Print Services Facility/MVS:

MVS Download Guide

IBM

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MVS Download Guide

┌─ **Note!** ──┐

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

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Second Edition (July 1996)

This edition applies to IBM Print Services Facility/MVS Version 2 Release 2 Modification Level 0, Program Number 5695-040, and to
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| Summary of Changes

| In addition to editorial changes, the following changes are included in the second
| edition of this publication:

- You can write an exit to pass additional job information to a PSF/6000 server
  on an AIX system.

- You can request that MVS Download not append a record-length prefix to each
  record transmitted to an AIX system. This may improve performance for certain
  OnDemand for AIX applications.

- Before transmitting data sets containing S/370 line data and inline resources to
  a PSF/6000 server on an AIX system, IBM recommends that you use the AFP
  Conversion and Indexing Facility (ACIF) to convert the data sets to a
  MO:DCA-P data stream.

- Message APS996I is added, because MVS Download now performs additional
  syntax checking of statements in the routing-control data set.

| Technical changes to the text made in this edition are indicated by a vertical line to
| the left of the changes.

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Preface

This publication provides information about MVS Download, a licensed feature of IBM Print Services Facility/Multiple Virtual Storage (PSF/MVS). This publication was written with the assumption that you are familiar with PSF/MVS and with Advanced Function Presentation (AFP) concepts.

Using this Publication

The information in this publication is directed to several audiences:

- The MVS job submitter who submits a job for processing by MVS Download. The MVS job submitter should read:

  - Chapter 1, "Introducing MVS Download"
  - Chapter 2, "Using MVS Download for Printing or Archiving"

- The MVS system programmer responsible for installation and configuration. The MVS system programmer should read:

  - Chapter 1, "Introducing MVS Download"
  - Chapter 3, "Configuring MVS Download"

- The MVS console operator responsible for starting, stopping, and monitoring MVS Download. The MVS console operator should read:

  - Chapter 1, "Introducing MVS Download"
  - Chapter 4, "Operating MVS Download"

- The MVS diagnostician responsible for diagnosing problems. The MVS diagnostician should read:

  - Chapter 1, "Introducing MVS Download"
  - Chapter 5, "Diagnosing Errors in MVS Download"

Chapter 6, "MVS Download Messages" contains messages issued by MVS Download and is a reference section for all audiences.

Understanding Syntax Notation

The following rules apply to coding illustrations throughout this publication:

- Uppercase letters are to be coded as shown.

- Variable data is printed in italics. Enter specific data to replace the characters in italics; for example, for PRT*nnnn* you could enter PRT0002.

- Do not enter the following symbols as part of a parameter or option:

  Vertical Bar |
  Underscore   ___
  Brackets   [ ]

- A vertical bar between two values means that you select one of the values.

- An underscored value means that if an option is not specified, the underscored value, called the default, is used.

- Brackets around a value means that you do not have to select the value.

Chapter 1. Introducing MVS Download

MVS Download is a separately-orderable feature of IBM Print Services Facility/Multiple Virtual Storage (PSF/MVS). MVS Download automatically transmits MVS system output to AIX operating systems in the TCP/IP network for printing or archiving by Print Services Facility for AIX and OnDemand for AIX. This publication refers to PSF for AIX as PSF/6000.

