590	17099	60	Bold Italic	Exact
C0D0GB10	39	144	Bold	Exact
C0D0GB12	69	120	Bold	Exact
C0D0GC15	231	96	Normal	Not Exact
C0D0GI12	68	120	Italic	Exact
C0D0GL10	303	144	Normal	Not Exact
C0D0GL12	303	120	Normal	Not Exact
C0D0GL15	303	96	Normal	Not Exact
C0D0GP12	174	120	Normal	Exact
C0D0GR10	310	144	Normal	Not Exact
C0D0GT10	40	144	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0D0GT12	66	120	Normal	Exact
C0D0GT13	203	108	Normal	Exact
C0D0GT15	230	96	Normal	Exact
C0D0GT18	275	78	Normal	Not Exact
C0D0GT20	281	72	Normal	Exact
C0D0GT24	290	54	Normal	Exact
C0D0RT10	41	144	Normal	Exact
C0D0SB12	72	120	Bold	Exact
C0D0SI10	43	144	Italic	Exact
C0D0SI12	71	120	Italic	Exact
C0D0SO12	332	120	Normal	Not Exact
C0D0ST10	42	144	Normal	Exact
C0D0ST12	70	120	Normal	Exact
C0D0ST15	229	96	Normal	Exact
C0G055A0	4663	73	Normal	Exact
C0G055B0	4663	80	Normal	Exact
C0G055D0	4663	93	Normal	Exact
C0G055F0	4663	107	Normal	Exact
C0G055H0	4663	120	Normal	Exact
C0G055J0	4663	133	Normal	Exact
C0G055N0	4663	160	Normal	Exact
C0G055T0	4663	200	Normal	Exact
C0G055Z0	4663	240	Normal	Exact
C0G05500	4663	67	Normal	Exact
C0G05560	4663	40	Normal	Exact
C0G05570	4663	47	Normal	Exact
C0G05580	4663	53	Normal	Exact
C0G05590	4663	60	Normal	Exact
C0G075A0	4683	73	Bold	Exact
C0G075B0	4683	80	Bold	Exact
C0G075D0	4683	93	Bold	Exact
C0G075F0	4683	107	Bold	Exact
C0G075H0	4683	120	Bold	Exact
C0G075J0	4683	133	Bold	Exact
C0G075N0	4683	160	Bold	Exact
C0G075T0	4683	200	Bold	Exact
C0G075Z0	4683	240	Bold	Exact
C0G07500	4683	67	Bold	Exact
C0G07560	4683	40	Bold	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0G07570	4683	47	Bold	Exact
C0G07580	4683	53	Bold	Exact
C0G07590	4683	60	Bold	Exact
C0G155A0	4791	73	Italic	Exact
C0G155B0	4791	80	Italic	Exact
C0G155D0	4791	93	Italic	Exact
C0G155F0	4791	107	Italic	Exact
C0G155H0	4791	120	Italic	Exact
C0G155J0	4791	133	Italic	Exact
C0G155N0	4791	160	Italic	Exact
C0G155T0	4791	200	Italic	Exact
C0G155Z0	4791	240	Italic	Exact
C0G15500	4791	67	Italic	Exact
C0G15560	4791	40	Italic	Exact
C0G15570	4791	47	Italic	Exact
C0G15580	4791	53	Italic	Exact
C0G15590	4791	60	Italic	Exact
C0G175A0	4811	73	Bold Italic	Exact
C0G175B0	4811	80	Bold Italic	Exact
C0G175D0	4811	93	Bold Italic	Exact
C0G175F0	4811	107	Bold Italic	Exact
C0G175H0	4811	120	Bold Italic	Exact
C0G175J0	4811	133	Bold Italic	Exact
C0G175N0	4811	160	Bold Italic	Exact
C0G175T0	4811	200	Bold Italic	Exact
C0G175Z0	4811	240	Bold Italic	Exact
C0G17500	4811	67	Bold Italic	Exact
C0G17560	4811	40	Bold Italic	Exact
C0G17570	4811	47	Bold Italic	Exact
C0G17580	4811	53	Bold Italic	Exact
C0G17590	4811	60	Bold Italic	Exact
C0H200A0	2304	73	Normal	Exact
C0H200B0	2304	80	Normal	Exact
C0H200D0	2304	93	Normal	Exact
C0H200F0	2304	107	Normal	Exact
C0H200H0	2304	120	Normal	Exact
C0H200J0	2304	133	Normal	Exact
C0H200N0	2304	160	Normal	Exact
C0H200T0	2304	200	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0H200Z0	2304	240	Normal	Exact
C0H20000	2304	67	Normal	Exact
C0H20060	2304	40	Normal	Exact
C0H20070	2304	47	Normal	Exact
C0H20080	2304	53	Normal	Exact
C0H20090	2304	60	Normal	Exact
C0H300A0	2306	73	Italic	Exact
C0H300B0	2306	80	Italic	Exact
C0H300D0	2306	93	Italic	Exact
C0H300F0	2306	107	Italic	Exact
C0H300H0	2306	120	Italic	Exact
C0H300J0	2306	133	Italic	Exact
C0H300N0	2306	160	Italic	Exact
C0H300T0	2306	200	Italic	Exact
C0H300Z0	2306	240	Italic	Exact
C0H30000	2306	67	Italic	Exact
C0H30060	2306	40	Italic	Exact
C0H30070	2306	47	Italic	Exact
C0H30080	2306	53	Italic	Exact
C0H30090	2306	60	Italic	Exact
C0H400A0	2305	73	Bold	Exact
C0H400B0	2305	80	Bold	Exact
C0H400D0	2305	93	Bold	Exact
C0H400F0	2305	107	Bold	Exact
C0H400H0	2305	120	Bold	Exact
C0H400J0	2305	133	Bold	Exact
C0H400N0	2305	160	Bold	Exact
C0H400T0	2305	200	Bold	Exact
C0H400Z0	2305	240	Bold	Exact
C0H40000	2305	67	Bold	Exact
C0H40060	2305	40	Bold	Exact
C0H40070	2305	47	Bold	Exact
C0H40080	2305	53	Bold	Exact
C0H40090	2305	60	Bold	Exact
C0H500A0	2307	73	Bold Italic	Exact
C0H500B0	2307	80	Bold Italic	Exact
C0H500D0	2307	93	Bold Italic	Exact
C0H500F0	2307	107	Bold Italic	Exact
C0H500H0	2307	120	Bold Italic	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0H500J0	2307	133	Bold Italic	Exact
C0H500N0	2307	160	Bold Italic	Exact
C0H500T0	2307	200	Bold Italic	Exact
C0H500Z0	2307	240	Bold Italic	Exact
C0H50000	2307	67	Bold Italic	Exact
C0H50060	2307	40	Bold Italic	Exact
C0H50070	2307	47	Bold Italic	Exact
C0H50080	2307	53	Bold Italic	Exact
C0H50090	2307	60	Bold Italic	Exact
C0J055J0	37431	133	Normal	Not Exact
C0J055Z0	37431	240	Normal	Not Exact
C0L0AD10	45	144	Normal	Exact
C0L0AD12	76	120	Normal	Exact
C0L0AG10	45	144	Normal	Not Exact
C0L0AG12	76	120	Normal	Not Exact
C0L0AG15	219	96	Normal	Not Exact
C0L0AI10	58	144	Italic	Not Exact
C0L0AI12	105	120	Italic	Exact
C0L0AT10	45	144	Normal	Not Exact
C0L0AT12	76	120	Normal	Not Exact
C0L0DUMP	230	96	Normal	Not Exact
C0L0FM10	30	144	Normal	Not Exact
C0L0FM12	80	120	Normal	Not Exact
C0L0FM15	225	96	Normal	Not Exact
C0L0GU10	312	144	Normal	Not Exact
C0L0GU12	312	120	Normal	Not Exact
C0L0GU15	312	96	Normal	Not Exact
C0L0KATA	433	144	Normal	Exact
C0L0KN12	433	120	Normal	Exact
C0L0KN20	433	84	Normal	Not Exact
C0L0TU10	334	144	Normal	Not Exact
C0L00AOA	19	144	Normal	Exact
C0L00AON	19	144	Normal	Exact
C0L00APL	45	144	Normal	Not Exact
C0L00BOA	3	144	Normal	Exact
C0L00BON	3	144	Normal	Exact
C0L00GSC	398	96	Normal	Not Exact
C0L00GUC	311	96	Normal	Not Exact
C0L00OAB	3	144	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0L00T11	333	144	Normal	Not Exact
C0MO55A0	50231	73	Normal	Not Exact
C0MO55B0	50231	80	Normal	Not Exact
C0MO55B1	50231	320	Normal	Not Exact
C0MO55D0	50231	93	Normal	Not Exact
C0MO55F0	50231	107	Normal	Not Exact
C0MO55H0	50231	120	Normal	Not Exact
C0MO55H1	50231	360	Normal	Not Exact
C0MO55J0	50231	133	Normal	Not Exact
C0MO55L0	50231	147	Normal	Not Exact
C0MO55N0	50231	160	Normal	Not Exact
C0MO55N1	50231	400	Normal	Not Exact
C0MO55R0	50231	187	Normal	Not Exact
C0MO55T0	50231	200	Normal	Not Exact
C0MO55V0	50231	213	Normal	Not Exact
C0MO55Z0	50231	240	Normal	Not Exact
C0MO55Z1	50231	480	Normal	Not Exact
C0MO5500	50231	67	Normal	Not Exact
C0MO5541	50231	267	Normal	Not Exact
C0MO5560	50231	40	Normal	Not Exact
C0MO5570	50231	47	Normal	Not Exact
C0MO5580	50231	53	Normal	Not Exact
C0MO5581	50231	293	Normal	Not Exact
C0MO5590	50231	60	Normal	Not Exact
C0MP55A0	49463	73	Normal	Not Exact
C0MP55B0	49463	80	Normal	Not Exact
C0MP55D0	49463	93	Normal	Not Exact
C0MP55F0	49463	107	Normal	Not Exact
C0MP55H0	49463	120	Normal	Not Exact
C0MP55N0	49463	160	Normal	Not Exact
C0MP55Z0	49463	240	Normal	Not Exact
C0MP5500	49463	67	Normal	Not Exact
C0MP5560	49463	40	Normal	Not Exact
C0MP5570	49463	47	Normal	Not Exact
C0MP5580	49463	53	Normal	Not Exact
C0MP5590	49463	60	Normal	Not Exact
C0MP75A0	49483	73	Bold	Not Exact
C0MP75B0	49483	80	Bold	Not Exact
C0MP75D0	49483	93	Bold	Not Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0MP75F0	49483	107	Bold	Not Exact
C0MP75H0	49483	120	Bold	Not Exact
C0MP75N0	49483	160	Bold	Not Exact
C0MP75Z0	49483	240	Bold	Not Exact
C0MP7500	49483	67	Bold	Not Exact
C0MP7560	49483	40	Bold	Not Exact
C0MP7570	49483	47	Bold	Not Exact
C0MP7580	49483	53	Bold	Not Exact
C0MP7590	49483	60	Bold	Not Exact
C0MQ55A0	49719	73	Normal	Not Exact
C0MQ55B0	49719	80	Normal	Not Exact
C0MQ55D0	49719	93	Normal	Not Exact
C0MQ55F0	49719	107	Normal	Not Exact
C0MQ55H0	49719	120	Normal	Not Exact
C0MQ55N0	49719	160	Normal	Not Exact
C0MQ55Z0	49719	240	Normal	Not Exact
C0MQ5500	49719	67	Normal	Not Exact
C0MQ5560	49719	40	Normal	Not Exact
C0MQ5570	49719	47	Normal	Not Exact
C0MQ5580	49719	53	Normal	Not Exact
C0MQ5590	49719	60	Normal	Not Exact
C0MQ75A0	49739	73	Bold	Not Exact
C0MQ75B0	49739	80	Bold	Not Exact
C0MQ75D0	49739	93	Bold	Not Exact
C0MQ75F0	49739	107	Bold	Not Exact
C0MQ75H0	49739	120	Bold	Not Exact
C0MQ75N0	49739	160	Bold	Not Exact
C0MQ75Z0	49739	240	Bold	Not Exact
C0MQ7500	49739	67	Bold	Not Exact
C0MQ7560	49739	40	Bold	Not Exact
C0MQ7570	49739	47	Bold	Not Exact
C0MQ7580	49739	53	Bold	Not Exact
C0MQ7590	49739	60	Bold	Not Exact
C0N200A0	2308	73	Normal	Exact
C0N200B0	2308	80	Normal	Exact
C0N200D0	2308	93	Normal	Exact
C0N200F0	2308	107	Normal	Exact
C0N200H0	2308	120	Normal	Exact
C0N200J0	2308	133	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0N200N0	2308	160	Normal	Exact
C0N200T0	2308	200	Normal	Exact
C0N200Z0	2308	240	Normal	Exact
C0N20000	2308	67	Normal	Exact
C0N20060	2308	40	Normal	Exact
C0N20070	2308	47	Normal	Exact
C0N20080	2308	53	Normal	Exact
C0N20090	2308	60	Normal	Exact
C0N204B0	2308	80	Normal	Not Exact
C0N300A0	2310	73	Italic	Exact
C0N300B0	2310	80	Italic	Exact
C0N300D0	2310	93	Italic	Exact
C0N300F0	2310	107	Italic	Exact
C0N300H0	2310	120	Italic	Exact
C0N300J0	2310	133	Italic	Exact
C0N300N0	2310	160	Italic	Exact
C0N300T0	2310	200	Italic	Exact
C0N300Z0	2310	240	Italic	Exact
C0N30000	2310	67	Italic	Exact
C0N30060	2310	40	Italic	Exact
C0N30070	2310	47	Italic	Exact
C0N30080	2310	53	Italic	Exact
C0N30090	2310	60	Italic	Exact
C0N304B0	2310	80	Italic	Not Exact
C0N400A0	2309	73	Bold	Exact
C0N400B0	2309	80	Bold	Exact
C0N400D0	2309	93	Bold	Exact
C0N400F0	2309	107	Bold	Exact
C0N400H0	2309	120	Bold	Exact
C0N400J0	2309	133	Bold	Exact
C0N400N0	2309	160	Bold	Exact
C0N400T0	2309	200	Bold	Exact
C0N400Z0	2309	240	Bold	Exact
C0N40000	2309	67	Bold	Exact
C0N40060	2309	40	Bold	Exact
C0N40070	2309	47	Bold	Exact
C0N40080	2309	53	Bold	Exact
C0N40090	2309	60	Bold	Exact
C0N404B0	2309	80	Bold	Not Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0N404H0	2309	120	Bold	Not Exact
C0N404N0	2309	160	Bold	Not Exact
C0N500A0	2311	73	Bold Italic	Exact
C0N500B0	2311	80	Bold Italic	Exact
C0N500D0	2311	93	Bold Italic	Exact
C0N500F0	2311	107	Bold Italic	Exact
C0N500H0	2311	120	Bold Italic	Exact
C0N500J0	2311	133	Bold Italic	Exact
C0N500N0	2311	160	Bold Italic	Exact
C0N500T0	2311	200	Bold Italic	Exact
C0N500Z0	2311	240	Bold Italic	Exact
C0N50000	2311	67	Bold Italic	Exact
C0N50060	2311	40	Bold Italic	Exact
C0N50070	2311	47	Bold Italic	Exact
C0N50080	2311	53	Bold Italic	Exact
C0N50090	2311	60	Bold Italic	Exact
C0N504B0	2311	80	Bold Italic	Not Exact
C0N504H0	2311	120	Bold Italic	Not Exact
C0N504N0	2311	160	Bold Italic	Not Exact
C0OCRA10	19	144	Normal	Exact
C0OCRB10	3	144	Normal	Exact
C0P055B0	49719	80	Normal	Exact
C0P05500	49719	67	Normal	Exact
C0P05560	49719	40	Normal	Exact
C0P05580	49719	53	Normal	Exact
C0P075B0	49739	80	Bold	Exact
C0P07500	49739	67	Bold	Exact
C0P07560	49739	40	Bold	Exact
C0P07580	49739	53	Bold	Exact
C0Q055B0	49719	80	Normal	Not Exact
C0Q05500	49463	67	Normal	Not Exact
C0Q05560	49463	40	Normal	Not Exact
C0Q05580	49463	53	Normal	Not Exact
C0Q075B0	49483	80	Bold	Not Exact
C0Q07500	49483	67	Bold	Not Exact
C0Q07560	49483	40	Bold	Not Exact
C0Q07580	49483	53	Bold	Not Exact
C0S0AE10	26	144	Normal	Exact
C0S0AE10	45	144	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0S0AE20	280	72	Normal	Exact
C0S0AP13	206	108	Normal	Not Exact
C0S0AP20	280	72	Normal	Not Exact
C0S0BITR	155	120	Italic	Exact
C0S0BRTR	159	120	Normal	Exact
C0S0CB10	46	144	Bold	Exact
C0S0CB12	108	120	Bold	Exact
C0S0CB15	214	96	Bold	Exact
C0S0CD15	417	96	Double Wide	Exact
C0S0CE10	11	144	Normal	Not Exact
C0S0CE12	85	120	Normal	Exact
C0S0CH10	37	144	Normal	Not Exact
C0S0CI10	18	144	Italic	Exact
C0S0CI12	92	120	Italic	Exact
C0S0CI15	215	96	Italic	Exact
C0S0CO10	302	144	Normal	Not Exact
C0S0CR10	11	144	Normal	Exact
C0S0CR12	85	120	Normal	Exact
C0S0CR15	223	96	Normal	Exact
C0S0CW15	425	96	Double Wide Italic	Exact
C0S0DOTR	175	120	Normal	Exact
C0S0D224	203	108	Normal	Exact
C0S0D225	203	108	Normal	Exact
C0S0D226	201	108	Bold	Exact
C0S0D227	202	108	Italic	Exact
C0S0EBTR	163	120	Bold	Exact
C0S0EITR	162	120	Italic	Exact
C0S0ELTR	173	120	Normal	Exact
C0S0EOTR	196	120	Normal	Not Exact
C0S0ESTR	160	120	Normal	Exact
C0S0LB12	110	120	Bold	Exact
C0S0LR12	87	120	Normal	Exact
C0S0OB10	38	144	Bold	Exact
C0S0OR10	5	144	Normal	Exact
C0S0PB12	111	120	Bold	Exact
C0S0PI12	112	120	Italic	Exact
C0S0PR10	12	144	Normal	Exact
C0S0PR12	86	120	Normal	Exact
C0S0SR12	84	120	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0S0SYM0	49975	67	Normal	Not Exact
C0S0SYM2	49975	80	Normal	Not Exact
C0S0S192	80	120	Normal	Not Exact
C0S0S193	80	120	Normal	Not Exact
C0S0S198	30	144	Normal	Not Exact
C0S055A0	28983	73	Normal	Exact
C0S055B0	28983	80	Normal	Exact
C0S055D0	28983	93	Normal	Exact
C0S055F0	28983	107	Normal	Exact
C0S055H0	28983	120	Normal	Exact
C0S055J0	28983	133	Normal	Exact
C0S055N0	28983	160	Normal	Exact
C0S055T0	28983	200	Normal	Exact
C0S055Z0	28983	240	Normal	Exact
C0S05500	28983	67	Normal	Exact
C0S05560	28983	40	Normal	Exact
C0S05570	28983	47	Normal	Exact
C0S05580	28983	53	Normal	Exact
C0S05590	28983	60	Normal	Exact
C0S075A0	29003	73	Bold	Exact
C0S075B0	29003	80	Bold	Exact
C0S075D0	29003	93	Bold	Exact
C0S075F0	29003	107	Bold	Exact
C0S075H0	29003	120	Bold	Exact
C0S075J0	29003	133	Bold	Exact
C0S075N0	29003	160	Bold	Exact
C0S075T0	29003	200	Bold	Exact
C0S075Z0	29003	240	Bold	Exact
C0S07500	29003	67	Bold	Exact
C0S07560	29003	40	Bold	Exact
C0S07570	29003	47	Bold	Exact
C0S07580	29003	53	Bold	Exact
C0S07590	29003	60	Bold	Exact
C0S155A0	29111	73	Italic	Exact
C0S155B0	29111	80	Italic	Exact
C0S155D0	29111	93	Italic	Exact
C0S155F0	29111	107	Italic	Exact
C0S155H0	29111	120	Italic	Exact
C0S155J0	29111	133	Italic	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0S155N0	29111	160	Italic	Exact
C0S155T0	29111	200	Italic	Exact
C0S155Z0	29111	240	Italic	Exact
C0S15500	29111	67	Italic	Exact
C0S15560	29111	40	Italic	Exact
C0S15570	29111	47	Italic	Exact
C0S15580	29111	53	Italic	Exact
C0S15590	29111	60	Italic	Exact
C0S175A0	29131	73	Bold Italic	Exact
C0S175B0	29131	80	Bold Italic	Exact
C0S175D0	29131	93	Bold Italic	Exact
C0S175F0	29131	107	Bold Italic	Exact
C0S175H0	29131	120	Bold Italic	Exact
C0S175J0	29131	133	Bold Italic	Exact
C0S175N0	29131	160	Bold Italic	Exact
C0S175T0	29131	200	Bold Italic	Exact
C0S175Z0	29131	240	Bold Italic	Exact
C0S17500	29131	67	Bold Italic	Exact
C0S17560	29131	40	Bold Italic	Exact
C0S17570	29131	47	Bold Italic	Exact
C0S17580	29131	53	Bold Italic	Exact
C0S17590	29131	60	Bold Italic	Exact
C0T055A0	4407	73	Normal	Exact
C0T055B0	4407	80	Normal	Exact
C0T055B1	4407	320	Normal	Exact
C0T055D0	4407	93	Normal	Exact
C0T055F0	4407	107	Normal	Exact
C0T055H0	4407	120	Normal	Exact
C0T055J0	4407	133	Normal	Exact
C0T055N0	4407	160	Normal	Exact
C0T055N1	4407	400	Normal	Exact
C0T055T0	4407	200	Normal	Exact
C0T055Z0	4407	240	Normal	Exact
C0T055Z1	4407	480	Normal	Exact
C0T05500	4407	67	Normal	Exact
C0T05560	4407	40	Normal	Exact
C0T05570	4407	47	Normal	Exact
C0T05580	4407	53	Normal	Exact
C0T05590	4407	60	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0T075A0	4427	73	Bold	Exact
C0T075B0	4427	80	Bold	Exact
C0T075B1	4427	320	Bold	Exact
C0T075D0	4427	93	Bold	Exact
C0T075F0	4427	107	Bold	Exact
C0T075H0	4427	120	Bold	Exact
C0T075J0	4427	133	Bold	Exact
C0T075N0	4427	160	Bold	Exact
C0T075N1	4427	400	Bold	Exact
C0T075T0	4427	200	Bold	Exact
C0T075Z0	4427	240	Bold	Exact
C0T075Z1	4427	480	Bold	Exact
C0T07500	4427	67	Bold	Exact
C0T07560	4427	40	Bold	Exact
C0T07570	4427	47	Bold	Exact
C0T07580	4427	53	Bold	Exact
C0T07590	4427	60	Bold	Exact
C0T155A0	4535	73	Italic	Exact
C0T155B0	4535	80	Italic	Exact
C0T155B1	4535	320	Italic	Exact
C0T155D0	4535	93	Italic	Exact
C0T155F0	4535	107	Italic	Exact
C0T155H0	4535	120	Italic	Exact
C0T155J0	4535	133	Italic	Exact
C0T155N0	4535	160	Italic	Exact
C0T155N1	4535	400	Italic	Exact
C0T155T0	4535	200	Italic	Exact
C0T155Z0	4535	240	Italic	Exact
C0T155Z1	4535	480	Italic	Exact
C0T15500	4535	67	Italic	Exact
C0T15560	4535	40	Italic	Exact
C0T15570	4535	47	Italic	Exact
C0T15580	4535	53	Italic	Exact
C0T15590	4535	60	Italic	Exact
C0T175A0	4555	73	Bold Italic	Exact
C0T175B0	4555	80	Bold Italic	Exact
C0T175B1	4555	320	Bold Italic	Exact
C0T175D0	4555	93	Bold Italic	Exact
C0T175F0	4555	107	Bold Italic	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0T175H0	4555	120	Bold Italic	Exact
C0T175J0	4555	133	Bold Italic	Exact
C0T175N0	4555	160	Bold Italic	Exact
C0T175N1	4555	400	Bold Italic	Exact
C0T175T0	4555	200	Bold Italic	Exact
C0T175Z0	4555	240	Bold Italic	Exact
C0T175Z1	4555	480	Bold Italic	Exact
C0T17500	4555	67	Bold Italic	Exact
C0T17560	4555	40	Bold Italic	Exact
C0T17570	4555	47	Bold Italic	Exact
C0T17580	4555	53	Bold Italic	Exact
C0T17590	4555	60	Bold Italic	Exact
C0V055A0	33847	73	Normal	Exact
C0V055B0	33847	80	Normal	Exact
C0V055D0	33847	93	Normal	Exact
C0V055F0	33847	107	Normal	Exact
C0V055H0	33847	120	Normal	Exact
C0V055J0	33847	133	Normal	Exact
C0V055N0	33847	160	Normal	Exact
C0V055T0	33847	200	Normal	Exact
C0V055Z0	33847	240	Normal	Exact
C0V05500	33847	67	Normal	Exact
C0V05560	33847	40	Normal	Exact
C0V05570	33847	47	Normal	Exact
C0V05580	33847	53	Normal	Exact
C0V05590	33847	60	Normal	Exact
C0V075A0	33867	73	Bold	Exact
C0V075B0	33867	80	Bold	Exact
C0V075D0	33867	93	Bold	Exact
C0V075F0	33867	107	Bold	Exact
C0V075H0	33867	120	Bold	Exact
C0V075J0	33867	133	Bold	Exact
C0V075N0	33867	160	Bold	Exact
C0V075T0	33867	200	Bold	Exact
C0V075Z0	33867	240	Bold	Exact
C0V07500	33867	67	Bold	Exact
C0V07560	33867	40	Bold	Exact
C0V07570	33867	47	Bold	Exact
C0V07580	33867	53	Bold	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0V07590	33867	60	Bold	Exact
C0V155A0	33975	73	Italic	Exact
C0V155B0	33975	80	Italic	Exact
C0V155D0	33975	93	Italic	Exact
C0V155F0	33975	107	Italic	Exact
C0V155H0	33975	120	Italic	Exact
C0V155J0	33975	133	Italic	Exact
C0V155N0	33975	160	Italic	Exact
C0V155T0	33975	200	Italic	Exact
C0V155Z0	33975	240	Italic	Exact
C0V15500	33975	67	Italic	Exact
C0V15560	33975	40	Italic	Exact
C0V15570	33975	47	Italic	Exact
C0V15580	33975	53	Italic	Exact
C0V15590	33975	60	Italic	Exact
C0V175A0	33995	73	Bold Italic	Exact
C0V175B0	33995	80	Bold Italic	Exact
C0V175D0	33995	93	Bold Italic	Exact
C0V175F0	33995	107	Bold Italic	Exact
C0V175H0	33995	120	Bold Italic	Exact
C0V175J0	33995	133	Bold Italic	Exact
C0V175N0	33995	160	Bold Italic	Exact
C0V175T0	33995	200	Bold Italic	Exact
C0V175Z0	33995	240	Bold Italic	Exact
C0V17500	33995	67	Bold Italic	Exact
C0V17560	33995	40	Bold Italic	Exact
C0V17570	33995	47	Bold Italic	Exact
C0V17580	33995	53	Bold Italic	Exact
C0V17590	33995	60	Bold Italic	Exact
C0Z05640	33080	27	Normal	Not Exact
C04200B0	416	144	Normal	Exact
C04200D0	416	168	Normal	Exact
C04200J0	416	240	Normal	Exact
C0420000	416	120	Normal	Exact
C0420070	416	84	Normal	Exact
C0420080	416	96	Normal	Exact
C04202B0	416	144	Normal	Exact
C0420200	416	120	Normal	Exact
C0420270	416	84	Normal	Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C0420280	416	96	Normal	Exact
C04203B0	416	144	Normal	Exact
C0420300	416	120	Normal	Exact
C0420380	416	96	Normal	Exact
C04204B0	416	144	Normal	Exact
C0420400	416	120	Normal	Exact
C0420480	416	96	Normal	Not Exact
C04205B0	49	416	Normal	Exact
C0420500	416	120	Normal	Exact
C0420570	416	84	Normal	Not Exact
C0420580	416	96	Normal	Not Exact
C04300B0	424	144	Italic	Exact
C04300D0	424	168	Italic	Exact
C04300J0	424	240	Italic	Exact
C0430000	424	120	Italic	Exact
C0430070	424	84	Italic	Exact
C0430080	424	96	Italic	Exact
C04304B0	424	144	Italic	Exact
C0430400	424	120	Italic	Exact
C04400B0	420	144	Bold	Exact
C04400D0	420	168	Bold	Exact
C04400J0	420	240	Bold	Exact
C0440000	420	120	Bold	Exact
C0440070	420	84	Bold	Exact
C0440080	420	96	Bold	Exact
C0440200	420	120	Bold	Not Exact
C0440300	420	120	Bold	Not Exact
C04404B0	420	144	Bold	Exact
C04404D0	420	168	Bold	Not Exact
C0440470	420	84	Bold	Exact
C04405B0	420	144	Bold	Exact
C0440500	420	120	Bold	Not Exact
C04500B0	428	144	Bold Italic	Exact
C04500D0	428	168	Bold Italic	Exact
C04500J0	428	240	Bold Italic	Exact
C0450000	428	120	Bold Italic	Exact
C0450070	428	84	Bold Italic	Exact
C0450080	428	96	Bold Italic	Exact
C0450300	428	120	Bold Italic	Not Exact

Table 24. Host Resident to Printer Resident Font Character Set Mapping (continued)

Font Character Set Name	Registered Font ID	Font Width	Font Attributes	Map Fidelity
C04504B0	428	144	Bold Italic	Exact
C04504D0	428	168	Bold Italic	Not Exact

Printer Resident to Host Resident Font Character Set Mapping: Often, when a spooled file is created on OS/400, a font global identifier (FGID) or font ID is specified to be used when the spooled file is printed.

In the case of the 3820, 3825, 3827, 3828, 3829, 3831, 3835, and 3900 printer font IDs are not supported. Therefore, when the spooled file is directed to these printers, the system substitutes font character sets that allow the spooled file to print on these printers.

The following table can help you determine what host resident character sets (font character sets stored on the system) are downloaded to a 3820, 3825, 3827, 3828, 3829, 3831, 3835, or 3900 printer when your spooled file references a registered font identifier (font ID) instead of a host resident font character set.

In the case of *CONTENT fidelity, depending upon the registered font ID value, the font width value, and the font attributes that are requested for a particular font reference, the appropriate host resident font character set is selected to match (as closely as possible) your font request.

In the case of *ABSOLUTE fidelity, depending upon the registered font ID value, the font width value, and the font attributes that are requested for a particular font reference, the appropriate host resident font character set is selected to match exactly your font request. The system also ensures, for *ABSOLUTE fidelity, that the character set is compatible with the code page when mapping from printer resident fonts to host resident fonts.

If the FGID has an asterisk next to it, the appropriate CHRID must be specified to match this entry in the font table regardless of what fidelity value has been specified.

The font width specifies the width of the blank character in 1440ths of an inch. This is an indicator of how many characters fit per inch of space on the paper.

Some FGIDs, such as 416, have multiple widths associated with them. The **Font Width** column of the table is blank for these FGIDs. Also, the primary and secondary character set names of these FGIDs have an XX in the last two positions, which identify the size of the font. For uniformly spaced fonts, there are six widths: 84, 96, 120, 144, 168, and 240. For typographic fonts, there are 14 widths: 40, 47, 53, 60, 67, 73, 80, 93, 107, 120, 133, 160, 200 and 240. The system determines whether a uniformly spaced font or a typographic font is needed and then selects the host resident character set name based on the width provided.

The first choice is used if it is present on your iSeries server. The second choice is used if the first choice cannot be found. The Map Fidelity column indicates whether or not the first choice is considered to be an exact match to the printer resident font (font ID) that is requested in your spooled file. As a rule, the second choice is not considered to be an exact match.

If the first choice contains a metric-only font character set name, the system uses the second choice regardless of the fidelity setting. A metric-only font character set name begins with the characters *COE*.

If code page (CPGID) 259 (the symbol font code page) has been specified, this table is not used. Instead, if the FGID specified is a 10-pitch font, the C0S0SYM2 character set is substituted; otherwise, if the FGID specified is anything other than a 10-pitch font, the C0S0SYM0 character set is substituted.

Table 25. Printer Resident to Host Resident Font Character Set Mapping

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
2	144	Normal	Exact	C0E0DE10	C0S0CR12
2	144	Normal	Exact	C0E0DE0R	C0S0SYM0
3	144	Normal	Exact	C0L00BOA	
3	144	Normal	Exact	C0S0SYM2	
5	144	Normal	Exact	C0S0OR10	
5	144	Bold	Exact	C0S0OB10	
5	144	Normal	Exact	C0E0OR10	C0S0OR10
5	144	Normal	Exact	C0S0SYM2	
10	144	Normal	Exact	C0E0CY10	C04203B0
10	144	Normal	Exact	C0E0CY0R	C0S0SYM0
11	144	Normal	Exact	C0S0CR10	
11	144	Bold	Exact	C0S0CB10	
11	144	Italic	Exact	C0S0CI10	
11	144	Normal	Exact	C0S0SYM2	
11	144	Normal	Exact	C0E0CR0K	C04203B0
11	144	Normal	Exact	C0E0CR0F	C0S0CR10
11	144	Normal	Exact	C0E0CR0N	C04203B0
11	144	Normal	Exact	C0E0CR0Q	C04203B0
11	144	Normal	Exact	C0E0CR0G	C04202B0
11	144	Normal	Exact	C0E0CR0H	C04202B0
12	144	Normal	Exact	C0S0PR10	
12	144	Normal	Exact	C0S0SYM2	
12	144	Normal	Exact	C0E0PR0G	C04202B0
12	144	Normal	Exact	C0E0PR0H	C04202B0
13	144	Normal	Not Exact	C0S0CR10	
13	144	Normal	Exact	C0S0SYM2	
13	144	Bold	Not Exact	C0S0CB10	
18	144	Italic	Exact	C0S0CI10	
18	144	Normal	Exact	C0S0SYM2	
19	144	Normal	Exact	C0L00AOA	
19	144	Normal	Exact	C0S0SYM2	
20	144	Normal	Not Exact	C0S0CR10	
20	144	Bold	Not Exact	C0S0CB10	
20	144	Normal	Exact	C0S0SYM2	
21	144	Normal	Exact	C0E0KA10	C0L0KATA
25	144	Normal	Exact	C0E0PS10	C0S0CR10
26	144	Normal	Exact	C0L0KATA	
26	144	Normal	Exact	C0S0AE10	

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
26	144	Normal	Exact	C0D0GT10	
26	144	Bold	Exact	C0D0GB10	
30	144	Normal	Exact	C0S0S198	
30	144	Normal	Exact	C0S0SYM2	
36	144	Normal	Exact	C0E0LR10	C0S0CR10
38	144	Bold	Exact	C0S0OB10	
38	144	Bold	Exact	C0S0SYM2	
39	144	Bold	Exact	C0D0GB10	
39	144	Bold	Exact	C0S0SYM2	
40	144	Normal	Exact	C0D0GT10	
40	144	Normal	Exact	C0S0SYM2	
41	144	Normal	Exact	C0D0RT10	
41	144	Normal	Exact	C0S0SYM2	
42	144	Normal	Exact	C0D0ST10	
42	144	Normal	Exact	C0S0SYM2	
43	144	Italic	Exact	C0D0SI10	
43	144	Italic	Exact	C0S0SYM2	
44	144	Normal	Exact	C0L0KATA	
44	144	Normal	Exact	C0S0SYM2	
45	144	Normal	Exact	C0S0AE10	
46	144	Bold	Exact	C0S0CB10	
46	144	Normal	Exact	C0S0SYM2	
49	144	Normal	Exact	C0E0HR10	C04205B0
50	144	Bold	Exact	C0H0HB10	C04405B0
50	144	Bold	Exact	C0E0HB10	C04405B0
50	144	Normal	Exact	C0S0SYM2	
51	144	Normal	Not Exact	C0S0CR10	
51	144	Bold	Not Exact	C0S0CB10	
52	144	Normal	Not Exact	C0S0CR10	
52	144	Bold	Not Exact	C0S0CB10	
61	144	Normal	Exact	C0E0NR10	C04204B0
62	144	Italic	Exact	C0E0NI10	C04304B0
63	144	Bold	Exact	C0E0NB10	C04404B0
64	144	Bold Italic	Exact	C0E0NM10	C04504B0
66	120	Normal	Exact	C0D0GT12	
66	120	Bold	Exact	C0D0GB12	
66	120	Normal	Exact	C0S0SYM0	
68	120	Italic	Exact	C0D0GI12	

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
68	120	Italic	Exact	C0S0SYM0	
69	120	Bold	Exact	C0D0GB12	
69	120	Bold	Exact	C0S0SYM0	
70	120	Normal	Exact	C0D0ST12	
70	120	Normal	Exact	C0S0SYM0	
71	120	Italic	Exact	C0D0SI12	
71	120	Italic	Exact	C0S0SYM0	
72	120	Bold	Exact	C0D0SB12	
72	120	Bold	Exact	C0S0SYM0	
74	120	Normal	Not Exact	C0S0CR12	
74	120	Bold	Not Exact	C0S0CB12	
75	120	Normal	Not Exact	C0S0CR12	
75	120	Bold	Not Exact	C0S0CB12	
76	120	Normal	Exact	C0E0AP12	C0S0AE10
78	120	Normal	Exact	C0E0KA12	C0L0KN12
80	120	Normal	Not Exact	C0S0CR12	
80	120	Bold	Not Exact	C0S0CB12	
80	120	Normal	Exact	C0S0SYM0	
84	120	Normal	Exact	C0S0SR12	
84	120	Normal	Exact	C0E0SR12	C0S0SR12
84	120	Normal	Exact	C0S0SYM0	
85	120	Normal	Exact	C0S0CR12	
85	120	Normal	Exact	C0S0CE12	
85	120	Bold	Exact	C0S0CB12	
85	120	Italic	Exact	C0S0CI12	
85	120	Normal	Exact	C0S0SYM0	
85	120	Normal	Exact	C0E0CREF	C0420200
85	120	Normal	Exact	C0E0CREQ	C0420300
85	120	Normal	Exact	C0E0CREG	C0420200
85	120	Normal	Exact	C0E0CREH	C0420200
86	120	Normal	Exact	C0S0PR12	
86	120	Bold	Exact	C0S0PB12	
86	120	Normal	Exact	C0S0SYM0	
86	120	Normal	Exact	C0E0PREF	C0420200
86	120	Normal	Exact	C0E0PREQ	C0420300
86	120	Normal	Exact	C0E0PREG	C0420200
86	120	Normal	Exact	C0E0PREH	C0420200
87	120	Normal	Exact	C0S0LR12	

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
87	120	Bold	Exact	C0S0LB12	
87	120	Italic	Exact	C0D0GI12	
87	120	Normal	Exact	C0S0SYM0	
87	120	Normal	Exact	C0E0LRSR	C0S0LR12
87	120	Normal	Exact	C0E0LREK	C0420300
87	120	Normal	Exact	C0E0LREF	C0420200
87	120	Normal	Exact	C0E0LREN	C0420300
87	120	Normal	Exact	C0E0LREQ	C0420300
87	120	Normal	Exact	C0E0LREG	C0420200
87	120	Normal	Exact	C0E0LREH	C0420200
91	120	Italic	Not Exact	C0S0CR12	
91	120	Bold Italic	Not Exact	C0S0CB12	
91	120	Italic	Exact	C0S0SYM0	
92	120	Italic	Exact	C0S0CI12	
92	120	Normal	Exact	C0E0CIER	C0S0SYM2
95	120	Normal	Exact	C0E0AJ12	C0S0CR12
95	120	Normal	Exact	C0E0AJER	C0S0SYM2
96	120	Bold	Exact	C0E0WB12	C0S0CR12
98	120	Normal	Exact	C0E0HR12	C0420500
103	120	Normal	Exact	C0E0NR12	C0420400
104	120	Italic	Exact	C0E0NI12	C0430400
108	120	Bold	Exact	C0S0CB12	
108	120	Normal	Exact	C0E0CBER	C0S0SYM2
109	120	Italic	Exact	C0E0LI12	C0S0CR12
109	120	Normal	Exact	C0E0LISR	C0S0SYM2
110	120	Bold	Exact	C0S0LB12	
110	120	Bold	Exact	C0E0LBEK	C0440300
110	120	Bold	Exact	C0E0LBEN	C0440300
110	120	Normal	Exact	C0S0SYM0	
111	120	Bold	Exact	C0S0PB12	
111	120	Normal	Exact	C0S0SYM0	
112	120	Italic	Exact	C0S0PI12	
112	120	Normal	Exact	C0S0SYM0	
154	120	Normal	Exact	C0S0ESTR	
154	120	Bold	Exact	C0S0EBTR	
155	120	Bold Italic	Exact	C0S0BITR	
155	120	Bold Italic	Exact	C0E0BIRK	C0450300
155	120	Bold Italic	Exact	C0E0BIRN	C0450300

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
155	120	Bold	Exact	C0S0SYM0	
157	120	Bold	Exact	C0E0TBTR	C0S0ESTR
157	120	Bold	Exact	C0E0TBRF	C0420200
157	120	Normal	Exact	C0E0TBRR	C0S0SYM2
158	120	Normal	Not Exact	C0S0ESTR	
158	120	Bold	Not Exact	C0S0EBTR	
158	120	Normal	Exact	C0S0SYM0	
159	120	Bold	Exact	C0S0BRTR	
159	120	Bold	Exact	C0E0BRRK	C0440300
159	120	Bold	Exact	C0E0BRRN	C0440300
159	120	Bold	Exact	C0E0BRRQ	C0440300
159	120	Bold	Exact	C0E0BRRG	C0440200
159	120	Bold	Exact	C0E0BRRH	C0440200
159	120	Bold	Exact	C0S0SYM0	
160	120	Normal	Exact	C0S0ESTR	
160	120	Bold	Exact	C0S0EBTR	
160	120	Italic	Exact	C0S0EITR	
160	120	Normal	Exact	C0S0SYM0	
162	120	Italic	Exact	C0S0EITR	
162	120	Normal	Exact	C0S0SYM0	
163	120	Bold	Exact	C0S0EBTR	
163	120	Bold	Exact	C0S0SYM0	
164	120	Normal	Exact	C0E0PRTR	C0S0ESTR
164	120	Normal	Exact	C0E0PRRR	C0S0SYM2
167	120	Bold	Normal	C0E0BKTR	C0440500
168	120	Bold	Exact	C0H0BRK2	
168	120	Bold	Exact	C0S0SYM0	
173	120	Normal	Exact	C0S0ELTR	
173	120	Normal	Exact	C0S0SYM0	
174	120	Normal	Exact	C0D0GP12	
175	120	Normal	Exact	C0S0DOTR	
175	120	Normal	Exact	C0S0SYM0	
186	120	Normal	Exact	C0E0RRTR	C0S0ESTR
186	120	Normal	Exact	C0E0RRRR	C0S0SYM2
187	120	Bold	Exact	C0E0RBTR	C0S0ESTR
187	120	Normal	Exact	C0E0RBRR	C0S0SYM2
188	120	Italic	Exact	C0E0RITR	C0S0ESTR
188	120	Normal	Exact	C0E0RIRR	C0S0SYM2

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
189	120	Bold Italic	Exact	C0E0RMTR	C0S0ESTR
189	120	Normal	Exact	C0E0RMRR	C0S0SYM2
190	120	Normal	Exact	C0E0FRTR	C0S0ESTR
190	120	Normal	Exact	C0E0FRRR	C0S0SYM2
191	120	Bold	Exact	C0E0FBTR	C0S0ESTR
191	120	Normal	Exact	C0E0FBRR	C0S0SYM2
194	120	Italic	Exact	C0E0FITR	C0S0ESTR
194	120	Normal	Exact	C0E0FIRR	C0S0SYM2
195	120	Bold Italic	Exact	C0E0FMTR	C0S0ESTR
195	120	Normal	Exact	C0E0FMRR	C0S0SYM2
201	108	Bold	Exact	C0S0D226	C0D0GT13
202	108	Italic	Exact	C0S0D227	C0D0GT13
203	108	Normal	Exact	C0S0D224	C0D0GT13
203	108	Normal	Exact	C0S0D225	C0D0GT13
204	108	Normal	Exact	C0S0D224	C0D0GT13
204	108	Normal	Exact	C0S0D225	C0D0GT13
204	108	Bold	Exact	C0S0D226	C0D0GT13
204	108	Italic	Exact	C0S0D227	C0D0GT13
204	96	Normal	Not Exact	C0S0CR15	
204	96	Bold	Not Exact	C0S0CB15	
204	111	Normal	Exact	C0S0SYM0	
205	96	Normal	Not Exact	C0S0CR15	C0D0GT13
205	96	Bold	Not Exact	C0S0CB15	C0D0GT13
213	96	Normal	Exact	C0E0NR15	C0420480
214	96	Bold	Exact	C0S0CB15	
215	96	Italic	Exact	C0S0CI15	
217	96	Double Wide	Exact	C0S0CD15	
218	96	Double Wide Italic	Exact	C0S0CW15	
221	96	Normal	Not Exact	C0S0CR15	
221	96	Bold	Not Exact	C0S0CB15	
221	96	Normal	Exact	C0E0PR15	C0S0CR15
221	96	Normal	Exact	C0S0SYM0	
222	96	Normal	Exact	C0D0GT15	
222	96	Bold	Not Exact	C0S0CB15	
222	96	Normal	Exact	C0E0LR15	C0S0LR15
222	96	Normal	Exact	C0E0LR5R	C0S0SYM2
223	96	Normal	Exact	C0S0CR15	
223	96	Double Wide	Exact	C0S0CD15	

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
223	96	Bold	Exact	C0S0CB15	
223	96	Italic	Exact	C0S0CI15	
223	96	Double Wide Italic	Exact	C0S0CW15	
223	96	Normal	Exact	C0E0CR15	C0S0CR15
223	96	Normal	Exact	C0S0SYM0	
223	96	Normal	Exact	C0E0CR5K	C0420380
223	96	Normal	Exact	C0E0CR5N	C0420380
223	96	Normal	Exact	C0E0CR5G	C0420280
223	96	Normal	Exact	C0E0CR5H	C0420280
225	96	Normal	Not Exact	C0S0CR15	
225	96	Bold	Not Exact	C0S0CB15	
225	96	Normal	Exact	C0S0SYM0	
226	96	Normal	Exact	C0E0HR15	C0420580
229	96	Normal	Exact	C0D0ST15	C0S0CR15
229	96	Normal	Exact	C0S0SYM0	
230	96	Normal	Exact	C0D0GT15	C0S0CR15
230	96	Normal	Exact	C0S0SYM0	
232	96	Normal	Not Exact	C0S0CR15	
232	96	Bold	Not Exact	C0S0CB15	
233	96	Normal	Exact	C0S0CD15	
244	288	Normal	Exact	C0S0SYM0	
245	144	Normal	Not Exact	C0S0CR10	
245	144	Bold	Not Exact	C0S0CB10	
245	288	Bold	Exact	C0S0SYM2	
248	84	Normal	Exact	C0420580	
249	84	Normal	Exact	C0E0KA17	C0L0KN20
252	78	Normal	Not Exact	C0D0GT18	
252	84	Normal	Exact	C0D0GT18	
252	84	Normal	Exact	C0S0SYM0	
253	84	Bold	Not Exact	C0D0GT18	
253	84	Bold	Exact	C0S0SYM0	
254	78	Normal	Not Exact	C0D0GT18	
254	84	Normal	Exact	C0E0CR7F	C0D0GT18
254	84	Normal	Exact	C0E0CR7G	C0420270
254	84	Normal	Exact	C0E0CR7H	C0420270
254	84	Normal	Exact	C0E0CR17	C0D0GT18
254	84	Normal	Exact	C0S0SYM0	
255	84	Normal	Exact	C0E0LR17	C0D0GT18

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
255	84	Normal	Exact	C0E0LR7R	C0S0SYM2
256	84	Normal	Exact	C0E0PR17	C0D0GT18
256	84	Normal	Exact	C0E0PR7R	C0S0SYM2
258	78	Normal	Exact	C0D0GT18	
259	78	Normal	Not Exact	C0D0GT18	
266	177	Bold	Exact	C0E0NB08	C04404D0
267	177	Bold Italic	Exact	C0E0NM08	C04504D0
275	78	Normal	Exact	C0D0GT18	
279	84	Bold	Exact	C0E0NR17	C0440470
280	72	Normal	Exact	C0S0AE20	
281	72	Normal	Exact	C0D0GT20	
281	72	Normal	Exact	C0E0LR20	C0D0GT20
281	72	Normal	Exact	C0S0SYM0	
282	72	Normal	Exact	C0E0LV20	C0420570
283	72	Bold	Exact	C0E0GN20	C0440470
285	58	Normal	Exact	C0E0LR25	C0D0GT20
290	54	Normal	Exact	C0D0GT24	
290	53	Normal	Not Exact	C0D0GT24	
290	53	Normal	Exact	C0S0SYM0	
300	54	Normal	Exact	C0D0GT18	
304*	54	Normal	Exact	C0620050	C0D0GT20
304*	72	Normal	Exact	C0620060	C0D0GT20
304*	84	Normal	Exact	C0620070	C0D0GT18
304*	96	Normal	Exact	C0620080	C0D0GT15
304*	108	Normal	Exact	C0620090	C0D0GT13
304*	120	Normal	Exact	C0620000	C0D0GT12
304*	144	Normal	Exact	C06200B0	C0D0GT10
304*	168	Normal	Exact	C06200D0	C0D0GT10
304*	240	Normal	Exact	C06200N0	C0D0GT10
304*	72	Normal	Exact	C0620860	C0L0KN20
304*	84	Normal	Exact	C0620870	C0L0KN20
304*	96	Normal	Exact	C0620880	C0L0KN20
304*	120	Normal	Exact	C06208B0	C0L0KATA
304*	168	Normal	Exact	C06208D0	C0L0KATA
304*	240	Normal	Exact	C06208J0	C0L0KATA
305*	144	Normal	Exact	C0920AB0	C0L00AOA
306*	144	Normal	Exact	C0920BB0	C0L00BOA
307*	144	Normal	Exact	C0420P00	C050AE10

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
318*		Bold	Exact	C07400XX	C050CBXX
319*		Italic	Exact	C07300XX	C050CIXX
322*	144	Normal	Exact	C0440P00	C050AE10
323*	120	Normal	Exact	C0BPOSA0	
323*	144	Normal	Exact	C0BPOS91	
323*	168	Normal	Exact	C0BPOSB0	
323*	240	Normal	Exact	C0BPOSBN	
326	96	Bold	Exact	C0T40680	
326	120	Bold	Exact	C0T40600	
326	144	Bold	Exact	C0T406B0	
326	180	Bold	Exact	C0T406E0	
327	96	Italic	Exact	C0T30680	
327	120	Italic	Exact	C0T30600	
327	144	Italic	Exact	C0T306B0	
327	180	Italic	Exact	C0T306E0	
328	96	Normal	Exact	C0T20680	
328	120	Normal	Exact	C0T20600	
328	144	Normal	Exact	C0T206B0	
328	180	Normal	Exact	C0T206E0	
335		Normal	Exact	C0B200XX	
335*		Normal	Exact	C0B20CXX	
336		Bold	Exact	C0B400XX	
336*		Bold	Exact	C0B40CXX	
337		Italic	Exact	C0B300XX	
337*		Italic	Exact	C0B30CXX	
338		Bold Italic	Exact	C0B500XX	
338*		Bold Italic	Exact	C0B50CXX	
339		Reverse	Exact	C0B600XX	
339*		Reverse	Exact	C0B60CXX	
400	80	Normal	Exact	C0D0GT18	
400*		Normal	Exact	C05200XX	C0D0GTXX
404*		Normal	Exact	C05400XX	C0D0GTXX
416		Normal	Exact	C04200XX	C0S0CRXX
416	115	Normal	Exact	C0420000	C0S0CR15
416		Normal	Exact	C04202XX	
416		Normal	Exact	C04203XX	
416		Normal	Exact	C04204XX	
416		Normal	Exact	C04205XX	

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
416*		Normal	Exact	C04201XX	
416*		Normal	Exact	C04207XX	
417	96	Double Wide	Exact	C0S0CD15	
420		Bold	Exact	C04400XX	C0S0CBXX
420	115	Normal	Exact	C0440000	C0S0CB15
420		Bold	Exact	C04402XX	
420		Bold	Exact	C04403XX	
420		Bold	Exact	C04404XX	
420		Bold	Exact	C04405XX	
420*		Bold	Exact	C04401XX	
420*		Bold	Exact	C04407XX	
424		Italic	Exact	C04300XX	C0S0CIXX
424	115	Italic	Exact	C0430000	C0S0CI15
424		Italic	Exact	C04302XX	
424		Italic	Exact	C04303XX	
424		Italic	Exact	C04304XX	
424		Italic	Exact	C04305XX	
424*		Italic	Exact	C04307XX	
425	96	Double Wide Italic	Exact	C0S0CW15	
428		Bold Italic	Exact	C04500XX	C0S0CIXX
428	115	Bold Italic	Exact	C0450000	C0S0CI15
428		Bold Italic	Exact	C04502XX	
428		Bold Italic	Exact	C04503XX	
428		Bold Italic	Exact	C04504XX	
428		Bold Italic	Exact	C04505XX	
428*		Bold Italic	Exact	C04507XX	
432*		Normal	Exact	C07200XX	C0S0CRXX
434	177	Bold	Exact	C0E0OB08	C0S0CB10
435	221	Bold	Exact	C0E0OB06	C0S0CB10
751	53	Normal	Exact	C0T05580	C0D0GT24
751	53	Normal	Exact	C0S0SYM0	
752	80	Normal	Exact	C0E20NB0	C0N204B0
753	120	Bold	Exact	C0E0BNTR	C0N404B0
753	80	Bold	Exact	C0E40NB0	C0N404B0
754	120	Bold	Exact	C0E40NH0	C0N404H0
755	160	Bold	Exact	C0E40NN0	C0N404N0
756	80	Italic	Exact	C0E30NB0	C0N304B0
757	80	Bold Italic	Exact	C0E50NB0	C0N504B0

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
758	120	Bold Italic	Exact	C0E50NH0	C0N504H0
759	160	Bold Italic	Exact	C0E50NN0	C0N504N0
1051	67	Normal	Exact	C0T05500	C0D0GT20
1051	67	Normal	Exact	C0S0SYM0	
1053	67	Bold	Exact	C0T07500	C0D0GT20
1053	67	Bold	Exact	C0S0SYM0	
1056	67	Italic	Exact	C0T15500	C0D0GT20
1056	67	Italic	Exact	C0S0SYM0	
1351	80	Normal	Exact	C0T055B0	C0D0GT18
1351	80	Normal	Exact	C0S0SYM2	
1653	107	Bold	Exact	C0T075F0	C0S0CB15
1653	107	Bold	Exact	C0S0SYM2	
1803	120	Bold	Exact	C0T075H0	C0S0CB10
2103	160	Bold	Exact	C0T075N0	C0S0CB10
2304		Normal	Exact	C0H200XX	C0S0CRXX
2304	96	Normal	Exact	C0H20080	C0D0GT24
2304	115	Normal	Exact	C0H200H0	C0S0CR12
2304	144	Normal	Exact	C0H200B0	C0D0GT18
2304	169	Normal	Exact	C0H200D0	C0S0CR15
2304	221	Normal	Exact	C0H200J0	C0S0CR10
2304	288	Normal	Exact	C0H200Z0	C0S0CR10
2304		Normal	Exact	C0H202XX	
2304		Normal	Exact	C0H203XX	
2304		Normal	Exact	C0H204XX	
2304		Normal	Exact	C0H205XX	
2304*		Normal	Exact	C0H201XX	
2304*		Normal	Exact	C0H207XX	
2305		Bold	Exact	C0H400XX	C0S0CBXX
2305	96	Bold	Exact	C0H40080	C0D0GT24
2305	115	Bold	Exact	C0H400H0	C0S0CB12
2305	144	Bold	Exact	C0H400B0	C0D0GT18
2305	169	Bold	Exact	C0H400D0	C0S0CB15
2305	221	Bold	Exact	C0H400J0	C0S0CB10
2305	288	Bold	Exact	C0H400Z0	C0S0CB10
2305		Bold	Exact	C0H402XX	
2305		Bold	Exact	C0H403XX	
2305		Bold	Exact	C0H404XX	
2305		Bold	Exact	C0H405XX	

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
2305*		Bold	Exact	C0H401XX	
2305*		Bold	Exact	C0H407XX	
2306		Italic	Exact	C0H300XX	C0S0C1XX
2306	96	Italic	Exact	C0H30080	C0D0GT24
2306	115	Italic	Exact	C0H300H0	C0S0CI12
2306	144	Italic	Exact	C0H300B0	C0D0GT18
2306	169	Italic	Exact	C0H300D0	C0S0CI15
2306	221	Italic	Exact	C0H300J0	C0S0CI10
2306	288	Italic	Exact	C0H300Z0	C0S0CI10
2306		Italic	Exact	C0H302XX	
2306		Italic	Exact	C0H303XX	
2306		Italic	Exact	C0H304XX	
2306		Italic	Exact	C0H305XX	
2306*		Italic	Exact	C0H307XX	
2307		Bold Italic	Exact	C0H500XX	C0S0C1XX
2307	96	Bold Italic	Exact	C0H50080	C0D0GT24
2307	115	Bold Italic	Exact	C0H500H0	C0S0CI12
2307	144	Bold Italic	Exact	C0H500B0	C0D0GT18
2307	169	Bold Italic	Exact	C0H500D0	C0S0CI15
2307	221	Bold Italic	Exact	C0H500J0	C0S0CI10
2307	288	Bold Italic	Exact	C0H500Z0	C0S0CI10
2307		Bold Italic	Exact	C0H502XX	
2307		Bold Italic	Exact	C0H503XX	
2307		Bold Italic	Exact	C0H504XX	
2307		Bold Italic	Exact	C0H505XX	
2307*		Bold Italic	Exact	C0H507XX	
2308		Normal	Exact	C0N200XX	C0S0CRXX
2308	96	Normal	Exact	C0N20080	C0D0GT24
2308	115	Normal	Exact	C0N200H0	C0S0CR12
2308	144	Normal	Exact	C0N200B0	C0D0GT18
2308	169	Normal	Exact	C0N200D0	C0S0CR15
2308	221	Normal	Exact	C0N200J0	C0S0CR10
2308	288	Normal	Exact	C0N200Z0	C0S0CR10
2308		Normal	Exact	C0N202XX	
2308		Normal	Exact	C0N203XX	
2308		Normal	Exact	C0N204XX	
2308		Normal	Exact	C0N205XX	
2308*		Normal	Exact	C0N201XX	

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
2308*		Normal	Exact	C0N207XX	
2309		Bold	Exact	C0N400XX	C0S0CBXX
2309	96	Bold	Exact	C0N40080	C0D0GT24
2309	115	Bold	Exact	C0N400H0	C0S0CB12
2309	144	Bold	Exact	C0N400B0	C0D0GT18
2309	169	Bold	Exact	C0N400D0	C0S0CB15
2309	221	Bold	Exact	C0N400J0	C0S0CB10
2309	288	Bold	Exact	C0N400Z0	C0S0CB10
2309		Bold	Exact	C0N402XX	
2309		Bold	Exact	C0N403XX	
2309		Bold	Exact	C0N404XX	
2309		Bold	Exact	C0N405XX	
2309*		Bold	Exact	C0N401XX	
2309*		Bold	Exact	C0N407XX	
2310		Italic	Exact	C0N300XX	C0S0CIXX
2310	96	Italic	Exact	C0N30080	C0D0GT24
2310	115	Italic	Exact	C0N300H0	C0S0CI12
2310	144	Italic	Exact	C0N300B0	C0D0GT18
2310	169	Italic	Exact	C0N300D0	C0S0CI15
2310	221	Italic	Exact	C0N300J0	C0S0CI10
2310	288	Italic	Exact	C0N300Z0	C0S0CI10
2310		Italic	Exact	C0N302XX	
2310		Italic	Exact	C0N303XX	
2310		Italic	Exact	C0N304XX	
2310		Italic	Exact	C0N305XX	
2310*		Italic	Exact	C0N307XX	
2311		Bold Italic	Exact	C0N500XX	C0S0CIXX
2311	96	Bold Italic	Exact	C0N50080	C0D0GT24
2311	115	Bold Italic	Exact	C0N500H0	C0S0CI12
2311	144	Bold Italic	Exact	C0N500B0	C0D0GT18
2311	169	Bold Italic	Exact	C0N500D0	C0S0CI15
2311	221	Bold Italic	Exact	C0N500J0	C0S0CI10
2311	288	Bold Italic	Exact	C0N500Z0	C0S0CI10
2311		Bold Italic	Exact	C0N502XX	
2311		Bold Italic	Exact	C0N503XX	
2311		Bold Italic	Exact	C0N504XX	
2311		Bold Italic	Exact	C0N505XX	
2311		Bold Italic	Exact	C0N507XX	

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
4407		Normal	Exact	C0T055XX	C0S0CRXX
4407	42	Normal	Exact	C0T05560	C0D0GT24
4407	54	Normal	Exact	C0T05580	C0D0GT24
4407	66	Normal	Exact	C0T05500	C0D0GT20
4407	72	Normal	Exact	C0T055A0	C0D0GT20
4407	78	Normal	Exact	C0T055B0	C0D0GT18
4427		Bold	Exact	C0T075XX	C0S0CBXX
4427	66	Bold	Exact	C0T07500	C0D0GT20
4427	96	Bold	Exact	C0T075D0	C0S0CB15
4427	108	Bold	Exact	C0T075F0	C0S0CB15
4427	132	Bold	Exact	C0T075J0	C0S0CB10
4427	162	Bold	Exact	C0T075N0	C0S0CB10
4535		Italic	Exact	C0T155XX	C0S0CIXX
4535	66	Italic	Exact	C0T15500	C0D0GT20
4535	72	Italic	Exact	C0T155A0	C0D0GT20
4555		Bold Italic	Exact	C0T175XX	C0S0CIXX
4555	66	Bold Italic	Exact	C0T17500	C0D0GT20
4555	78	Bold Italic	Exact	C0T175B0	C0D0GT18
4555	132	Bold Italic	Exact	C0T175J0	C0S0CI10
4919	40	Normal	Exact	C0E20G60	C0D0GT18
4919	53	Normal	Exact	C0E20G80	C0S0CR15
4919	67	Normal	Exact	C0E20G00	C0S0CR12
4919	80	Normal	Exact	C0E20GB0	C0S0CR10
4939	67	Bold	Exact	C0E40G00	C0S0CB12
4939	93	Bold	Exact	C0E40GD0	C0S0CB10
4939	120	Bold	Exact	C0E40GH0	C0S0CB10
5047	67	Italic	Exact	C0E30G00	C0S0CI12
5067	67	Bold Italic	Exact	C0E50G00	C0S0CI12
5687	80	Normal	Exact	C0E20TB0	C0S0CR10
5687	67	Normal	Exact	C0E20T00	C0S0CR12
5687	53	Normal	Exact	C0E20T80	C0S0CR15
5687	40	Normal	Exact	C0E20T60	C0D0GT18
5707	160	Bold	Exact	C0E40TN0	C0S0CB10
5707	120	Bold	Exact	C0E40TH0	C0S0CB10
5707	93	Bold	Exact	C0E40TD0	C0S0CB10
5707	80	Bold	Exact	C0E40TB0	C0S0CB10
5707	67	Bold	Exact	C0E40T00	C0S0CB12
5815	80	Italic	Exact	C0E30TB0	C0S0CI10

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
5815	67	Italic	Exact	C0E30T00	C0S0CI12
5835	80	Bold Italic	Exact	C0E50TB0	C0S0CI10
5835	67	Bold Italic	Exact	C0E50T00	C0S0CI12
5943	120	Normal	Exact	C0E20MH0	C0S0CR10
5943	93	Normal	Exact	C0E20MD0	C0S0CR10
5943	80	Normal	Exact	C0E20MB0	C0S0CR10
6199	80	Normal	Exact	C0E20PB0	C0S0CR10
6199	67	Normal	Exact	C0E20P00	C0S0CR12
6199	53	Normal	Exact	C0E20P80	C0S0CR15
6199	40	Normal	Exact	C0E20P60	C0D0GT18
6219	120	Bold	Exact	C0E40PH0	C0S0CB10
6219	93	Bold	Exact	C0E40PD0	C0S0CB12
6219	67	Bold	Exact	C0E40P00	C0S0CB15
6327	67	Italic	Exact	C0E30P00	C0S0CI12
6347	67	Bold Italic	Exact	C0E50P00	C0S0CI12
8503	80	Normal	Exact	C0E20BB0	C0S0CR10
8503	67	Normal	Exact	C0E20B00	C0S0CR10
8503	53	Normal	Exact	C0E20B80	C0S0CR15
8503	40	Normal	Exact	C0E20B60	C0D0GT18
8523	120	Bold	Exact	C0E40BH0	C0S0CB10
8523	93	Bold	Exact	C0E40BD0	C0S0CB10
8523	67	Bold	Exact	C0E40B00	C0S0CB12
8631	67	Italic	Exact	C0E30B00	C0S0CI12
8651	67	Bold Italic	Exact	C0E50B00	C0S0CI12
12855	80	Normal	Exact	C0E20KB0	C0S0CR10
12855	67	Normal	Exact	C0E20K00	C0S0CR12
12855	53	Normal	Exact	C0E20K80	C0S0CR15
12875	160	Bold	Exact	C0E40KN0	C0S0CB10
12875	120	Bold	Exact	C0E40KH0	C0S0CB10
12875	67	Bold	Exact	C0E40K00	C0S0CB12
12875	53	Bold	Exact	C0E40K80	C0S0CB15
12875	80	Bold	Exact	C0E40KB0	C0S0CB10
16951	80	Normal	Exact	C0E20CB0	C0S0CR10
16951	67	Normal	Exact	C0E20C00	C0S0CR10
16951	53	Normal	Exact	C0E20C80	C0S0CR15
16951	40	Normal	Exact	C0E20C60	C0D0GT18
16971	120	Bold	Exact	C0E40CH0	C0S0CB10
16971	93	Bold	Exact	C0E40CD0	C0S0CB10

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
16971	67	Bold	Exact	C0E40C00	C0S0CB12
17079	67	Italic	Exact	C0E30C00	C0S0CI12
17099	67	Bold Italic	Exact	C0E50C00	C0S0CI12
33079		Normal	Exact	C0A055XX	C0S0CRXX
33099		Bold	Exact	C0A075XX	C0S0CBXX
33207		Italic	Exact	C0A155XX	C0S0CIXX
33227		Bold Italic	Exact	C0A175XX	C0S0CIXX
33335	80	Normal	Exact	C0E20OB0	C0S0CR10
33335	67	Normal	Exact	C0E20O00	C0S0CR12
33335	53	Normal	Exact	C0E20O80	C0S0CR15
33335	40	Normal	Exact	C0E20O60	C0D0GT18
33355	120	Bold	Exact	C0E40OH0	C0S0CB10
33355	93	Bold	Exact	C0E40OD0	C0S0CB10
33355	67	Bold	Exact	C0E40O00	C0S0CB12
33463	67	Italic	Exact	C0E30O00	C0S0CI10
33483	67	Bold Italic	Exact	C0E50O00	C0S0CI12
33591	80	Normal	Exact	C0E20FB0	C0S0CR10
33591	67	Normal	Exact	C0E20F00	C0S0CR12
33591	53	Normal	Exact	C0E20F80	C0S0CR15
33591	40	Normal	Exact	C0E20F60	C0D0GT18
33601	120	Bold	Exact	C0E40FH0	C0S0CB10
33601	93	Bold	Exact	C0E40FD0	C0S0CB10
33601	67	Bold	Exact	C0E40F00	C0S0CB12
33719	67	Italic	Exact	C0E30F00	C0S0CI12
33729	67	Bold Italic	Exact	C0E50F00	C0S0CI12
34103	80	Normal	Exact	C0E20HB0	C0S0CR10
34103	67	Normal	Exact	C0E20H00	C0S0CR10
34103	53	Normal	Exact	C0E20H80	C0S0CR15
34103	40	Normal	Exact	C0E20H60	C0D0GT18
34123	120	Bold	Exact	C0E40HH0	C0S0CB10
34123	93	Bold	Exact	C0E40HD0	C0S0CB10
34123	67	Bold	Exact	C0E40H00	C0S0CB12
34231	67	Italic	Exact	C0E30H00	C0S0CI12
34251	67	Bold Italic	Exact	C0E50H00	C0S0CI10
37431	120	Normal	Exact	C0E20EH0	C0S0CR10
37431	93	Normal	Exact	C0E20ED0	C0S0CR10
37431	80	Normal	Exact	C0E20EB0	C0S0CR10
41783	80	Italic	Exact	C0E30SB0	C0S0CI10

Table 25. Printer Resident to Host Resident Font Character Set Mapping (continued)

Registered Font ID	Font Width	Font Attributes	Map Fidelity	Font Character Set Name (first choice)	Font Character Set Name (second choice)
41803	120	Bold Italic	Exact	C0E50SH0	C0S0CI10
41803	93	Bold Italic	Exact	C0E50SD0	C0S0CI10
49719	54	Normal	Exact	C0P05580	C0D0GT18

Printer Resident to Host Resident Code Page Mapping: The following table can help you determine what host resident code page will be downloaded to a 3820, 3825, 3827, 3829, 3831, 3835, or 3900 printer when your spooled file references a registered code page identifier (ID) instead of a host resident code page.

This font substitution is necessary because these printers do not support printer resident fonts. Depending upon the registered code page ID value that is requested for a particular font reference, the appropriate host resident code page is selected to match (as closely as possible) your font request.

The first choice is used if it is present on your iSeries server. The second choice is used if the first choice cannot be found.

The Map Fidelity indicates whether or not the first choice is considered to be an exact match to the printer resident font that is requested in your spooled file. As a rule, the second choice is not considered to be an exact match.

Table 26. Printer Resident to Host Resident Code Page Mapping

Registered Code Page ID	Host Resident Code Page Name (first choice)	Host Resident Code Page Name (second choice)	Map Fidelity
29	T1V10871		Exact
37	T1V10037		Exact
38	T1V10500		Exact
256	T1GDP256		Exact
259	T1000259		Exact
260	T1V10037		Exact
273	T1V10273		Exact
274	T1V10274		Exact
275	T1V10275		Exact
277	T1V10277		Exact
278	T1V10278		Exact
280	T1V10280		Exact
281	T1V10281		Exact
282	T1V10282		Exact
283	T1V10284		Exact
284	T1V10284		Exact
285	T1V10285		Exact
286	T1V10273		Exact
287	T1V10277		Exact
288	T1V10278		Exact

Table 26. Printer Resident to Host Resident Code Page Mapping (continued)

Registered Code Page ID	Host Resident Code Page Name (first choice)	Host Resident Code Page Name (second choice)	Map Fidelity
289	T1V10284		Exact
290	T1V10290		Exact
293	T1000293	T1S0AE10	Exact
297	T1V10297		Exact
310	T1000310	T1S0AE10	Exact
340	T1L0OCR1	T1V10500	Not Exact
361	T1000361	T1GI0361	Exact
363	T1GPI363		Exact
382	T1000382	T1GI0382	Exact
383	T1000383	T1GI0383	Exact
384	T1000384	T1GI0384	Exact
385	T1000385	T1GI0385	Exact
386	T1000386	T1GI0386	Exact
387	T1000387	T1GI0387	Exact
388	T1000388	T1GI0388	Exact
389	T1000389	T1GI0389	Exact
390	T1000390	T1GI0390	Exact
391	T1000391	T1GI0391	Exact
392	T1000392	T1GI0392	Exact
393	T1000393	T1GI0393	Exact
394	T1000394	T1GI0394	Exact
395	T1000395	T1GI0395	Exact
396	T1GI0396		Exact
420	T1000420	T1V10500	Not Exact
423	T1000423		Exact
424	T1000424	T1V10500	Not Exact
437	T1000437	T1V10500	Not Exact
500	T1V10500		Exact
803	T1000803		Exact
813	T1000813		Exact
819	T1000819		Exact
829	T1M00829		Exact
831	T1V10282		Exact
838	T1000838		Exact
850	T1000850		Exact
851	T1000851		Exact
852	T1000852		Exact
853	T1000853		Exact
855	T1000855		Exact

Table 26. Printer Resident to Host Resident Code Page Mapping (continued)

Registered Code Page ID	Host Resident Code Page Name (first choice)	Host Resident Code Page Name (second choice)	Map Fidelity
856	T1000856		Exact
857	T1000857		Exact
860	T1000860		Exact
861	T1000861		Exact
862	T1000862		Exact
863	T1000863		Exact
864	T1000864		Exact
865	T1000865		Exact
866	T1000866		Exact
869	T1000869		Exact
870	T1000870	T1V10500	Not Exact
871	T1V10871		Exact
874	T1V10874		Exact
875	T1000875		Exact
880	T1000880		Exact
890	T1000890	T1V10500	Not Exact
892	T1L0OCR1	T1V10500	Not Exact
893	T1L0OCRB	T1V10500	Not Exact
897	T1000897		Exact
899	T1000899		Exact
905	T1000905		Exact
912	T1000912		Exact
914	T1000914		Exact
915	T1000915		Exact
916	T1000916		Exact
920	T1000920		Exact
1002	T1001002	T1D0BASE	Exact
1003	T1DCDCFS		Exact
1004	T1001004		Exact
1008	T1001008		Exact
1025	T1001025		Exact
1026	T1001026		Exact
1027	T1001027		Exact
1028	T1001028		Exact
1029	T1001029		Exact
1038	T1001038		Exact
1039	T1001039		Exact
1041	T1001041		Exact
1046	T1001046		Exact

Table 26. Printer Resident to Host Resident Code Page Mapping (continued)

Registered Code Page ID	Host Resident Code Page Name (first choice)	Host Resident Code Page Name (second choice)	Map Fidelity
1068	T1001068		Exact
1069	T1001069		Exact
1070	T1GDP037		Exact
1071	T1GDP273		Exact
1072	T1GDP274		Exact
1073	T1GDP275		Exact
1074	T1GDP277		Exact
1075	T1GDP278		Exact
1076	T1GDP280		Exact
1077	T1GDP281		Exact
1078	T1GDP282		Exact
1079	T1GDP284		Exact
1080	T1GDP285		Exact
1081	T1GDP279		Exact
1087	T1001087		Exact
1091	T1001091		Exact
1092	T1001092		Exact
2063	T1D0BASE		Exact
2064	T1GDP276		Exact
2065	T1GI0361		Exact
2066	T1GPI363		Exact
2067	T1GI0382		Exact
2068	T1GI0383		Exact
2069	T1GI0384		Exact
2070	T1GI0385		Exact
2071	T1GI0386		Exact
2072	T1GI0387		Exact
2073	T1GI0388		Exact
2074	T1GI0389		Exact
2075	T1GI0390		Exact
2076	T1GI0391		Exact
2077	T1GI0392		Exact
2078	T1GI0394		Exact
2079	T1GI0395		Exact
2081	T1GE0200		Exact
2082	T1GE0300		Exact
2086	T1L0OCRB		Exact
2087	T1L0OCR1		Exact
2092	T1S0S193		Exact

Table 26. Printer Resident to Host Resident Code Page Mapping (continued)

Registered Code Page ID	Host Resident Code Page Name (first choice)	Host Resident Code Page Name (second choice)	Map Fidelity
2093	T1S0S198		Exact
2102	T1L02773		Exact
2103	T1L02774		Exact
2108	T1S0AE10		Exact

Character Identifier (CHRID) Values Supported: The following table lists all the character identifiers, the related national language groups, the correct code page, and which printers support which character identifier.

Table 27. CHRID Values and Applicable Printers (CHRID Parameter)

Language Groups	Code Pages		Printers ¹							
	CHRID Code Page xxx yyy ^{2,3}	Sub-stitute Code Page yyy ^{2,4}	3812 ⁵ 3816 ⁵	4214 ⁵	4224 ⁵ 4230 ⁵ 4247 ⁵	4234 ⁵ 6400 ⁹ 6408 ⁹ 6412 ⁹	5219	5224 5225	3112 3116 3912 3916 4312 4317 4324 4028 Infoprint 20 Infoprint 32 ⁵	3130 3160 3935 Infoprint 3000 Infoprint 4000
Major Groups										
International (and US ASCII)	103 038	500	Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
Multinational	697 500		Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes
	337 256	500	Yes	N/A	N/A	N/A	N/A	Yes	Yes	Yes
	697 256	500	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A
United States	101 037 697 037		Yes Yes	Yes Yes	Yes N/A	Yes Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
US, Canada, Netherlands, Portugal, Brazil, Australia, New Zealand ¹⁰	695 1140	697 037	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Individual Regions/Languages										
Arabic	697 361		Yes	N/A	Yes	N/A	N/A	N/A	Yes	N/A
Arabic X/B	235 420	500	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
	697 420		Yes	N/A	4224-No 4230-Yes 4247-Yes	IPDS ⁷	N/A	N/A	Yes	N/A
Arabic ¹⁰	1461 420	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria/ Germany ⁶	265 273 697 273		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
Austria/ Germany	697 286 317 286	273	Yes Yes	N/A N/A	Yes Yes	IPDS ⁷ IPDS ⁷	N/A N/A	N/A N/A	N/A N/A	Yes Yes
Austria, Germany ¹⁰	695 1141	697 273	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 27. CHRID Values and Applicable Printers (CHRID Parameter) (continued)

Language Groups	Code Pages		Printers ¹							
	CHRID Code Page xxx yyy ^{2,3}	Sub-stitute Code Page yyy ^{2,4}	3812 ⁵ 3816 ⁵	4214 ⁵	4224 ⁵ 4230 ⁵ 4247 ⁵	4234 ⁵ 6400 ⁹ 6408 ⁹ 6412 ⁹	5219	5224 5225	3112 3116 3912 3916 4312 4317 4324 4028 Infoprint 20 Infoprint 32 ⁵	3130 3160 3935 Infoprint 3000 Infoprint 4000
Belgium ⁶	697 500 269 274 697 274		N/A N/A N/A	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes N/A	Yes Yes N/A	N/A N/A N/A	Yes Yes Yes
Belgium, Canada, Switzerland ¹⁰	695 1148	697 500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brazil ⁶	273 275 697 275		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
Bulgaria, FYR Macedonia, Serbia (Cyrillic) ¹⁰	1381 1154	1150 1025	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Canadian French ⁶	277 276 341 260	297 037	Yes Yes	N/A N/A	N/A Yes	N/A IPDS ⁷	Yes N/A	Yes N/A	Yes Yes	Yes Yes
	697 260		Yes	N/A	N/A	IPDS ⁷	N/A	N/A	Yes	N/A
Canada-Bilingual	038 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
	039 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Canada-English	037 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Chinese (Hong Kong S.A.R.)	119 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
Chinese-Simplified	1174 836		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chinese-Traditional	1175 037		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chinese-Traditional ¹⁰	32000 1159	697 37	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cyrillic	960 880		N/A	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
Cyrillic multilingual	1150 1025				4224-No 4230-Yes 4247-Yes	IPDS ⁷				Yes
Czechoslovakia/ Czech	083 257		N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A
Czechoslovakia/ Slovak	085 257		N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A
Czech Republic, Hungary, Poland ¹⁰	1375 1153	959 870	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark/ Norway ⁶	281 277 697 277		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
Denmark/ Norway	697 287	277	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A

Table 27. CHRID Values and Applicable Printers (CHRID Parameter) (continued)

Language Groups	Code Pages		Printers ¹							
	CHRID Code Page xxx yyy ^{2,3}	Sub-stitute Code Page yyy ^{2,4}	3812 ⁵ 3816 ⁵	4214 ⁵	4224 ⁵ 4230 ⁵ 4247 ⁵	4234 ⁵ 6400 ⁹ 6408 ⁹ 6412 ⁹	5219	5224 5225	3112 3116 3912 3916 4312 4317 4324 4028 Infoprint 20 Infoprint 32 ⁵	3130 3160 3935 Infoprint 3000 Infoprint 4000
	321 287		Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
Denmark, Norway ¹⁰	695 1142	697 277	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Farsi	1219 1097		N/A	N/A	Yes	IPDS ⁷	N/A	N/A	N/A	N/A
Estonia	1307 1122		N/A	N/A	4224-No 4230-Yes 4247-Yes	N/A	N/A	N/A	N/A	N/A
Estonia ¹⁰	1391 1157	1307 1122	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland/ Sweden ⁶	285 278 697 278		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
Finland/ Sweden	697 288	278	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A
	325 288		Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
Finland, Sweden ¹⁰	695 1143	697 278	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
France (1977) ⁶	289 279	297	Yes	N/A	N/A	N/A	N/A	Yes	Yes	N/A
France (1980) ⁶	288 297 697 297		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes N/A	N/A N/A	Yes Yes	Yes Yes
France	251 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
France/ Belgium	031 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
France ¹⁰	695 1147	697 297	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany/ Austria	028 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
	029 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Greek	218 423		N/A	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
	925 875		N/A	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
Greek ¹⁰	1371 875	218 423	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hebrew	941 424		Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
	697 424		Yes	N/A	4224-No 4230-Yes 4247-Yes	IPDS ⁷	N/A	N/A	Yes	N/A
	1147 803		N/A	N/A	4224-No 4230-Yes 4247-Yes	IPDS ⁷	N/A	N/A	N/A	Yes
Hebrew ¹⁰	1356 424	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 27. CHRID Values and Applicable Printers (CHRID Parameter) (continued)

Language Groups	Code Pages		Printers ¹							
	CHRID Code Page xxx yyy ^{2,3}	Sub-stitute Code Page yyy ^{2,4}	3812 ⁵ 3816 ⁵	4214 ⁵	4224 ⁵ 4230 ⁵ 4247 ⁵	4234 ⁵ 6400 ⁹ 6408 ⁹ 6412 ⁹	5219	5224 5225	3112 3116 3912 3916 4312 4317 4324 4028 Infoprint 20 Infoprint 32 ⁵	3130 3160 3935 Infoprint 3000 Infoprint 4000
Hungary	091 257		N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A
Icelandic	697 871		Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
	697 029		Yes	N/A	N/A	N/A	N/A	N/A	Yes	N/A
Iceland ¹⁰	695 1149	697 871	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy ⁶	293 280 697 280		Yes Yes	Yes Yes	Yes Yes	IPDS ⁷ Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
Italy	041 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Italy ¹⁰	695 1144	697 280	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Japan-English ⁶	297 281 697 281		Yes Yes	Yes Yes	Yes Yes	IPDS ⁷ Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
	068 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
	069 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Japan- Katakana ⁶	332 290		Yes	N/A	Yes	Yes	N/A	Yes	Yes	Yes
Japan- Katakana	1172 290		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Japan- Katakana ¹⁰	1398 290		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Japan-Latin	1172 1027		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Japan-Latin ¹⁰	1398 1027		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Korean	1173 833		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Korean	933 833		N/A	N/A	4230-Yes 4247-Yes 4224- N/A	IPDS ⁷	N/A	N/A	N/A	N/A
	697 290		Yes	N/A	N/A	IPDS ⁷	N/A	N/A	Yes	N/A
Latin	959 870		N/A	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
Latin America/ Puerto Rico	025 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Latvia/Lithuania	1305 1112		N/A	N/A	4224-No 4230-Yes 4247-Yes	N/A	N/A	N/A	N/A	N/A
Latvia/Lithuania ¹⁰	1393 1156	1305 1112	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 27. CHRID Values and Applicable Printers (CHRID Parameter) (continued)

Language Groups	Code Pages		Printers ¹							
	CHRID Code Page xxx yyy ^{2,3}	Sub-stitute Code Page yyy ^{2,4}	3812 ⁵ 3816 ⁵	4214 ⁵	4224 ⁵ 4230 ⁵ 4247 ⁵	4234 ⁵ 6400 ⁹ 6408 ⁹ 6412 ⁹	5219	5224 5225	3112 3116 3912 3916 4312 4317 4324 4028 Infoprint 20 Infoprint 32 ⁵	3130 3160 3935 Infoprint 3000 Infoprint 4000
Lao	1341 1132		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	043 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Norway/ Denmark	055 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Poland	093 257		N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A
Portugal ⁶	301 282 697 282		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
Portugal	697 831 063 256	282	Yes Yes	N/A N/A	Yes N/A	N/A N/A	N/A Yes	N/A N/A	Yes Yes	N/A N/A
Romania	087 258		N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A
South Africa	081 258		N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A
Spain ⁶	305 283 697 283	284 284	Yes Yes	N/A N/A	Yes Yes	Yes N/A	Yes N/A	Yes N/A	Yes Yes	Yes Yes
	697 289	284	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A
	329 289		Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
	045 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Spanish Speaking ⁶	309 284 697 284 1149 284		Yes Yes N/A	Yes Yes N/A	Yes Yes N/A	Yes Yes N/A	Yes Yes Yes	Yes N/A N/A	Yes Yes N/A	Yes N/A Yes
Spain, Latin America (Spanish) ¹⁰	695 1145	697 284	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sweden/ Finland	052 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
	053 256		Yes	N/A	N/A	N/A	Yes	N/A	N/A	N/A
Switzerland/ French	048 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Switzerland/ German	049 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Thai	1102 889		N/A	N/A	Yes	IPDS ⁷	N/A	N/A	N/A	N/A
	938 838		N/A	N/A	4230-Yes 4247-Yes 4224- N/A	IPDS ⁷	N/A	N/A	N/A	N/A

Table 27. CHRID Values and Applicable Printers (CHRID Parameter) (continued)

Language Groups	Code Pages		Printers ¹							
	CHRID Code Page xxx yyy ^{2,3}	Sub-stitute Code Page yyy ^{2,4}	3812 ⁵ 3816 ⁵	4214 ⁵	4224 ⁵ 4230 ⁵ 4247 ⁵	4234 ⁵ 6400 ⁹ 6408 ⁹ 6412 ⁹	5219	5224 5225	3112 3116 3912 3916 4312 4317 4324 4028 Infoprint 20 Infoprint 32 ⁵	3130 3160 3935 Infoprint 3000 Infoprint 4000
Thai ¹⁰	1395 1160	938 838	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Turkish	965 905		N/A	N/A	4230-Yes 4247-Yes 4224-Yes	IPDS ⁷	N/A	N/A	Yes	Yes
	1152 1026		N/A	N/A	4230-Yes 4247-Yes 4224- N/A	IPDS ⁷	N/A	N/A	N/A	Yes
Turkish ¹⁰	1378 1155	1152 1026	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ukraine	1326 1123	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ukraine ¹⁰	1388 1158	1326 1123	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom ⁶	313 285 697 285		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes N/A	Yes N/A	Yes Yes	Yes Yes
U.K./ Israel	066 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
U.K./ Israel-Latin	067 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
United Kingdom ¹⁰	695 1146	697 285	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
USA- Accounting	017 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
USA/Australia	001 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Vietnamese	1336 1130		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vietnamese ¹⁰	1397 1164	1336 1130	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Countries of the former Yugoslavia	410 890		N/A	N/A	Yes	IPDS ⁷	N/A	N/A	N/A	N/A
Countries of the former Yugoslavia-Latin	095 257		N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A
Noncountry Languages										
APL	697 293		Yes	N/A	N/A	IPDS ⁷	N/A	N/A	Yes	N/A

Table 27. CHRID Values and Applicable Printers (CHRID Parameter) (continued)

Language Groups	Code Pages		Printers ¹							
	CHRID Code Page xxx yyy ^{2,3}	Sub-stitute Code Page yyy ^{2,4}	3812 ⁵ 3816 ⁵	4214 ⁵	4224 ⁵ 4230 ⁵ 4247 ⁵	4234 ⁵ 6400 ⁹ 6408 ⁹ 6412 ⁹	5219	5224 5225	3112 3116 3912 3916 4312 4317 4324 4028 Infoprint 20 Infoprint 32 ⁵	3130 3160 3935 Infoprint 3000 Infoprint 4000
	380 293		Yes	N/A	4224-N/A 4230-N/A 4247-N/A	IPDS ⁷	N/A	N/A	Yes	Yes
APL Alternate	697 310		Yes	N/A	4224-No 4230-Yes 4247-Yes	IPDS ⁷	N/A	N/A	Yes	Yes
	963 310		Yes	N/A	4224-No 4230-Yes 4247-Yes	N/A	N/A	N/A	Yes	Yes
ASCII	103 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
DCF Compatibility	1132 1002		Yes	N/A	4230-Yes 4247-Yes 4224-No	IPDS ⁷	N/A	N/A	Yes	Yes
DCF US Text	1133 1003		N/A	N/A	4230-N/A 4247-N/A 4224-N/A	N/A	N/A	N/A	N/A	Yes
DCF text with numeric space	1259 1068		N/A	N/A	4230-N/A 4247-N/A 4224-N/A	N/A	N/A	N/A	N/A	Yes
EBCDIC	101 256		Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
GML List Symbols	1258 1039		N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes
International Typographic	697 361		Yes	N/A	N/A	N/A	N/A	N/A	Yes	N/A
OCR (unregistered)	697 340	500	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A
OCR A	697 892	500	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A
	968 892		Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes
OCR A (unregistered)	580 340	892	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A
OCR B	697 893	500	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A
	969 893		Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	Yes

Table 27. CHRID Values and Applicable Printers (CHRID Parameter) (continued)

Language Groups	Code Pages		Printers ¹							
	CHRID Code Page xxx yyy ^{2,3}	Substitute Code Page yyy ^{2,4}	3812 ⁵ 3816 ⁵	4214 ⁵	4224 ⁵ 4230 ⁵ 4247 ⁵	4234 ⁵ 6400 ⁹ 6408 ⁹ 6412 ⁹	5219	5224 5225	3112 3116 3912 3916 4312 4317 4324 4028 Infoprint 20 Infoprint 32 ⁵	3130 3160 3935 Infoprint 3000 Infoprint 4000
OCR B (unregistered)	590 340	893	Yes	N/A	Yes	IPDS ⁷	N/A	N/A	Yes	N/A
Personal Computer	697 437		Yes	N/A	4224-No 4247-Yes 4230-Yes	N/A	N/A	N/A	Yes	N/A
Symbols	340 259		Yes	N/A	N/A	N/A	N/A	N/A	Yes	Yes
Symbol- Selectric	201 259	500	Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Symbol-6640	202 259	500	Yes	Yes	N/A	N/A	Yes	N/A	Yes	N/A
Symbol-6670	203 259		Yes	N/A	N/A	N/A	Yes	N/A	Yes	N/A
Symbols, Adobe	1257 1087		N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes
Symbols Set 7	697 259		Yes	N/A	N/A	N/A	N/A	N/A	Yes	N/A
Symbols Mod Set 7	1191 1091		N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes
Symbols Set 8	630 363		N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes

Notes:

- ¹ The 5256, 5262, and 4245 work station printers do not support the hardware function required for alternative CHRID processing. If a nondefault character set and code page is selected for these printers, a diagnostic message is sent and processing continues using the default character set.
- ² If the printer supports the code page specified (the second part (*yyy*) of the CHRID parameter) but not the character set (*xxx*), then the character set supported by the printer is used along with the specified code page. For example, if 337 037 (extended character set for displays) is specified for the 5224 and 5225 Printers, the print file is printed with character set 101, code page 037.
- ³ In some cases, the printer will substitute a supported code page for an unsupported code page. Consult the various printer reference guides for defaults on the code page mapping.
- ⁴ If the printer does not support or map the code page specified, an attempt is made by the system to find a satisfactory substitute. This column shows the code page substitutes that are made if the specified printer supports the substitute.
- ⁵ The 3812, 3816, 4214, 4224, 4230, 4234, and 4247 Printers support character set 697 (full character set). This character set contains all the characters in the limited character sets. For example, 697 037 would contain all the characters in 101 037 or 337 037 (extended character set for displays).
- ⁶ This language is considered a primary language group. All other entries, if any, under the primary language group are considered as alternative language groups.
- ⁷ Supported by 4234 IPDS version and 64xx with IPDS feature only.
- ⁸ Supported by 4234 SCS version only.
- ⁹ 64xx SCS emulation mode set to 4234
- ¹⁰ Provides support for Euro currency symbol.

Host Resident to Printer Resident Code Page Mapping: Code pages are necessary for jobs to print. Some printers have code pages stored in memory or on a font card (printer resident code page); other printers do not.

Refer to the following table:

- if your spooled files are directed to a 4224, 4230, 4234, 4247, or 64xx printer that is configured as an AFP printer.
- if your spooled files have a host resident code page (stored on the iSeries server) specified.

The table can help you determine what printer resident code page is substituted when your spooled file specifies a host resident code page instead of a registered code page identifier (ID).

This code page substitution is necessary because these printers do not support the downloading of 240-pel host resident fonts. Depending upon the host resident code page name that is requested for a particular font reference, the appropriate registered code page ID value is selected to match (as closely as possible) your font request.

The Map Fidelity indicates whether or not the substituted printer resident code page is considered to be an exact match to the code page that is requested in your spooled file.

Table 28. Host Resident to Printer Resident Code Page Mapping

Host Resident Code Page Name	Registered Code Page ID	Map Fidelity
T1V10037	37	Exact
T1GDP256	256	Exact
T1V10273	273	Exact
T1V10274	274	Exact
T1V10275	275	Exact
T1V10277	277	Exact
T1V10278	278	Exact
T1V10280	280	Exact
T1V10281	281	Exact
T1V10282	282	Exact
T1V10284	284	Exact
T1V10285	285	Exact
T1000290	290	Exact
T1L02773	2102	Exact
T1L02774	2103	Exact
T1S0AE10	2108	Exact
T1V10297	297	Exact
T1000361	361	Exact
T1GI0361	2065	Exact
T1000382	382	Exact
T1GI0382	2067	Exact
T1GI0383	2068	Exact
T1000384	384	Exact
T1GI0384	2069	Exact
T1000385	385	Exact
T1GI0385	2070	Exact
T1000386	386	Exact
T1GI0386	2071	Exact
T1000387	387	Exact

Table 28. Host Resident to Printer Resident Code Page Mapping (continued)

Host Resident Code Page Name	Registered Code Page ID	Map Fidelity
T1GI0387	2072	Exact
T1000388	388	Exact
T1GI0388	2073	Exact
T1000389	389	Exact
T1GI0389	2074	Exact
T1000390	390	Exact
T1GI0390	2075	Exact
T1000391	391	Exact
T1GI0391	2076	Exact
T1000392	392	Exact
T1GI0392	2077	Exact
T1000393	393	Exact
T1GI0393	2077	Exact
T1000394	394	Exact
T1GI0394	2078	Exact
T1000395	395	Exact
T1GI0395	2079	Exact
T1000420	420	Exact
T1000424	424	Exact
T1GPI363	2066	Exact
T1000437	437	Exact
T1V10500	500	Exact
T1000819	819	Exact
T1000850	850	Exact
T1000852	852	Exact
T1000857	857	Exact
T1000863	863	Exact
T1000870	870	Exact
T1V10871	871	Exact
T1000912	912	Exact
T1000920	920	Exact
T1001002	1002	Exact
T1D0BASE	1002	Exact
T1001003	1003	Exact
T1DCDCFS	1003	Exact
T1001004	1004	Exact
T1001026	1026	Exact

Lines Per Inch (LPI) Values Supported: Lines per inch means the number of characters that can be printed vertically within an inch.

Each entry in the following table shows the valid range of values for lines per page for each printer type and for each value of lines per inch (LPI) valid for the printer.

Note: Because of slight adjustments made for position checks, it is recommended to not print on line 1 when specifying 8 or 9 LPI on an IPDS printer.

Table 29. Lines per Page (LPI Parameter)

Printer	3 Lines per Inch	4 Lines per Inch	6 Lines per Inch	7.5 Lines per Inch	8 Lines per Inch	9 Lines per Inch	12 Lines per Inch
3287	–	1-104	1-104	–	1-104	–	–
3812 SCS	–	1-56	1-84	–	1-112	1-126	1-168
3812 IPDS	–	2-56	2-84	–	2-112	2-112	2-168
3816 SCS	–	1-56	1-84	–	1-112	1-126	1-168
3816 IPDS	–	2-56	2-84	–	2-112	2-112	2-168
3820	–	1-56	1-84	–	1-112	1-126	1-168
3825	–	1-56	1-84	–	1-112	1-126	1-168
3827	–	1-56	1-84	–	1-112	1-126	1-168
3835	–	2-91	2-136	–	2-182	2-204	2-273
3935		1-68	1-102		1-136	1-153	1-204
4028	–	2-56	2-84	–	1-112	1-112 or 2-126	2-168
4214	–	1-255	1-255	–	1-255	1-255	–
4224, 4234 IPDS	–	2-91	2-136	–	2-182	2-204	2-273
4230	–	2-91	2-136	–	2-182	2-204	2-273
4234 SCS	–	1-255	1-255	–	1-255	–	–
4245 Models T12 and T20	–	–	1-255	–	1-255	–	–
4247	–	2-91	2-136	–	2-182	2-204	2-273
5211	–	–	2-84	–	2-112	–	–
5219 Continuous Forms	–	2-255	2-255	–	2-255	–	2-255
5219 Cut Sheet	–	57	86	–	114	–	172
5224	–	1-255	1-255	–	1-255	1-255	–
5225	–	1-255	1-255	–	1-255	1-255	–
5256 (set manually)	–	–	1-255	–	1-255	–	–
5262	–	–	1-255	–	1-255	–	–
5553	1-255	1-255	1-255	1-255	1-255	–	1-255
5583	1-255	1-255	1-255	1-255	1-255	–	–
6252	–	1-255	1-255	–	1-255	1-255	–

Characters Per Inch (CPI) Values Supported: Characters per inch means the number of characters printed horizontally within an inch across a page.

Each entry in the following table shows the valid range of values for the characters per line for each printer type and for each value of characters per inch (CPI) for the printer.

Table 30. Characters per Line (CPI Parameter)

Printer	5 Characters per Inch	10 Characters per Inch	12 Characters per Inch	13.3 Characters per Inch	15 Characters per Inch	16.7 Characters per Inch	18 Characters per Inch	20 Characters per Inch
3287	–	1-132	–	–	–	–	–	–
3112 ¹	1-42	1-85	1-102	–	1-127	–	–	–
3116 ¹	1-42	1-85	1-102	–	1-127	–	–	–
3130 ¹	–	1-132	1-158	–	1-198	–	–	–
3160 ¹	–	1-132	1-158	–	1-198	–	–	–
3812 ¹	1-42	1-85	1-102	–	1-127	–	–	–
3812 ¹ Rotated Form	1-70	1-140	1-168	–	1-210	–	–	–
3816 ¹	1-42	1-85	1-102	–	1-127	–	–	–
3816 ¹ Rotated Form	1-70	1-140	1-168	–	1-210	–	–	–
3820 ¹	–	1-85	1-102	–	1-127	–	–	–
3825 ¹	–	1-85	1-102	–	1-127	–	–	–
3827 ¹	–	1-85	1-102	–	1-127	–	–	–
3835 ¹ , 3935 ¹	–	1-132	1-158	–	1-198	–	–	–
3912 ¹	1-42	1-85	1-102	–	1-127	–	–	–
3916 ¹	1-42	1-85	1-102	–	1-127	–	–	–
4028 ¹	1-42	1-85	1-102	–	1-127	–	–	–
4028 ¹ Rotated Form	1-70	1-140	1-168	–	1-210	–	–	–
4214 Continuous Forms	1-66	1-132	1-158	–	1-198	1-220	–	–
4214 Cut Sheet	1-60	1-120	1-144	–	1-180	1-200	–	–
4224 ¹	–	1-132	1-158	–	1-198	1-220	–	–
4230 ¹	–	1-132	1-158	–	1-198	1-220	–	–
4234 SCS ¹	–	1-132	–	–	1-198	–	–	–
4234 IPDS ¹	1-66	1-132	1-158	–	1-198	1-238	–	–
4245	–	1-132	–	–	–	–	–	–
4247 ¹	–	1-132	1-158	–	1-198	1-220	–	–
5219	–	1-132	1-158	–	1-198	–	–	–
5224	–	1-132	–	–	1-198	–	–	–
5225	–	1-132	–	–	1-198	–	–	–
5256 Model 3	–	1-132	–	–	–	–	–	–

Table 30. Characters per Line (CPI Parameter) (continued)

Printer	5 Characters per Inch	10 Characters per Inch	12 Characters per Inch	13.3 Characters per Inch	15 Characters per Inch	16.7 Characters per Inch	18 Characters per Inch	20 Characters per Inch
5262	–	1-132	–	–	–	–	–	–
5553	–	1-136	1-163	1-181	1-204	–	1-244	1-272
5583	–	1-132	1-158	1-176	1-198	–	1-236	1-264
6252	–	1-132	–	–	1-198	–	–	–
6408 SCS ²	–	1-132	–	–	1-198	–	–	–
6408 IPDS ³	1-66	1-132	1-158	–	1-198	1-238	–	–

Notes:

¹ Many character per inch values (implied by the pitch of the font, see the FONT parameter), are supported in addition to the ones listed here. To find the maximum characters per line, multiply the implied characters per inch value listed in the font table by maximum page width supported (in inches). The maximum page width supported by the 3812 and 3816 Printers is 8.5 inches for non-rotated forms and 14.0 inches for rotated forms.

² Emulates 4234 SCS or 5225

³ Emulates 4234 IPDS

4019 Printer Information: The following tables list the ways you can attach the 4019 printer, the emulation method used, and the function provided by the combination of the attachment and emulation methods. In this table a supported function is indicated by an X.

The 4019 is supported on the iSeries server by treating it as an emulated version of another device. In some respects the result achieved with the 4019 is not identical to the emulated device. The following tables express capabilities in terms of the emulated printers, but indicate some situations in which the 4019 result exceeds that of the emulated device.

Note: Go to Table 15 on page 123 for information on how to work with your emulated 4019 printer to make the 4019 resident fonts available.

Note that image, graphics, and bar codes are not supported under any emulation or means of attachment.

Pay special attention to the treatment of fonts and the footnotes relating to page length and width.

Table 31 shows a matrix of functions when printing via any system function other than OfficeVision. In this table a supported function is indicated by an X.

Table 31. 4019 Printer-System Functions

Attached via ⇒	3477	3197	AWSC	WSF	WSE	E5250	R5250	OS/2 WSF 5219
Emulating ⇒	5219	4214	3812	3812	5219	5219	5219	5219
Printer File Commands								
Page Length ¹	X	X	X	X	X	X	X	X
Page Width ¹	X	X	X	X	X	X	X	X
LPI (4.0)	X	X	X	X	X	X	X	X
LPI (6.0)	X	X	X	X	X	X	X	X
LPI (8.0)	X	X	X	X	X	X	X	X
LPI (9.0) ²	X	X	X	X				

Table 31. 4019 Printer-System Functions (continued)

Attached via ⇒	3477	3197	AWSC	WSF	WSE	E5250	R5250	OS/2 WSF 5219
Emulating ⇒	5219	4214	3812	3812	5219	5219	5219	
FONT(*CPI) ³ CPI(5.0) ⁴	X	X	X	X				
FONT(*CPI) ³ CPI(10.0)	X	X	X	X	X	X	X	X
FONT(*CPI) ³ CPI(12.0)	X	X	X	X	X	X	X	X
FONT(*CPI) ³ CPI(15.0)	X	X	X	X	X	X	X	X
FONT(*CPI) ³ CPI(16.7)		X	X	X	X	X	X	X
Fold Records	X	X	X	X	X	X	X	X
Truncate Records	X	X	X	X	X	X	X	X
Paper Drawer (1)	X	X	X	X	X	X	X	X
Paper Drawer (2)	X		X	X		X		
Paper Drawer (E1)	X		X	X	X	X		
Non-Typographical Fonts (See Font Table below for details.)								
Typo and User Defined Fonts								
Form Feed (*CUT)		X		X	X		X	X
Form Feed (*AUTOCUT)	X	X	X	X	X	X	X	X
Print Quality (*Draft) with PAGRTT(*DEVD) automatically give PAGRTT (*COR)			X	X				
Change Char Set/Code Page ID	X		X	X				
Rotation 0	X	X	X	X	X	X	X	X
Rotation 90								
Rotation 180								
Rotation 270	X		X	X				
Rotation *COR			X	X				
Print Text	X	X	X	X	X	X	X	X
Hardware Justification 0	X	X	X	X	X	X	X	X
Hardware Justification 50	X			X	X	X	X	X
Hardware Justification 100	X		X	X	X	X	X	X
Duplex								
Copies	X	X	X	X	X	X	X	X

Table 31. 4019 Printer-System Functions (continued)

Attached via ⇒	3477	3197	AWSC	WSF	WSE	E5250	R5250	OS/2 WSF 5219
Emulating ⇒	5219	4214	3812	3812	5219	5219	5219	
File Separators	X	X	X	X	X	X	X	X
Additional DDS Keywords								
Barcode								
Chrsiz								
Color								
Font (Changing Type Styles)								
Highlight			X					
Skipa	X	X	X	X	X	X	X	X
Skipb	X	X	X	X	X	X	X	X
Spacea	X	X	X	X	X	X	X	X
Spaceb	X	X	X	X	X	X	X	X
Underline	X	X	X	X	X	X	X	X
Other Functions								
Graphics								
Image								
Symbols Code Page 259	X		X	X				
Notes:								
¹	<p>Existing applications or documents may not fit on the 4019 page since there is an unprintable border around the outside edge. You may have to change the margins and lines per page (and re-paginate in some cases) to obtain the desired output.</p> <p>This unprintable area applies to both envelopes and paper of any size. The unprintable area is 6.35 mm (0.25 in) from the sides and 4.23 mm (0.17 in) from the top and bottom. This results in an 8-inch writing line on 8.5 by 11 inch paper and a 7.7-inch writing line on A4 paper. With 6 LPI for example, this yields 64 lines on an 11-inch page or 68 lines on A4 paper.</p> <p>Consideration should be given to the effect of this unprintable area when a document is formatted to assure that it prints correctly. If data is formatted to print beyond the printable area on the sides, the excess will print as an additional short line.</p>							
²	<p>LPI(9.0) is not supported by the 5219 printer; therefore LPI(9.0) is not supported for any of the 5219 emulations.</p>							
³	<p>On the CRTPRTE, CHGPRTE, and OVRPRTE commands you may avoid direct specification of a font by using FONT(*CPI). This allows the system to default to any font that supports the requested CPI value. However, the defaulted font may be one that is not supported on the 4019. An unsupported font will cause printing to halt and require operator intervention. We therefore recommend that you specify FONT explicitly on these commands.</p>							
⁴	<p>CPI(5.0) is not supported by the 5219; therefore CPI(5.0) is not supported for any of the 5219 emulations.</p>							

4234 Compressed Font Substitution by Lines Per Inch (LPI) Value: The following table lists the font substitution that takes place when printing on a 4234 printer configured as follows:

Value of *NO for the AFP parameter

Value greater than or equal to 8 for the LPI parameter

This substitution allows the use of fonts that are slightly shorter when the LPI value is greater than or equal to 8.

Table 32. 4234 Compressed Font Substitution by Lines Per Inch (LPI) Value

Font Used When LPI is 4 or 6	Font Substituted When LPI is Greater Than or Equal to 8
11	52
26	51
85	75
87	74
160	154
204	205
222	232
223	233
258	259
400	300

Appendix E. Printer Data Streams

| The information in this appendix has been moved to the iSeries Information Center under the Printing
| topic.

Appendix F. Double-Byte Character Set Support

This appendix contains information that you need if you use double-byte characters. This includes the following topics:

- Double-byte character set (DBCS) fundamentals
- Processing double-byte characters
- Device file support
- Printer support
- Spooling support

Other DBCS device file support and conversion information can be found in the File Management topic in the iSeries Information Center.

Double-Byte Character Set Fundamentals

Some languages, such as Chinese, Japanese, and Korean, have a writing scheme that uses many different characters that cannot be represented with single-byte codes. To create coded character sets for such languages, the system uses 2 bytes to represent each character. Characters that are encoded in 2-byte code are called double-byte characters. A **double-byte character set** (DBCS) is a set of characters in which each character is represented by 2 bytes.

The following example shows alphanumeric characters coded in a single-byte code scheme and double-byte characters coded in a double-byte code scheme.

(SBCS)	1-Byte Code	(DBCS)	2-Byte Code
A	—— X'C1'	A	—— X'42C1'
B	—— X'C2'	B	—— X'42C2'
1	—— X'F1'	1	—— X'42F1'
2	—— X'F2'	2	—— X'42F2'
		あ	—— X'4481'
		美	—— X'457D' (Japanese)
		橘	—— X'8877' (Japanese)
		강	—— X'525F' (Korean)
		进	—— X'4F99' (Simplified Chinese)
		進	—— X'5B70' (Traditional Chinese)

X'hhhh' indicates that the code has the hexadecimal value, "hhhh".

1-Byte Codes:

2-Byte Codes:

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You can use double-byte characters as well as single-byte characters in one application. For instance, you may want to store double-byte data and single-byte data in your database, create your display screens with double-byte text and fields, or print reports with double-byte characters.

DBCS Code Scheme

IBM supports two DBCS code schemes: one for the host system, the other for personal computers. The IBM-host code scheme has the following code-range characteristics:

First byte

hex 41 to hex FE

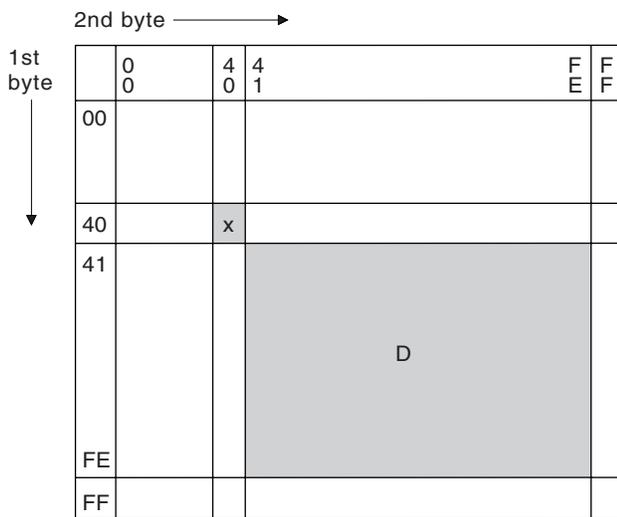
Second byte

hex 41 to hex FE

Double-byte blank

hex 4040

In the following figure, using the first byte as the vertical axis and the second byte as the horizontal axis, 256 x 256 intersections (code points) are expressed. The lower-right code area is designated as the valid double-byte code area and X is assigned to the double-byte blank.



D: double-byte code area
x: double-byte blank

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Figure 7. IBM-Host Code Scheme

By assigning the values hex 41 to hex FE in the first and second bytes as the DBCS character codes, the codes can be grouped in wards with 192 code points in each ward. For example, the code group with the first byte starting with hex 42 is called *ward 42*. Ward 42 has the same alphanumeric characters as those in a corresponding single-byte EBCDIC code page, but with double-byte codes. For example, the character *A* is represented in single-byte EBCDIC code as hex C1 and in IBM-host code as hex 42C1.

The iSeries server supports the following double-byte character sets:

- IBM Japanese Character Set
- IBM Korean Character Set
- IBM Simplified Chinese Character Set
- IBM Traditional Chinese Character Set

The following tables show the code ranges for each character set and the number of characters supported in each character set.

Table 33. IBM Japanese Character Set

Wards	Content	Number of Characters
40	Space in 4040	1
41 to 44	Non-Kanji characters <ul style="list-style-type: none"> • Greek, Russian, Roman numeric (Ward 41) • Alphanumeric and related symbols (Ward 42) • Katakana, Hiragana, and special symbols (Ward 43-44) 	549
45 to 55	Basic Kanji characters	3226
56 to 68	Extended Kanji characters	3487
69 to 7F	User-defined characters	Up to 4370
80 to FE	Reserved	
: Total number of IBM-defined characters: 7263		

Table 34. IBM Korean Character Set

Wards	Content	Number of Characters
40	Space in 4040	1
41 to 46	Non-Hangeul/Hanja characters (Latin alphabet, Greek, Roman, Japanese Kana, numeric, special symbols)	939
47 to 4F	Reserved	
50 to 6C	Hanja characters	5265
6D to 83	Reserved	
84 to D3	Hangeul characters (Jamo included)	2672
D4 to DD	User-defined characters	Up to 1880
DE to FE	Reserved	
: Total number of IBM-defined characters: 8877		

Table 35. IBM Simplified Chinese Character Set

Wards	Content	Number of Characters
40	Space in 4040	1
41 to 47	Non-Chinese characters (Latin alphabet, Greek, Russian, Japanese Kana, numeric, special symbols)	712
48 to 6F	Chinese characters: Level 1 and Level 2	3755 and 3008
70 to 75	Reserved	
76 to 7F	User-defined characters	Up to 1880
80 to FE	Reserved	
: Total number of IBM-defined characters: 7476		

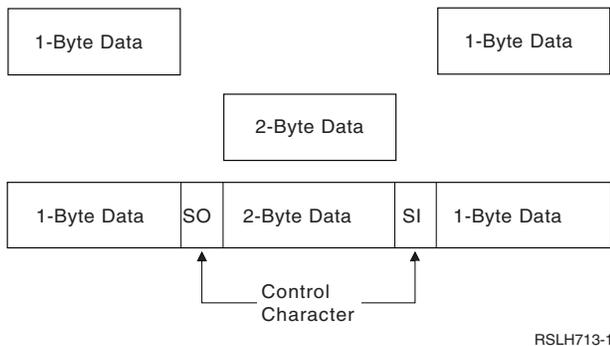
Table 36. IBM Traditional Chinese Character Set

Wards	Content	Number of Characters
40	Space in 4040	1
41 to 46	Non-Chinese characters (Latin alphabet, Greek, Roman, Japanese Kana, numeric, special symbols)	674
47 to 4B	Reserved	
4C to 68	Primary Chinese characters	5401
69 to 91	Secondary Chinese characters	7652
92 to CF	Reserved	
D0 to DD	User-defined characters	Up to 6204
DE to FE	Reserved	
: Total number of IBM-defined characters: 13728		

This code scheme applies to the iSeries server, System/36, and System/38, as well as the System/390* system. A different DBCS code scheme, called the IBM Personal Computer DBCS code scheme, is used on the Personal System/55. For details of the IBM Personal Computer DBCS code scheme, refer to IBM PS/55 publications.

Shift-Control Characters

When the IBM-host code scheme is used, the system sometimes uses shift-control characters to identify the beginning and end of a string of double-byte characters. The shift-out (SO) character, hex 0E, indicates the beginning of a double-byte character string. The shift-in (SI) character, hex 0F, indicates the end of a double-byte character string.



Each shift-control character occupies the same amount of space as one alphanumeric character. By contrast, double-byte characters occupy the same amount of space as two alphanumeric characters.

Printer files created with DEVTYPE(*AFPDS) do not have to use SO and SI. Instead the user may change to a DBCS font. The IPDS printer recognizes that the font is DBCS, and processes the user data accordingly.

Invalid Double-Byte Code and Undefined Double-Byte Code

Invalid double-byte code has a double-byte code value that is not in the valid double-byte code range. Figure 7 on page 276 shows valid double-byte code ranges. This is in contrast to undefined double-byte code where the double-byte code is valid, but no graphic symbol has been defined for the code.

Using Double-Byte Data

This section tells you where you can use double-byte data and discusses the limitations to its use.

Where You Can Use

You can use double-byte data in the following ways:

- As data in files:
 - Data in database files.
 - Data entered in input-capable and data displayed in output-capable fields of display files.
 - Data printed in output-capable fields in printer files.
 - Data used as literals in display files and printer files.
- As the text of messages.
- As the text of object descriptions.
- As literals and constants, and as data to be processed by high-level language programs.

Double-byte data can be displayed only at DBCS display stations and printed only on DBCS printers. Double-byte data can be written onto diskettes and tape, as well as onto disk storage.

Where You Cannot Use

You cannot use double-byte data in the following ways:

- As OS/400 object names.
- As command names or variable names in control language (CL) and other high-level languages.
- As displayed or printed output on alphanumeric work stations.

Double-Byte Character Size

When displayed or printed, double-byte characters are twice as wide as alphanumeric characters.

Consider the width of double-byte characters when you calculate the length of a double-byte data field because field lengths are usually identified as the number of alphanumeric character positions used. For more information on calculating the length of fields containing double-byte data, refer to the DDS Reference topic in the online Information Center.

Processing Double-Byte Characters

Due to the large number of double-byte characters, the system needs more information to identify each double-byte character than is needed to identify each alphanumeric character.

There are two types of double-byte characters: basic and extended. These characters are usually processed by the device on which the characters are displayed or printed.

Note: This does not apply to IPDS printers that support DBCS data. For IPDS printers, all characters printed are downloaded from the iSeries server.

Basic Characters

A DBCS device can process basic double-byte characters without any assistance from the system. The device knows about the graphic characters because they are stored in the device. The number of double-byte characters that are stored in the device varies with the language supported and the storage size of the device. A DBCS device can display or print basic characters without using the extended character processing function of the operating system.

Extended Characters

When processing extended characters, the device requires the assistance of the system. The system must tell the device what the character looks like before the device can display or print the character. Extended characters are stored in a DBCS font table, not in the DBCS device. When displaying or printing extended characters, the device receives them from the DBCS font table under control of the operating system.

Extended character processing is a function of the operating system that is required to make characters stored in a DBCS font table available to a DBCS device.

To request extended character processing, specify the double-byte extended character parameter, IGCEXNCHR(*YES), on the file creation command when you create a display (CRTDSPF command) or printer file (CRTPRTF command) that processes double-byte data. Because IGCEXNCHR(*YES) is the default value, the system automatically processes extended characters unless you instruct it otherwise. You can change this file attribute by using a change file (CHGDSPF or CHGPRTF) or override file (OVRDSPF or OVRPRTF) command. For example, to override the display file DBCSDSPF so that extended characters are processed, enter:

```
OVRDSPF DSPF(DBCSDSPF) IGCEXNCHR(*YES)
```

Notes:

1. The system ignores the IGCEXNCHR parameter when processing alphanumeric files.
2. When you use the Japanese 5583 Printer to print extended characters, you must use the Kanji print function of the Advanced DBCS Printer Support licensed program. Refer to *AS/400 Utilities: Kanji Print Function User's Guide and Reference*, SH18-2179, for how to use this utility.

What Happens When Extended Characters Are Not Processed

When extended characters are not processed:

- Basic double-byte characters are displayed and printed.
- On displays, the system displays the undefined character where it would otherwise display extended characters.
- On printed output, the system prints the undefined character where it would otherwise print extended characters.
- The extended characters, though not displayed or printed, are stored correctly in the system.

Device File Support

The following sections describe DBCS device files and special considerations for working with DBCS device files. Data description specifications (DDS), a language used to describe files, can be used with DBCS device files. For information about using DDS, refer to the DDS Reference topic in the iSeries Information Center.

What a DBCS File Is

A *DBCS file* is a file that contains double-byte data or is used to process double-byte data. Other files are called *alphanumeric files*.

The following types of device files can be DBCS files:

- Display
- Printer
- Tape
- Diskette
- ICF

When to Indicate a DBCS File

You should indicate that a file is DBCS in any of the following situations:

- The file receives input, or displays or prints output, that has double-byte characters.
- The file contains double-byte literals.
- The file has double-byte literals in the DDS that are used in the file at processing time (such as constant fields and error messages).

- The DDS of the file includes DBCS keywords. See the DDS Reference topic in the online Information Center for information on these keywords.
- The file stores double-byte data (database files).

How to Indicate a DBCS File

You must indicate that a device file is a DBCS file in order for the system to process double-byte data properly. You can do this in one of the following ways:

- Through DDS
 - DDS provides fields of the following data types.
 - DBCS-Only Field (Type J)
DBCS-only fields display and accept only double-byte characters. Double-byte characters are always enclosed in shift-out and shift-in characters that have to be paired.
 - Open Field (Type O)
Open fields display and accept both single-byte and double-byte characters. Double-byte characters are enclosed in shift-out and shift-in characters that have to be paired.
 - Either Field (Type E)
Either fields display and accept *either* single-byte or double-byte characters, but not *both*. Double-byte characters are enclosed in shift-out and shift-in character pairs.
 - Graphic Field (Type G)
Graphic fields display and accept only double-byte characters. The double byte characters are *not* enclosed in shift-out and shift-in pairs.
 - In printer files, by defining fields with DBCS-graphic data type (Type G).
 - In printer and ICF files, by defining fields with DBCS open data type (type O).
 - In display files, by defining fields with DBCS-only data type (type J), either data type (type E), or open data type (type O).
 - By using a double-byte literal that is used with the file at processing time, such as literals specified with the Default (DFT) and Error Message (ERRMSG) DDS keywords.

Note: You may also use double-byte literals as text and comments in a file, such as with the DDS keyword TEXT. However, the system does not consider a file, whose only DBCS attribute is that it has double-byte comments, to be a DBCS file.

- By specifying the Alternative Data Type (IGCALTTYP) DDS keyword in display and printer files. This keyword lets you use display and printer files with both alphanumeric and double-byte applications. When you put the IGCALTTYP keyword into effect, you can use double-byte data with the file.

Put the IGCALTTYP keyword into effect by creating, changing, or overriding display and printer files with the IGCDDTA(*YES) value. You can put the IGCALTTYP keyword into effect for display and printer files by specifying IGCDDTA(*YES) on the following device file commands:

- Create Display File (CRTDSPF)
- Create Printer File (CRTPRTF)
- Change Display File (CHGDSPF)
- Change Printer File (CHGPRTF)
- Override with Display File (OVRDSPF)
- Override with Printer File (OVRPRTF)

When you specify IGCDDTA(*NO), the IGCALTTYP keyword is not in effect and you can use only alphanumeric data with the file. Changing or overriding the file to put the IGCALTTYP keyword into effect does not change the DDS of the file.

Except when using the IGCALTTYP function, you do not need to specify IGCDDTA(*YES) on the file creation command if you have already specified DBCS functions in the DDS. Instead, specify IGCDDTA(*YES) when the file has DBCS functions that are not indicated in the DDS. For example, specify IGCDDTA(*YES) on the file creation command if the file is intended to contain double-byte data.

- By specifying IGCDDTA(*YES) on the following device file creation commands:
 - Create Diskette File (CRTDKTF)
 - Create Display File (CRTDSPF)
 - Create Printer File (CRTPRTF)
 - Create Tape File (CRTTAPF)
- By specifying IGCDDTA(*YES) on the following database file creation commands:
 - Create Physical File (CRTPPF)
 - Create Source Physical File (CRTSRCPF)

Note: DBCS-graphic data type fields are supported for externally-described (DDS) printer files only. For program-described printer files, the application program must enclose the DBCS-graphic data type fields with the appropriate shift-out and shift-in characters.

Improperly Indicated DBCS Files

If you do not properly indicate that a file is a DBCS file, one of the following happens:

- For printer files, printer data management assumes the output data to the printer does not contain double-byte data. The end result depends on the type of printer the data is printed on and the status of the replace unprintable character parameter for the printer file you are using.

If the replace-unprintable-character option is selected, printer data management interprets shift-control characters as unprintable characters and replaces them with blanks. The double-byte data itself is interpreted as alphanumeric data, and the printer attempts to print it as such. The printed double-byte data does not make sense.

If the replace-unprintable-character option is not selected and the printer is an alphanumeric printer, the double-byte data, including the control characters, is sent as-is to the printer. On most alphanumeric printers, the shift-control characters are not supported, and an error occurs at the printer.

If the replace-unprintable-character option is not selected and the printer is a DBCS printer, the double-byte data is printed with the exception of extended characters. Because the file was not indicated as a DBCS file, the system does not perform extended character processing. The extended characters are printed with the symbol for undefined double-byte characters.

- For display files, display data management assumes that the output data to the display does not contain double-byte data. The end result depends on whether the display is an alphanumeric or DBCS display.

If the display is an alphanumeric display, the double-byte data is interpreted as alphanumeric data. The shift-control characters appear as blanks. The displayed double-byte data does not make sense.

If the display is a DBCS display, the double-byte data is displayed with the exception of extended characters. The system does not perform extended character processing on the data. Therefore, extended characters are displayed with the symbol for undefined double-byte characters.

- The system does not recognize literals with DBCS text as double-byte literals if the source file is not specified as a DBCS file.

Making Printer Files Capable of DBCS

In many cases, printer files are used by the system to produce data that will eventually be printed or displayed. In these cases, the data is first placed into a spooled file using one of the IBM-supplied printer files. The data is then taken from the spooled file and is displayed or printed based on the request of the user.

When the data involved contains double-byte characters, the printer file that is used to place the data into the spooled file must be capable of processing double-byte data. A printer file is capable of processing double-byte data when *YES is specified on the IGCDTA parameter for the file. In most cases, the system recognizes the occurrence of double-byte data and takes appropriate measures to ensure the printer file that is used is capable of processing double-byte data.

In some cases, however, the system cannot recognize the occurrence of double-byte data and may attempt to use a printer file that is not capable of processing double-byte data. If this occurs, the output at the display or printer may not be readable. This can happen when object descriptions containing double-byte characters are to be displayed or printed on an alphanumeric device.

To ensure that you receive correct results when you display or print double-byte characters, some recommendations should be followed. Action is required on your part if you have a single-byte national language installed as a secondary language. Printer files that are received as part of the DBCS version of a product are always capable of processing DBCS data.

The following recommended actions should be performed after the product or feature has been installed:

1. If all printers and display devices attached to your system are DBCS-capable, you can enable all printer files for double-byte data. For IBM-supplied printer files that are received as part of a single-byte secondary language feature, you can enable all printer files by issuing the following command:

```
CHGPRTF FILE(*ALL/*ALL) IGCDTA(*YES)
```

Note: The IBM-supplied printer file QPSPLPRT should **not** have the IGCDTA parameter value changed to *YES. If you run the CHGPRTF command in the above example you must change the IGCDTA parameter value back to *NO.

After this command has been completed, all printer files in all libraries will be enabled for double-byte data. The change will be a permanent change.

2. If all printer and display devices attached to your system are not DBCS-capable, it is recommended that you do not enable all IBM-supplied printer files.

Instead, use the library search capabilities of the system to control which printer files will be used for any particular job. When the potential exists that double-byte data will be encountered, the library list for the job should be such that the printer files that are DBCS-enabled will be found first in the library list. Conversely, if only single-byte data is expected to be encountered, the library list should be set up so the printer files that are not enabled for DBCS will be found first. In this way, the printer file capabilities will match the type of data that will be processed. The decision as to what type of printer file to use is made on the basis of what type of data will be processed. The device that will be used to actually display or print the data may also influence this decision.

In some cases it may be desirable to make the printer file only temporarily DBCS-capable instead of making a permanent change. For a specific job, you can make this temporary change by using the OVRPRTF command.

To temporarily enable a specific printer file, you can use the following command:

```
OVRPRTF FILE(filename) IGCDTA(*YES)
```

where filename is the name of the printer file you want to enable.

Printer Support

You should be familiar with both the “Device File Support” on page 280 and DDS for DBCS printer files before reading this section.

Special DBCS Printer Functions

The DBCS printers offer the following functions:

- Character rotation

- Character expansion
- Condensed printing
- Shift-control character printing

Character Rotation

The DBCS printers can rotate double-byte characters 90 degrees counterclockwise before printing so that the printed output can be read vertically.

For example, the character rotation function takes characters as shown:

文字を旋回する

HRSL302-2

and rotates them so that you can read the printed characters vertically:

文字を旋回する

HRSL303-2

Specify character rotation with the IGCCHRRTT parameter on the Create Printer File (CRTPRTF), Change Printer File (CHGPRTF), and Override with Printer File (OVRPRTF) commands, or with the IGCCHRRTT keyword in the DDS for the file you are printing. This function rotates only double-byte characters. It does not rotate alphanumeric characters.

Character Expansion (SCS DBCS Printers Only)

The DBCS printers can expand characters to twice their normal width or their normal height. Specify the character expansion with the DDS character size (CHRSIZ) keyword. For example, if you specify the value CHRSIZ(2 1), the following characters:

are printed twice as wide, but the height remains the same.

文字を横倍角にする

HRSL304-2

文字を横倍角にする

HRSL305-2

To print twice as wide and twice as high, you would specify CHRSIZE (2 2).

Condensed Printing (SCS DBCS Printers Only)

The DBCS printers can print 20 double-byte characters per 3 inches so that more double-byte characters fit on a printed line. For example, the following characters shown:

when condensed, are printed as:

文字の密度を変更する

HRSL306-2

文字の密度を変更する

HRSL307-2

Specify condensed character printing with the IGCCPI parameter on the CRTPRTF, CHGPRTF, and OVRPRTF commands.

Defining a Line (SCS DBCS Printers Only)

The record-level define line (DFNLIN) keyword in DDS can be used to draw a horizontal or vertical line (also known as a grid line). A horizontal line is drawn at the bottom of the character spaces. A vertical line is drawn on the left edge of the character spaces. You can draw horizontal lines and vertical lines to form boxes on the printed output.

The DFNLIN keyword is valid for SCS printers.

The maximum number of lines that can be printed at one time is 200. The maximum number of active vertical lines (vertical lines currently being printed on the page) is 150. More than 200 DFNLIN keywords may be used per page if all the define lines from the previous records have been printed.

Output considerations at run time:

- Spacing and skipping are processed before the DFNLIN keyword. If you space or skip past the start of a line, that line will be truncated (or not printed if the end of the line is passed also).
- A horizontal line cannot extend over a page boundary. A horizontal or vertical line cannot be started over a page boundary.
- The start line value specified on the DFNLIN keyword cannot be larger than the page length value specified on the PAGESIZE parameter on the printer.
- The start position value specified on the DFNLIN keyword cannot be larger than the page width value specified on the PAGESIZE parameter.
- The sum of the length and the start line value for a vertical line (specified on the DFNLIN keyword) cannot be larger than the page length specified on the PAGESIZE parameter.
- The sum of the length and the start position value for a horizontal line (specified on the DFNLIN keyword) cannot be larger than the page width specified on the PAGESIZE parameter.

A diagnostic message is sent whenever the PAGESIZE and DFNLIN values together cannot correctly process a request.

The following is an example of using DFNLIN to produce lines in a table:

社員番号	氏名
010001	山田一郎
010002	日本一郎

HRSL308-2

Shift-Control Character Printing

The DBCS printers can print shift-control characters in one of the following ways:

- Suppress the shift-control characters so that these characters do not occupy any space on printed output.
- Print one blank in the space occupied by each shift-control character.
- Print two blanks in the space occupied by the shift-in character and suppress the shift-out character.

Specify how to print shift-control characters on the DBCS printers with the IGCSOSI parameter on the CRTPRTE, CHGPRTE, and OVRPRTF commands.

For data printed using the DBCS-graphic data type with an externally described printer file, shift-out/shift-in processing is not used. Instead, the shift control characters added to the DBCS data do not occupy any space on the printed output.

Double-Byte Character Printing Considerations

When you print double-byte data, consider the following:

- Extended character printing
- Condensed printing
- Unprintable double-byte characters
- Double-byte characters in an alphanumeric field
- Spanned lines
- Spanned pages
- Use of the Print key
- End-of-forms on the 5553 Printer
- Double-byte characters printed on alphanumeric printers

Extended Character Printing

Specify extended character processing to make sure that extended characters are processed. Otherwise, the system prints only basic double-byte characters. See “Processing Double-Byte Characters” on page 279 for instructions on specifying extended character processing and for information on the effects of such processing.

Condensed Printing

When specifying condensed printing on DBCS printers (by specifying IGCCPI(*CONDENSED) on the CRTPRTF, CHGPRTF, or OVRPRTF command), consider the following:

- Specify the page width in alphanumeric print positions with the CPI parameter. Although the record to be printed may contain 88 double-byte characters (which would use 176 print positions in normal printing) and the page width is 132 print positions, the double-byte data should print properly in condensed mode.
- For program-described printer files, data might not be printed in the proper position on the page. The system does not perform boundary alignment for alphanumeric data in printed records. When double-byte and alphanumeric data are printed on the same line, the printer begins printing alphanumeric data in the first space following the double-byte data. As a result, characters might not be printed on the proper position on the page.
- For DDS files, the printer begins printing alphanumeric data in the first position following the double-byte data, when double-byte and alphanumeric characters are mixed in a field defined with data type O (double-byte-capable). As a result, data might not be printed on the proper position on the page. This situation does not arise when the field contains only double-byte data or when alphanumeric data is printed in a field defined with an alphanumeric data type.

Selecting the Appropriate Page Width

Page width is specified as the second value of the PAGESIZE parameter on the CRTPRTF, CHGPRTF, or OVRPRTF commands. The correct page width depends on the printer being used and the characters per inch (CPI) specified for the printer file.

When describing printer files used with printers configured as a 5553 Printer, select a page size in the range based on characters per inch:

CPI	Page-Width Range
10	1 through 136
12	1 through 163
13.3	1 through 181
15	1 through 204
18	1 through 244
20	1 through 272

Choose one of the following (depending on the CPI selected) when describing printer files used with printers configured as a 5583 Printer:

CPI	Page-Width Range
10	1 through 132
12	1 through 158
13.3	1 through 176
15	1 through 198
18	1 through 236
20	1 through 264

Unprintable Double-Byte Characters

A double-byte character is considered unprintable if its double-byte code is not in the valid range or if its double-byte code is valid but does not have a character image defined.

You can specify that the system replace unprintable double-byte characters by specifying the replace unprintable character parameter (RPLUNPRT(*YES)) on the CRTPRTF, CHGPRTF, or OVRPRTF command, but you cannot choose the replacement character.

Although you cannot choose the replacement character for unprintable double-byte characters, you can choose the replacement character for unprintable alphanumeric characters. To improve system performance, select a blank () as the replacement character for unprintable alphanumeric characters.

When the system finds an unprintable double-byte character during printing, the following happens:

- If you specify RPLUNPRT(*YES), the system does not send a message when it finds unprintable characters. Instead, the system prints unprintable extended characters as either the double-byte underline (__) when you specify extended character processing, or as an undefined character when you do not specify extended character processing.

For Japanese printers, the default symbol used is:



For Chinese and Korean printers, the default symbol used is the underscore.

The system prints unprintable basic double-byte characters as double-byte blanks.

- If you specify RPLUNPRT(*NO), the system sends an inquiry message when it finds unprintable characters. You have the following options:
 - Hold the spooled file.
 - Continue printing where the unprintable character was encountered. If you continue printing, the system sends the inquiry message that you just received. It is sent each time the system finds an unprintable character, regardless of your response to the first message.
 - Continue printing by specifying a page number where printing should continue. When the system finds subsequent unprintable characters, it processes the characters as if the file were specified with RPLUNPRT(*YES). See the item in this list about RPLUNPRT(*YES) for a description of how the system processes these characters.

If the system finds invalid double-byte code, it stops processing double-byte extended characters and prints them as the undefined character.

Double-Byte Data in an Alphanumeric Field

If you try to print double-byte data in a field that is described in DDS as alphanumeric, the system interprets the data as alphanumeric. What happens depends on whether the printer being used is an alphanumeric or DBCS printer, and on the status of the replace-unprintable-characters option. This condition is a special case described under “Improperly Indicated DBCS Files” on page 282.

Spanned Lines

If a printed line of double-byte data exceeds its specified page width (line length), the system tries to continue printing the data. To do this, the system ignores the FOLD parameter on the CRTPRTF, CHGPRTF, and OVRPRTF commands. As a result, the system might not print the double-byte data as you expected and the following occurs:

- If a record to be printed exceeds the page width, the printer **wraps** the data (continues printing the record on the next line). Because the system is not aware that the data is wrapped, the system does not skip lines and start new pages properly. A new page might start in the middle of a record.
- The printer does not split double-byte characters when there is not enough room at the end of a line and a field of double-byte data is continued on a second printed line, even if you specified the CHRSIZ keyword. Instead, the system leaves a blank space on the first line where the character would have been printed and continues printing the complete character on the next line.

Spanned Pages (SCS DBCS Printers Only)

If data from a printed DBCS field spans to a second page, the system inserts a shift-in character at the beginning of each printed page of double-byte data, shifting the data out of DBCS mode. The printed data that follows does not make sense unless the data on the second page begins with a shift-out character.

To avoid this problem, break double-byte data fields that might span pages into several smaller fields.

Using the Print Key

If you want to print a display containing double-byte data by pressing the Print key, make sure that the associated display file or printer file is a DBCS file. If neither is a DBCS file, the display will not print properly.

One way to make sure that either the display or printer file is a DBCS file is to override the file using the OVRDSPF or the OVRPRTF command. For example, to override the system-supplied default printer file (the printer file used to print displays that are printed by pressing the Print key), enter:

```
OVRPRTF FILE(QSYSPRT) IGCDATA(*YES)
```

Notes:

1. If you do not plan to use double-byte data, do not change the printer file QSYSPRT to a DBCS file with a CHGPRTF command. This printer file is used to print a variety of system data, including alphanumeric data. A system performance degradation results if QSYSPRT is a DBCS file and it is processing only alphanumeric data.
2. If the Print key is used to print the image of a display containing DBCS-graphic data type fields, the system inserts shift-out and shift-in (SO/SI) characters around the graphic data. Depending on the IGCSOSI printer file value, the SO/SI characters could print as blanks, causing the printed alignment to be different from what was displayed.

Refer to the File Management topic in the iSeries Information Center for more information on overrides.

5553 Printer End-of-Forms

If you send the ignore (I) reply to the end-of-forms message that you receive when using continuous forms on the 5553 Printer, and if the printer has already printed within 2-1/2 inches of the bottom of the page, the system might not start printing subsequent pages where expected.

To avoid this problem, do the following when you receive the end-of-forms message:

1. Remove the current form from the tractor feed.

2. Insert new forms.
3. Align the first form to the first line.
4. Press the CANCEL button on the printer.
5. Press the SELECT button on the printer.
6. Respond to the end-of-forms message:
 - a. For spooled files, specify the page on which you want to continue printing when you enter a response to the message. Determine which page to continue printing as follows:
 - 1) If no data was printed on the last 2-1/2 inches of the last form, enter the number of the next page to be printed.
 - 2) If data was printed on the last 2-1/2 inches of the last form, enter the number of the last page printed. Reprinting the page ensures that all of the data is printed.

Use the Work with Writer (WRKWTR) command to find out approximately which page was last printed. The WRKWTR command displays the number of pages that the writer has currently printed.

- b. For direct printer output, enter RETRY to reprint the last page printed. This ensures that all of the data is printed.

Effects of Printing Double-Byte Data on Alphanumeric Printers

Printing DBCS output on an alphanumeric printer can result in degradation of system performance.

In addition, the following occurs using printer files that are indicated to be DBCS-capable through DDS or with the IGCDTA parameter:

- For direct printer output, the system prints the file and sends a diagnostic message describing the situation to your program message queue.

Instead of printing double-byte data, the system prints double-byte characters as underscores (`__`) and prints shift-control characters as blanks (). Although the system does not print the individual double-byte characters, they are correctly stored in the system.
- For spooled printer output, the system sends an inquiry message to the message queue named on the Start Printer Writer (STRPRTWTR) command. This message lets you do the following:
 - Continue printing. When you continue printing, the system prints the file but does not print double-byte characters within it. Instead, the system prints double-byte characters as underscores (`__`) and prints shift-control characters as blanks (). Although the system does not print the individual double-byte characters, they are correctly stored in the system.
 - Hold the spooled file so that you can transfer it to an output queue used only for DBCS output. See Chapter 3, “Spool support” for instructions on transferring a spooled file.
 - Cancel printing altogether.

Spool Support

Create separate output queues for double-byte and alphanumeric data. This may improve throughput (the rate at which the system processes work) because the system can process alphanumeric data more quickly than it can process double-byte data.

See the Work Management topic in the iSeries Information Center for detailed information about creating output queues.

Applying Overrides in Printing

When starting a job, consider adding the OVRPRTF command to the initial program of the job:

```
OVRPRTF FILE(QSYSPRT) IGCDTA(*YES)
```

Override the printer file (QSYSPRT) to make it capable of printing double-byte data and to ensure that DBCS output printed as the result of pressing the Print key is printed properly. Refer to the File Management topic in the iSeries Information Center for more information on overrides.

3130 Printer Resident Font Support

When printing to a 3130 printer (Release 2 of printer microcode required), you may specify to use the double byte fonts resident in the 3130 printer.

The QPQCHGCF program provides a way for you to indicate whether a particular section of a double byte coded font is resident in the printer or should be downloaded.

This section provides the following information:

- How to use the QPQCHGCF program
- Examples of using the QPQCHGCF program .
- Restrictions on using the QPQCHGCF program
- List of IBM supplied coded fonts whose font character sets are resident in the 3130 printer.
- QPQCHGCF instructions for marking coded fonts.

How to use the QPQCHGCF program.

Parameters:

1	Coded font name	Input	Char(8)
2	Coded font library name	Input	Char(10)
3	Font character set name	Input	Char(10)
4	Resident font indicator	Input	Char(4)

The QPQCHGCF program provides a way for you to indicate a particular section of a double byte coded font is

- Resident in the printer and should not be downloaded
- Is not resident in the printer or has been changed (different version than one in the printer) and needs to be downloaded by PSF/400 to the printer.

QPQCHGCF has the following parameters:

Coded-font-name:

Specifies the name of the coded font to be marked. This is a 8 character input parameter.

Coded-font-library-name

Specifies the name of the library containing the coded font. This is a 10 character input parameter.

You can use the following special values for the library name:

***LIBL** This indicates that the job's current library list will be used to search for the coded font.

Font-character-set-name:

Specifies the name of the font character set to mark within the coded font. This is a 8 character input parameter.

The font character set name can be specified with the following special value:

***ALL** This indicates that all the font character set/code page pairs in the coded font are to be marked.

The font character set name may be a generic name. A generic name is a character string of one or more characters followed by an asterisk (*); for example, C0S0*. The asterisk substitutes for any valid

characters. A generic name specifies all font character sets with names that begin with the generic prefix. If an asterisk is not included in the name, the system assumes it to be the complete font character set name. To change all the font character sets in a certain range, for example C0G16F70 - C0G16F7F, you should specify C0G16F7* for the font character set name. Specifying C0G16F* would be the same as *ALL and change all the font character sets in the coded font (assuming all font character set names started with C0G16F0).

Resident-font-indicator:

Specifies whether the font character set is resident in the printer or if it is not resident in the printer and needs to be downloaded by the system.

***NO:** The font character set is not resident in the printer and needs to be downloaded by the system to the printer. Also, the font character set may be resident in the printer, but has been modified. In that case, *NO should be specified.

:PK ***YES:** The font character set is resident in the printer and does not need to be downloaded by the system to the printer.

Note:

All IBM supplied coded fonts are shipped with the resident font indicator turned off. That means the entire font will be downloaded unless the QPQCHGCF program is run to mark the IBM supplied sections as resident.

The font character set and code page pair are treated the same for marking them resident or need to be downloaded. If the font character set has changed, then the corresponding code page will also be marked as needing to be downloaded. If the code page has been changed, then the corresponding font character will also be marked as needing to be downloaded.

Examples of using QPQCHGCF

Example 1: Example below marks all the font character set/code page pairs as resident in the printer for coded font X0G16F in library QFNT61. No user defined sections will be downloaded.

```
CALL QPQCHGCF (X0G16F QFNT61 *ALL *YES)
```

Example 2: Example below marks all the font character set/code page pairs in sections 41 - 4F as resident and then marks sections 50 - 55 as resident.

```
CALL QPQCHGCF (X0G16B QFNT61 C0G16F4* *YES)
CALL QPQCHGCF (X0G16B QFNT61 C0G16F50 *YES)
CALL QPQCHGCF (X0G16B QFNT61 C0G16F51 *YES)
CALL QPQCHGCF (X0G16B QFNT61 C0G16F52 *YES)
CALL QPQCHGCF (X0G16B QFNT61 C0G16F53 *YES)
CALL QPQCHGCF (X0G16B QFNT61 C0G16F54 *YES)
CALL QPQCHGCF (X0G16B QFNT61 C0G16F55 *YES)
```

Example 3: Example below marks all the font character set/code page pairs in sections 41 - 4F as resident; then marks section 48 to be downloaded. Sections 50 - 5F are marked as resident and sections 60 - 68 are marked as resident.

```
CALL QPQCHGCF (X0G16F QFNT61 C0G16F4* *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F48 *NO)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F5* *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F60 *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F61 *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F62 *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F63 *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F64 *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F65 *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F66 *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F67 *YES)
CALL QPQCHGCF (X0G16F QFNT61 C0G16F68 *YES)
```

Restrictions on using the QPQCHGCF program

- When marking fonts, the print writer must be stopped and re-started. If fonts are marked while the writer is active, unpredictable results will occur.
 - End PSF/400 (ENDWTR), if it is active.
 - Use QPQCHGCF to mark the coded font.
 - Start PSF/400 (STRPRTWTR).
- If a section of a font is modified, the modified section must contain all rotations that the original font contained. For example if the coded font X0M16B is resident in the printer in rotations 0, 90, 180 and 270, and section 46 is modified, then the modified section 46 must also contain rotations 0, 90, 180, and 270.
- If IBM supplied coded fonts are modified, you should not remove sections from the coded font as supplied. This could result in incorrect results when the modified font is referenced in a job being printed on device that does not support resident double byte raster fonts.
- PSF/400 does not support referencing a double byte resident raster font by its registered font ID. That is, you should not specify a double byte font on the FONT parameter of the printer file, on the FONT DDS keyword, or with any other application that allows you to specify font with its registered font ID.

Coded fonts whose font character sets are resident in the 3130

The following is a list of the DBCS fonts that are resident in the 3130 printer.

Japanese (In QFNT61 library)

FONT	RESIDENT FONT				
FONT	SIZE	CODED FONT	CHARACTER SET	FONTID	WIDTH
Mincho	16x16	X0M16B/F	C0M16FXX	53559	096
Mincho	24x24	X0M24B/F	C0M24FXX	53559	140
Mincho	20x24	X0Z24B/F	C0Z24FXX	53559	144
Mincho	26x26	X0M26B/F	C0M26FXX	53559	156
Mincho	32x32	X0M32B/F	C0M32FXX	53559	180
Mincho	36x36	X0M36B/F	C0M36FXX	53559	216
Mincho	40x40	X0M40B/F	C0M40FXX	53559	240
Mincho	44x44	X0M44B/F	C0M44FXX	53559	264
Mincho	48x48	X0M48B/F	C0M48FXX	53559	288
Mincho	52x52	X0M52B/F	C0M52FXX	53559	312
Mincho	64x64	X0M64B/F	C0M64FXX	53559	384
Gothic	16x16	X0G16B/F	C0G16FXX	53815	100
Gothic	20x24	X0G20B/F	C0G20FXX	53813	144
Gothic	24x30	X0G24B/F	C0G24FXX	53813	140
Gothic	32x32	X0G32B/F	C0G32FXX	53815	192
Gothic	36x36	X0G36B/F	C0G36FXX	53815	216
Gothic	48x48	X0G48B/F	C0G48FXX	53815	288
Gothic	64x44	X0G64B/F	C0G64FXX	53815	384
R-Gothic	36x36	X0R36B/F	C0R36FXX	54071	216
R-Gothic	40x40	X0R40B/F	C0R40FXX	54071	240
R-Gothic	48x48	X0R48B/F	C0R48FXX	54071	288
R-Gothic	64x64	X0R64B/F	C0R64FXX	54071	384

Korean (In QFNT62 library)

FONT	RESIDENT FONT				
FONT	SIZE	CODED FONT	CHARACTER SET	FONTID	WIDTH
Mincho	24x24	X0M24K/L	C0HB00XX	53559	144
Mincho	32x32	X0M32K/L	C0HD00XX	53559	192
Mincho	36x36	X0M36K/L	C0HE00XX	53559	216
Mincho	40x40	X0M40K/L	C0HF00XX	53559	240
Mincho	48x48	X0M48K/L	C0HG00XX	53559	288
Mincho	64x64	X0M64K/L	C0HH00XX	53559	384
Gothic	16x16	X0G16K/L	C0HA00XX	53815	096
Gothic	24x30	X0G24K/L	C0HC00XX	53813	180

Traditional Chinese (In QFNT63 library)
 FONT RESIDENT FONT
 FONT SIZE CODED FONT CHARACTER SET FONTID WIDTH

FONT	SIZE	CODED FONT	CHARACTER SET	FONTID	WIDTH
Ming	24x24	X0M24T	C0TB00XX	54583	144
Ming	32x32	X0M32T	C0TC00XX	54583	192
Ming	40x40	X0M40T	C0TD00XX	54583	240
Gothic	16x16	X0G16T	C0TA00XX	53815	096

Simplified Chinese (In QFNT64 library)
 FONT RESIDENT FONT
 FONT SIZE CODED FONT CHARACTER SET FONTID WIDTH

FONT	SIZE	CODED FONT	CHARACTER SET	FONTID	WIDTH
Song	26x26	X0S26P	C0S26PXX	54327	144
Song	32x32	X0S32P	C0S32PXX	54327	192
Song	40x40	X0S40P	C0S40PXX	54327	240
Gothic	16x16	X0G16P	C0G16PXX	53815	096

Thai (In QFNT65 library)
 FONT RESIDENT FONT
 FONT SIZE CODED FONT CHARACTER SET FONTID WIDTH

FONT	SIZE	CODED FONT	CHARACTER SET	FONTID	WIDTH
Official	24x40	X0040F	C0040FXX	57655	240
Official	24x60	X0060F	C0060FXX	57655	360
Italics	24x60	X0I60F	C0I60FXX	58039	360

QPQCHGCF instructions for marking coded fonts.

Included with the QPQCHGCF program is file QCDEFNT in library QGPL This file contains five members: QFNT61, QFNT62, QFNT63, QFNT64, and QFNT65. Each member contains CL statements for marking the IBM supplied sections of the fonts shipped in libraries QFNT61 - QFNT65.

To run a batch job to mark IBM supplied sections as resident, you must edit the appropriate member in QCDEFNT.

- Edit the JOBDD parameter on the //BCHJOB statement. This JOBDD should have enough authority to change the coded fonts in the QFNT6X libraries.
- Edit this source file if you have changed any IBM supplied sections and want these sections to be downloaded.

After the source file has been edited, you can run the batch job to mark the specified fonts.

This is done with the STRDBRDR command

```
STRDBRDR FILE(QGPL/QCDEFNT)
MBR(QFNT6X)
```

where member-name is QFNT61, QFNT62, QFNT63, QFNT64, OR QFNT65.

In order that the marked coded fonts take effect, you must perform the following:

- End PSF/400 (ENDWTR), if it is active.
- Run batch program to mark coded fonts.
- Start PSF/400 (STRPRTWTR).

QCDEFNT in QUSRSYS contains the following five members:

```
QFNT61 - CL statements to mark Japanese coded fonts
QFNT62 - CL statements to mark Korean coded fonts
QFNT63 - CL statements to mark Traditional Chinese coded fonts
QFNT64 - CL statements to mark Simplified Chinese coded fonts
QFNT65 - CL statements to mark Thai coded fonts
```

Appendix G. Feedback Area Layouts

This chapter contains general-use programming interface and associated guidance information

Tables in this section describe the open and I/O feedback areas associated with any opened printer file. The following information is presented for each item in these feedback areas:

- Offset, which is the number of bytes from the start of the feedback area to the location of each item
- Data type
- Length, which is given in number of bytes
- Contents, which is the description of the item and the valid values for it

The support provided by the high-level language you are using determines how to access this information and how the data types are represented. See your high-level language manual for more information.

Note: The tables in this appendix are relevant only to device file type of printer. For a complete description of all file types (printer, diskette, displays, tape, database, ICF, and inline) see the File Management topic in the iSeries Information Center.

Open Feedback Area for Printer

The **open data path** (ODP) contains information about the merged file attributes and information returned by input or output operations. The ODP only exists while the file is open.

The **open feedback area** is the part of the open data path (ODP) that contains general information about the file after it has been opened. It also contains file-specific information, depending on the file type, plus information about each device defined for the file. This information is set during open processing and may be updated as other operations are performed.

Table 37. Open Feedback Area

Offset	Data Type	Length in Bytes	Contents
0	Character	2	Open data path (ODP) type: DS Printer file not being spooled, display, tape, ICF, save, or diskette file not being spooled. SP Printer or diskette file being spooled or inline data file.
2	Character	10	Name of the file being opened. If the ODP type is DS, this is the name of the device file or save file. If the ODP type is SP, this is the name of the device file or the inline data file.
12	Character	10	Name of the library containing the file.
22	Character	10	Name of the spooled file. The name of a database file containing the spooled input or output records.
32	Character	10	Name of the library in which the spooled file is located.
42	Binary	2	Spooled file number.
44	Binary	2	Maximum record length.
46	Character	2	Reserved.

Table 37. Open Feedback Area (continued)

Offset	Data Type	Length in Bytes	Contents
48	Character	10	Member name: <ul style="list-style-type: none"> If ODP type SP, the member name in the file named at offset 22.
58	Binary	4	Reserved.
62	Binary	4	Reserved.
66	Binary	2	File type: <ul style="list-style-type: none"> 1 Display 2 Printer 4 Diskette 5 Tape 9 Save 10 DDM 11 ICF 20 Inline data 21 Database
68	Character	3	Reserved.
71	Binary	2	Number of lines on a printed page.
73	Binary	2	Number of positions on a printed line.
75	Binary	4	Not applicable to printer.
79	Binary	4	Spooled file number.
83	Character	10	Reserved.
93	Character	10	Reserved.
103	Binary	2	Not applicable to printer.
105	Binary	2	Maximum number of records that can be read or written in a block when using blocked record I/O.
107	Binary	2	Overflow line number.
109	Binary	2	Blocked record I/O record increment. Number of bytes that must be added to the start of each record in a block to address the next record in the block.
111	Binary	4	Reserved.
115	Character	1	Miscellaneous flags. Bit 1: Reserved. Bit 2: File shareable <ul style="list-style-type: none"> 0 File was not opened shareable. 1 File was opened shareable (SHARE(*YES)). Bits 3-5: Not applicable to printer.

Table 37. Open Feedback Area (continued)

Offset	Data Type	Length in Bytes	Contents
			<p>Bit 6: Field-level descriptions</p> <p>0 File does not contain field-level descriptions.</p> <p>1 File contains field-level descriptions.</p> <p>Bit 7: DBCS-capable file</p> <p>0 File is not DBCS-capable.</p> <p>1 File is DBCS-capable.</p> <p>Bit 8: Not applicable to printer.</p>
116	Character	10	Not applicable to printer.
126	Binary	2	File open count. If the file has not been opened shareable, this field contains a 1. If the file has been opened shareable, this field contains the number of programs currently attached to this file.
128	Binary	2	Reserved.
130	Binary	2	Not applicable to printer.
132	Character	1	Miscellaneous flags.
			<p>Bits 1-4: Not applicable to printer.</p> <p>Bit 5: Separate indicator area</p> <p>0 Indicators are in the I/O buffer of the program.</p> <p>1 Indicators are not in the I/O buffer of the program. The DDS keyword, INDARA, was used when the file was created.</p> <p>Bit 6: User buffers</p> <p>0 System creates I/O buffers for the program.</p> <p>1 User program supplies I/O buffers.</p> <p>Bits 7-8: Reserved.</p>
133	Character	2	Open identifier. The value is unique for a full (not shared) open operation of a file. It allows you to match this file to an entry on the associated data queue.

Table 37. Open Feedback Area (continued)

Offset	Data Type	Length in Bytes	Contents
135	Binary	2	The field value is the maximum record format length, including both data and file-specific information such as: first-character forms control, option indicators, response indicators, source sequence numbers, and program-to-system data. If the value is zero, then use the field at offset 44.
137	Character	9	Reserved.
146	Binary	2	Number of devices defined for this ODP. For printers this always has a value of 1.
148	Character		Device name definition list. See "Device Definition List" for a description of this array.

Device Definition List

The device definition list part of the open feedback area is an array structure. Each entry in the array contains information about each device or communications session attached to the file. The number of entries in this array is determined by the number at offset 146 of the open feedback area. The device definition list begins at offset 148 of the open feedback area. The offsets shown for it are from the start of the device definition list rather than the start of the open feedback area.

Table 38. Device Definition List

Offset	Data Type	Length in Bytes	Contents
0	Character	10	Program device name. For printer or diskette files being spooled, the value is *N. For database files, the value is DATABASE. For save files, the value is *NONE. For ICF files, the value is the name of the program device from the ADDICFDEVE or OVRICFDEVE command. For all other files, the value is the name of the device description.
10	Character	50	Reserved.
60	Character	10	Device description name. For printer or diskette files being spooled, the value is *N. For save files, the value is *NONE. For all other files, the value is the name of the device description.
70	Character	1	Device class. hex 01 Display hex 02 Printer hex 04 Diskette hex 05 Tape hex 09 Save hex 0B ICF

Table 38. Device Definition List (continued)

Offset	Data Type	Length in Bytes	Contents
71	Character	1	Device type. hex 02 5256 Printer hex 0C 5224/5225 printers hex 0F 5219 Printer hex 10 5583 Printer (DBCS) hex 11 (DBCS) 5553 Printer hex 14 3270 Printer hex 21 4234 (SCS) Printer hex 22 3812 (SCS) Printer hex 23 4214 Printer hex 24 4224 (IPDS) Printer hex 25 4245 Printer hex 29 5262 Printer hex 30 3812 (IPDS) Printer hex 31 4234 (IPDS) Printer hex 32 IPDS printer, model unknown hex 55 6252 (SCS) Printer hex 57 4230 (IPDS) Printer hex 63 3935 (IPDS) Printer
72	Binary	2	Not applicable to printer.
74	Binary	2	Not applicable to printer.
76	Character	2	Not applicable to printer.
78	Character	1	Not applicable to printer.
79	Character	1	Not applicable to printer.
80	Character	50	Reserved.

I/O Feedback Area

The results of I/O operations are communicated to the program using OS/400 messages and I/O feedback information. The I/O feedback area is updated for every I/O operation unless your program is using blocked record I/O. In that case, the feedback area is updated only when a block of records written. Some of the information reflects the last record in the block. Other information, such as the count of I/O operations, reflects the number of operations on blocks of records and not the number of records. See your high-level language manual to determine if your program uses blocked record I/O.

The I/O feedback area consists of two parts: a common area and a file-dependent area. The file-dependent area varies by the file type. This guide discusses device file type of printers only.

Common I/O Feedback Area

Table 39. Common I/O Feedback Area

Offset	Data Type	Length in Bytes	Contents
0	Binary	2	Offset to file-dependent feedback area.
2	Binary	4	Write operation count. Updated only when a write operation completes successfully. For blocked record I/O operations, this count is the number of blocks, not the number of records.
6	Binary	4	Read operation count. Not applicable to printers.
10	Binary	4	Write-read operation count. Not applicable to printers.
14	Binary	4	Other operation count. Number of successful operations other than write, read, or write-read. Updated only when the operation completes successfully. This count includes force-end-of-data.
18	Character	1	Reserved.
19	Character	1	Current operation. hex 05 Write or write block
20	Character	10	hex 09 Force-end-of-data Name of the record format just processed, which is either: <ul style="list-style-type: none">• Specified on the I/O request, or• Determined by default or format selection processing

Table 39. Common I/O Feedback Area (continued)

Offset	Data Type	Length in Bytes	Contents
30	Character	2	<p>Device class:</p> <p>Byte 1:</p> <p>hex 00 Database</p> <p>hex 01 Display</p> <p>hex 02 Printer</p> <p>hex 04 Diskette</p> <p>hex 05 Tape</p> <p>hex 09 Save</p> <p>hex 0B ICF</p> <p>Byte 2 (if byte 1 is 02 for printer):</p> <p>hex 02 5256 Printer</p> <p>hex 0C 5224/5225 printers</p> <p>hex 0F 5219 Printer</p> <p>hex 10 5583 Printer (DBCS)</p> <p>hex 11 5553 Printer (DBCS)</p> <p>hex 14 3270 Printer</p> <p>hex 21 4234 (SCS) Printer</p> <p>hex 22 3812 (SCS) Printer</p> <p>hex 23 4214 Printer</p> <p>hex 24 4224 (IPDS) Printer</p> <p>hex 25 4245 Printer</p> <p>hex 29 5262 Printer</p> <p>hex 30 3812 (IPDS) Printer</p> <p>hex 31 4234 (IPDS) Printer</p> <p>hex 32 IPDS printer, model unknown</p> <p>hex 55 6252 (SCS) Printer</p> <p>hex 57 4230 (IPDS) Printer</p> <p>hex 63 3935 (IPDS) Printer</p>
32	Character	10	<p>Device name. The name of the device for which the operation just completed. Supplied only for printer, display, tape, diskette, and ICF files. For printer files being spooled, the value is *N. For printer files not being spooled, the value is the device description name.</p>
42	Binary	4	Not applicable to printer.
46	Character	80	Reserved.
126	Binary	2	Not applicable to printer.
128	Binary	2	For printers, the field value is the record format length, including first-character forms control, option indicators, source sequence numbers, and program-to-system data. If the value is zero, use the field at offset 42.

Table 39. Common I/O Feedback Area (continued)

Offset	Data Type	Length in Bytes	Contents
130	Character	2	Reserved.
132	Binary	4	Not applicable to printer.
136	Character	8	Reserved.

I/O Feedback Area for Printer Files

Table 40. I/O Feedback Area for Printer Files

Offset	Data Type	Length in Bytes	Contents
0	Binary	2	Current line number in a page.
2	Binary	4	Current page count.
6	Character	1	Miscellaneous flags Bit 1: Spooled file deleted. Bit 2–8: Reserved.
7	Character	27	Reserved.
34	Character	2	Major return code. 00 Operation completed successfully 80 Permanent system or file error 81 Permanent device error 82 Open operation failed 83 Recoverable device error occurred
36	Character	2	Minor return code.

Appendix H. Using DDS with High-Level Languages (HLL)

This appendix contains examples of DDS used with COBOL and RPG. Two different DDS are used with each programming language.

One DDS uses row/column as the positioning method for the data being acted on. The other DDS uses absolute positioning as its positioning method. When absolute positioning is used in DDS, all other objects (page segments, boxes, rotated text) must use absolute positioning.

Data Description Specifications (DDS)

Figure 8 and Figure 9 show the DDS source for:

- Row/column method of positioning
- Absolute method of positioning

DDS Coding Example Using the Row/column Method of Positioning

The row/column method of positioning means specifying where the data starts printing (how many rows down and how many columns in).

The following figure shows DDS coding using the row/column method of positioning.

```
000100911101          R LABEL
000200911101          NAME          25A 0 8 10
000300911101          ADDR1         25A 0 9 10
000400911101          CITY          15A 0 10 10
000500911101          STATE         2A 0 10 27
000600911101          ZIPCD         5S 00 10 30BARCODE(POSTNET *HRITOP)
000700911101                               13 5'Made in the USA'
000800911101                               TXTRTT(270)
000900911101                               FONT(5687 (*POINTSIZ 6))
```

Figure 8. DDS Source Using Row/Column Method of Positioning

For example, at row 10 column 30, a bar code is printed.

DDS Coding Example Using the Absolute Method of Positioning

Absolute positioning means being able to start printing at any point on a piece of paper by specifying that point.

Use of absolute positioning requires the Advanced Function Presentation data stream (AFPDS). This is obtained on OS/400 by specifying *AFPDS on the device type (DEVTYPE) parameter of the printer file.

Inches or centimeters are the measurement methods available. You choose the measurement method by specifying *INCH or *CENT on the unit of measure (UOM) parameter of the printer file.

The following figure shows DDS coding using the absolute method of positioning.

000100911101			PAGSEG(LOGO 1.5 1)
000200911101	R LABEL		BOX(1 1 5 4 *MEDIUM)
000300911101			BOX(1.5 4 2 4.5 *NARROW)
000400911101	NAME	25A 0	POSITION(1.3 1.6)
000500911101	ADDR1	25A 0	POSITION(1.5 1.6)
000600911101	CITY	15A 0	POSITION(1.7 1.6)
000700911101	STATE	2A 0	POSITION(1.7 2.7)
000800911101	ZIPCD	5S 00	POSITION(1.7 3)
000900911101			BARCODE(POSTNET *HRITOP)
f01000911101	TEXT	20A 0	TXTRTT(270)
000800911101			POSITION(1.9 .25)
001100911101			FONT(5687 (*POINTSIZE 6))

Figure 9. DDS Source Using Absolute Positioning

In this example, a page segment called LOGO is specified to start printing at 1.5 units down and 1 unit in. The TEXT record (Made in the USA) is supplied by the application program. The UOM parameter value (*INCH or *CM) of the printer file determines which unit of measurement is used.

COBOL and RPG Source Code

The following figures that contain the COBOL and RPG source code that produces (along with the previously discussed DDS source) the examples in the next section.

The following figure contains the COBOL source.

```

STMT SEQNBR -A 1 B.+....2....+....3....+....4....+....5....+....6....+....7..
IDENTFCN S COPYNAME CHG DATE
 1 000100 IDENTIFICATION DIVISION. 10/20/91
 2 000200 PROGRAM-ID. CBLLBL. 10/20/91
 3 000300 ENVIRONMENT DIVISION. 10/20/91
 4 000400 INPUT-OUTPUT SECTION. 10/20/91
 5 000500 FILE-CONTROL. 10/20/91
 6 000600 SELECT PRINTER-FILE 10/20/91
 7 000700 ASSIGN TO FORMATFILE-LABELS. 10/23/91
 8 000800 SELECT VENDOR-FILE 10/20/91
 9 000900 ASSIGN TO DATABASE-VENDORS. 10/20/91
10 001000 DATA DIVISION. 10/20/91
11 001100 FILE SECTION. 10/20/91
12 001200 FD PRINTER-FILE 10/20/91
13 001300 DATA RECORD IS PRINT-REC. 10/23/91
14 001400 01 PRINT-REC. 10/23/91
15 001500 COPY DDS-ALL-FORMATS-O OF LABELS. 10/23/91
16 +000001 05 LABELS-RECORD PIC X(72). <-ALL-FMTS
+000002* OUTPUT FORMAT;LABEL FROM FILE LABELS OF LIBRARY SGAFP <-ALL-FMTS
+000003* <-ALL-FMTS
17 +000004 05 LABEL-O REDEFINES LABELS-RECORD. <-ALL-FMTS
18 +000005 06 NAME PIC X(25). <-ALL-FMTS
19 +000006 06 ADDR1 PIC X(25). <-ALL-FMTS
20 +000007 06 CITY PIC X(15). <-ALL-FMTS
21 +000008 06 STATE PIC X(2). <-ALL-FMTS
22 +000009 06 ZIPCD PIC S9(5). <-ALL-FMTS
23 001600 FD VENDOR-FILE 10/23/91
24 001700 DATA RECORD IS VENDOR-REC. 10/23/91
25 001800 01 VENDOR-REC. 10/23/91
26 001900 COPY DDS-ALL-FORMATS-I OF VENDORS. 10/23/91
27 +000001 05 VENDORS-RECORD PIC X(82). <-ALL-FMTS
+000002* I-O FORMAT;VNDMSTR FROM FILE VENDORS OF LIBRARY SGAFP <-ALL-FMTS
+000003* VENDMAST DB FORMAT <-ALL-FMTS
28 +000004 05 VNDMSTR REDEFINES VENDORS-RECORD. <-ALL-FMTS
29 +000005 06 VNDNBR PIC S9(5) COMP-3. <-ALL-FMTS
+000006* VENDOR NUMBER <-ALL-FMTS
30 +000007 06 NAME PIC X(25). <-ALL-FMTS
+000008* NAME <-ALL-FMTS
31 +000009 06 ADDR1 PIC X(25). <-ALL-FMTS
+000010* ADDRESS LINE 1 <-ALL-FMTS
32 +000011 06 CITY PIC X(15). <-ALL-FMTS
+000012* CITY <-ALL-FMTS
33 +000013 06 STATE PIC X(2). <-ALL-FMTS
+000014* STATE <-ALL-FMTS
34 +000015 06 ZIPCD PIC S9(5) COMP-3. <-ALL-FMTS
+000016* ZIP CODE <-ALL-FMTS
35 +000017 06 VNDCLS PIC S9(2) COMP-3. <-ALL-FMTS
+000018* VENDOR CLASS <-ALL-FMTS
36 +000019 06 VNDSTS PIC X(1). <-ALL-FMTS
+000020* A=ACTIVE, D=DELETE, S=SUSPEND <-ALL-FMTS
37 +000021 06 BALOWE PIC S9(7)V9(2) COMP-3. <-ALL-FMTS
+000022* BALANCE OWED <-ALL-FMTS
38 +000023 06 SRVRTG PIC X(1). <-ALL-FMTS
+000024* G=GOOD, A=AVERAGE, B=BAD, P=PREFERRED<-ALL-FMTS
39 002000 WORKING-STORAGE SECTION. 10/20/91
40 002100 77 EOF-FLAG PIC X. 10/23/91
41 002200 88 NOT-END-OF-FILE VALUE " ". 10/23/91

```

Figure 10. COBOL Source for DDS Example (panel 1)

```

5738CB1 V2R1M0 910524
AS/400 COBOL Source SGAFP/CBLLBL RCHASA12 10/24/91 10:18:16 Page 3
STMT SEQNBR -A 1 B..+...2...+...3...+...4...+...5...+...6...+...7..
IDENTFCN S COPYNAME                                CHG DATE
 42 002300      88 END-OF-FILE                        VALUE "1".      10/23/91
    002400                                           10/23/91
 43 002500 PROCEDURE DIVISION.                      10/23/91
    002600 MAIN-PARA.                                10/23/91
 44 002700      OPEN INPUT VENDOR-FILE              10/23/91
    002800          OUTPUT PRINTER-FILE.            10/23/91
 45 002900      PERFORM PRINT-LABELS UNTIL END-OF-FILE. 10/23/91
 46 003000      CLOSE VENDOR-FILE, PRINTER-FILE.    10/23/91
    003100      GOBACK.                              10/23/91
    003200                                           10/23/91
 47 003300 PRINT-LABELS.                            10/23/91
 48 003400      READ VENDOR-FILE                    10/23/91
 49 003500          AT END SET END-OF-FILE TO TRUE.  10/23/91
 50 003600      IF NOT-END-OF-FILE                  10/23/91
 51 003700          MOVE CORRESPONDING VNDMSTR TO LABEL-0 10/23/91
    *          ** CORRESPONDING items for statement 51:
    *          **      NAME
    *          **      ADDR1
    *          **      CITY
    *          **      STATE
    *          **      ZIPCD
    *          ** End of CORRESPONDING items for statement 51
 52 003800      WRITE PRINT-REC FORMAT IS "LABEL".    10/23/91
* * * * * E N D   O F   S O U R C E   * * * * *

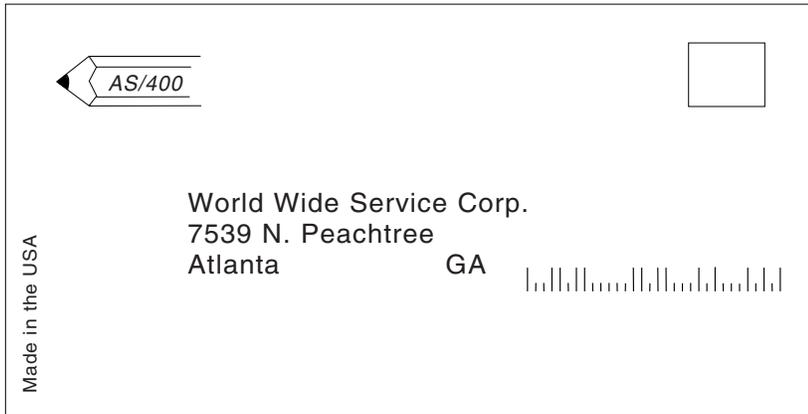
```

Figure 11. COBOL Source for DDS Example (Panel 2)

The following figure contains the RPG source.

Example 2: DDS and Absolute Positioning

This example highlights the additional function absolute positioning provides by using boxes (indicating where the stamp goes) and page segments (the pencil-type logo).



RV2H335-1

Appendix I. What Does a Font Look Like?

Did you ever wonder what a font looks like before using it in an application? This appendix contains instructions and source code that allow you to print an FGID, font character set, or coded font and see what it looks like. The source code provided is data description specifications (DDS), which can be used with the following high-level languages:

- C
- COBOL
- Pascal
- RPG

To print the FGID, font character set, or coded font you want to see, edit the DDS source and insert the correct identifier or name.

Notes:

1. These sample programs work only with printers configured as AFP(*YES).
2. See Appendix D, "Working with Fonts, Font Character Sets, Code Pages, CHRIDs, and Coded Fonts," on page 177 for the names of FGIDs, font character sets, and coded fonts.

Getting Started

Follow the instructions in the list below. If you need assistance with any of the CL commands, use the F4 (Prompt) key and then press the Help key on any of the parameters.

1. Create a library to contain the objects needed to print the font samples. In this example, the library is named FONTSAMPLE.
`CRTLIB FONTSAMPLE`
2. Add FONTSAMPLE to your library list.
`ADDLIBL FONTSAMPLE`
3. Create a source physical file in FONTSAMPLE to contain your source code. In this example the source file is named SOURCE.
`CRTSRCPF FONTSAMPLE/SOURCE`
4. Add a member named FONT to that physical file. This member is used for entering the source code for the printer file.
`ADDPFM FILE(FONTSAMPLE/SOURCE) MBR(FONT)`
5. Edit the member FONT with the source entry utility (SEU).
`STRSEU SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(FONT) TYPE(PRTF)`
Type the DDS source code (shown in "DDS Source Code" on page 310) for the printer file. When you are done, press F3 to exit.
6. Create the printer file from the DDS source you just typed in.
`CRTPRTF FILE(FONTSAMPLE/FONT) SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(FONT)
DEVTYPE(*AFPDS)`
7. Choose the high-level language you will be using to produce printed output. The compiler for the high-level language you choose must be installed on your system. Samples are given for C, RPG, Pascal, and COBOL. Add a member to the physical file SOURCE. Use one of the following names depending on which language you choose:
 - CCODE for the C language
 - COBOLCODE for the COBOL language
 - PASCODE for the Pascal language

- RPGCODE for the RPG language

ADDPFM FILE(FONTSAMPLE/SOURCE) MBR(CCODE, COBOLCODE, PASCODE, or RPGCODE)

8. Edit the member (CCODE, COBOLCODE, PASCODE, or RPGCODE) with source entry utility (SEU). Type in the command that corresponds to the high-level language you are using. Then, type the program source (listed below these instructions) for one of the languages.

C: STRSEU SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(CCODE) TYPE(C)

RPG: STRSEU SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(RPGCODE) TYPE(RPG)

Pascal:

STRSEU SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(PASCODE) TYPE(PAS)

COBOL:

STRSEU SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(COBOLCODE) TYPE(CBL)

When you are done, press F3 to exit.

9. Create the program, using the command below that corresponds to the language you chose.

C: CRTCPGM PGM(FONTSAMPLE/CPGM) SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(CCODE)

RPG: CRTRPGPGM PGM(FONTSAMPLE/RPGPGM) SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(RPGCODE)

Pascal:

CRTPASPGM PGM(FONTSAMPLE/PASPGM) SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(PASCODE)
LANGLVL(*SYSTEM)

COBOL:

CRTCBLPGM PGM(FONTSAMPLE/CBLPGM) SRCFILE(FONTSAMPLE/SOURCE) SRCMBR(COBOLCODE)

10. Call the program that corresponds to the language you chose:

C: Call CPGM

RPG: Call RPGPGM

Pascal:

Call PASPGM

COBOL:

Call CBLPGM

11. The output from the program is sent to a spooled file named FONT. You cannot view the spooled file until it prints.

DDS Source Code

```
5738PW1 V2R2M0 920615          SEU SOURCE LISTING
02/09/93 13:56:16              PAGE      1
SOURCE FILE . . . . . FONTSAMPLE/SOURCE
MEMBER . . . . . FONT
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
...+... 8 ...+... 9 ...+... 0
100                             R REC1
200
300                             6 10FONT(5)
400                             'Rhetoric Orator FGID 5'
500                             8 10FNTCHRSET(QFNT01/C0T055B0 +
600                             QFNT01/T1V10037)
700                             'Sonoran Serif 12 Pt +
800                             Font Char Set C0T055B0'
900                             10 10CDEFNT(QFNTCPL/X0BIR1)
1000                            'Book Italic 10 Pt +
                                CODED FONT X0BIR1'
1100                            * Above is the source for DDS and the fontsample program
*** * E N D O F S O U R C E * * * *
```

C Source Code

```
5738PW1 V2R2M0 920615 SEU SOURCE LISTING
SOURCE FILE . . . . . FONTSAMPLE/SOURCE
MEMBER . . . . . CCODE
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
...+... 8 ...+... 9 ...+... 0
100 #include <stdio.h>
200 #include <xxasio.h>
300 main()
400 {
500 FILE          *outfile;
600
700 outfile = fopen("font","wb type=record");
800 QXXFORMAT(outfile, "REC1  ");
900 fwrite("",0,0,outfile);
1000 }
* * * * E N D O F S O U R C E * * * *
```

Pascal Source Code

```
5738PW1 V2R2M0 920615 SEU SOURCE LISTING
SOURCE FILE . . . . . FONTSAMPLE/SOURCE
MEMBER . . . . . PASCODE
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
...+... 8 ...+... 9 ...+... 0
100 program print (input, output);
200 var
300   format:  BINDINGTYPE;
400   prtfile: FILE OF char;
500 begin
600   REWRITE(prtfile, 'file(font) COMMIT(*NO) FILETYPE(*PRTF)');
700   format.options := 'format(rec1)';
800   BIND(prtfile, format);
900   put(prtfile);
1000 end.
* * * * E N D O F S O U R C E * * * *
```

RPG Source Code

```
5738PW1 V2R2M0 920615 SEU SOURCE LISTING
SOURCE FILE . . . . . FONTSAMPLE/SOURCE
MEMBER . . . . . RPGCODE
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
...+... 8 ...+... 9 ...+... 0
100   FFONT  0  E          PRINTER
200   C          WRITEREC1
300   C          SETON          LR
* * * * E N D O F S O U R C E * * * *
```

COBOL Source Code

```
5738PW1 V2R2M0 920615 SEU SOURCE LISTING
SOURCE FILE . . . . . FONTSAMPLE/SOURCE
MEMBER . . . . . COBOLCODE
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
...+... 8 ...+... 9 ...+... 0
100 100010 IDENTIFICATION DIVISION.
200
300 100020 PROGRAM-ID. PRINTLBL.
400
500 100030 ENVIRONMENT DIVISION.
600
700 100040 INPUT-OUTPUT SECTION.
800
900 100050 FILE-CONTROL.
1000
```

```
1100 100060    SELECT PRINTER-FILE
1200
1300 100070          ASSIGN TO FORMATFILE-FONT.
1400
1500 100080 DATA DIVISION.
1600
1700 100090 FILE SECTION.
1800
1900 100100 FD PRINTER-FILE
2000
2100 100110    DATA RECORD IS REC1.
2200
2300 100120 01 REC1.
2400
2500 100130    COPY DDS-ALL-FORMATS OF FONT.
2600
2700 100140 PROCEDURE DIVISION.
2800
2900 100150 MAIN-PARA.
3000
3100 100160    OPEN OUTPUT PRINTER-FILE.
3200
3300 100170    WRITE REC1 FORMAT IS "REC1".
3400
3500 100180    CLOSE PRINTER-FILE.
3600
* * * * E N D   O F   S O U R C E * * * *
```

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Bibliography

The following is a list of manuals and topics in the iSeries Information Center that provide additional information about topics described or referred to in this manual. The manuals in this bibliography are listed with their full title and order number, but when referred to in text, a shortened version of the title is used.

- *About Type: Guide for Type Users (Current Release)* G544-3122.

This publication introduces the use of typography in designing and printing documents with special emphasis using Advanced Function Presentation fonts and printing systems.

- *About Type: Technical Reference for 240-Pel Digitized Type*, S544-3516.

This manual provides information about the names, content and size of the character sets, code pages and coded fonts in the font licensed programs used in printing on 240-pel dots-per-inch (240-pel) non-impact printers supported by Advanced Function Presentation (AFP) software.

- *About Type: Typographic Primer for Digitized Type* G544-3183.

This publication introduces typographic concepts to show the reader how to create effective printed material with style and emphasis, and to illustrate how much value type characters from IBM's typographic fonts can add to business messages. This is primarily a marketing tool.

- Management Central.

This topic in the iSeries Information Center gives system operators a fast path for system operator tasks on OS/400. It covers the basics of system startup and provides information about the system control panel, starting and stopping the system, using media, working with PTFs, and handling problems.

- Communication Configuration.

Provided via PDF, using this manual, the user can configure the communications functions available with OS/400. It provides general configuration information, including detailed descriptions of network interface, line, controller, device, mode, and class-of-service descriptions, configuration lists, and connection lists.

- Networking.

This topic in the iSeries Information Center contains information on configuring and using the Transmission Control Protocol/Internet Protocol (TCP/IP) and writing programs to the TCP/IP application program interface.

- DDS Reference: Printer Files.

This topic in the iSeries Information Center provides detailed descriptions of the entries and keywords needed to describe database files (both logical and physical) and certain device files (for displays, printers, and intersystem communications function (ICF)) external to the user's programs.

- Database Management.

This topic in the iSeries Information Center provides information about using files in application programs. This manual includes information on the following topics:

- Fundamental structure and concepts of data management support on the system
- Overrides and file redirection (temporarily making changes of files when an application program is run)
- Copying files by using system commands to copy data from one place to another
- Tailoring a system using double-byte data

- Local Device Configuration.

Provided via PDF, this manual provides information on how to do an initial local hardware configuration and how to change that configuration. This manual also contains conceptual information about device configuration and planning information for device configuration on the 9406, 9404, and 9402 system units.

The PDF includes additional information such as configuration terminology for lines, controllers, and devices. It also includes information on automatic configuration, how to do an initial configuration, how to change a configuration to suit the system, how to do local configuration including configuring ASCII devices, and unique double-byte character set (DBCS) configuration information (as a separate appendix). Information about local, twinaxial, ASCII work station controllers, modems, and the devices that attach to these local

workstation controllers is also included as well as forms for local work station attachment diagrams.

- *Graphic Object Content Architecture SC31-6804.*

This manual explains the architecture of graphic objects for IPDS-capable devices.

- *IBM Enhanced 5250 Emulation Program User's Guide G570-2221.*

This guide explains how to work with the IBM Enhanced 5250 Emulation Program.

- *IBM's Guide for Using PMF With Type S544-3648.*

This publication describes how to use fonts with PMF in MVS and VM. It was originally published as two separate books - one for each environment.

This manual could help you in communicating with System/390 sites in transferring AFP resources to an iSeries server.

- CL Reference.

This iSeries Information Center topic describes the OS/400 control language (CL) and its OS/400 commands. Each command description includes a syntax diagram; descriptions of parameters, default values, and keywords; and at least one example.

- GDDM Programming Guide.

Provided via PDF, this guide provides information about using OS/400 graphical data display manager (GDDM) to write graphics application programs. GDDM allows you to add color and pictures to your application programs. This guide includes example programs and information to help you understand how the product fits into data processing systems.

- Work Management.

The Work Management topic in the iSeries Information Center provides information about how to create and change a work management environment. Other topics include a description of tuning the system, collecting performance data including information on record formats and contents of the data being collected, working with system values to control or change the overall operation of the system, and a description of how to gather data to determine who is using the system and what resources are being used.

- System Operation.

This topic in the iSeries Information Center provides information about handling messages, working with jobs and printer output, device

communications, working with support functions, cleaning up your system, and so on.

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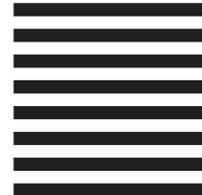
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