Overview

Figure 1 shows the steps that occur as MVS Download transmits system output from an MVS system to AIX systems.
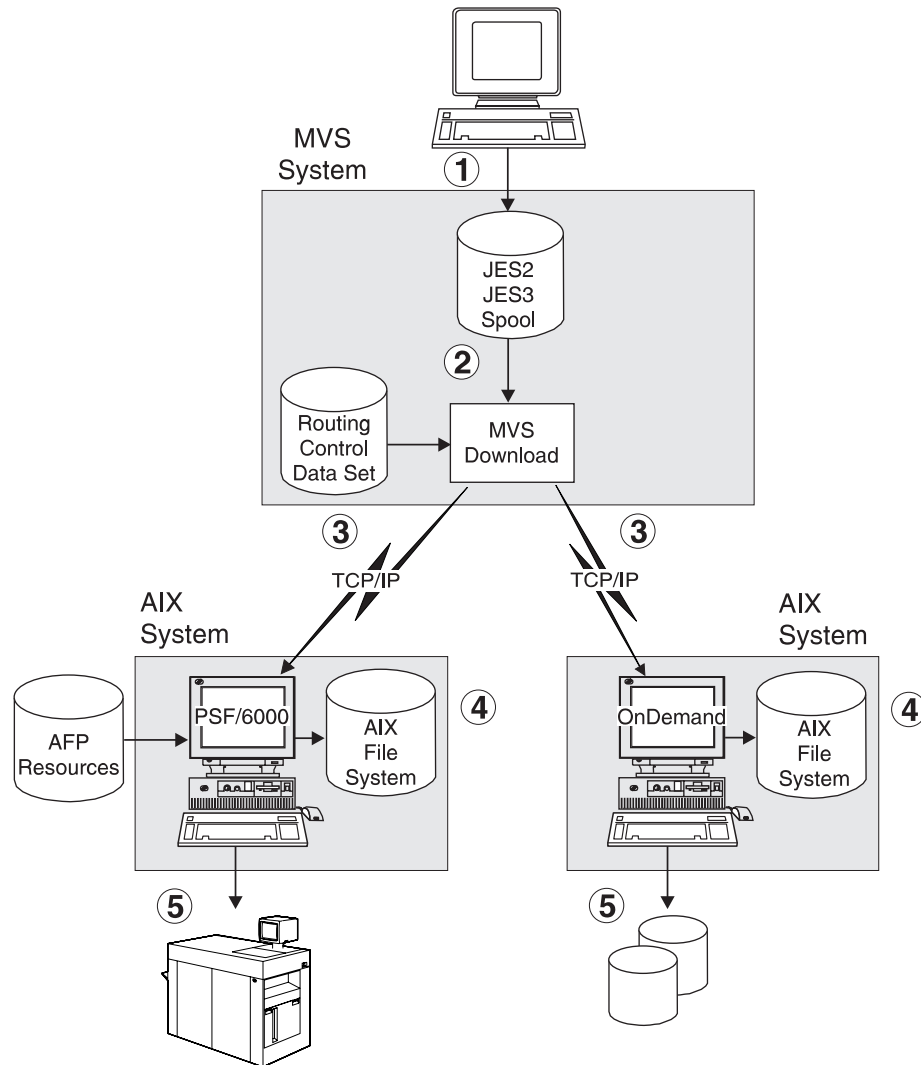
Figure 1. MVS Download System Diagram

Following is a description of the steps shown in Figure 1:

1. Users submit jobs on the MVS system, creating system output on the Job Entry Subsystem (JES) spool in either a JES2 or JES3 environment. The job submitters specify job control language (JCL) parameters that direct the output data sets to MVS Download and to an AIX system. The data sets can contain any type of data stream.

2. MVS Download, running as a JES2 or JES3 output writer, selects output data sets from the JES spool according to installation-defined JES work-selection criteria that correspond to JCL parameters specified by the job submitters. Several MVS Download output writers can run at the same time to process a high volume of data.

3. MVS Download transmits the output data sets, with associated JCL parameters, to AIX systems in the TCP/IP network, using routing information specified by the installation in a routing-control data set.

   The routing information associates JCL parameters specified by the job submitter (output class, destination, and form name) with the addresses of target AIX systems and receiving programs.

4. The receiving programs on the AIX systems, also called servers, receive the data sets into AIX file systems. Two IBM products provide servers to receive data from MVS Download: PSF/6000 and OnDemand for AIX. These servers are shipped with PSF/6000 and OnDemand for AIX. Several servers may run simultaneously on one AIX system to handle large amounts of transmitted data.

5. The PSF/6000 and OnDemand servers process the received files according to instructions coded by the AIX installation in a shell script. The shell script might be coded to perform the following functions:

   - PSF/6000 Server: Print the data on an AFP or non-AFP printer using printing options specified in the associated JCL parameters and using AFP resources accessible to the AIX system. Optionally, a server could save files for subsequent processing.

   - OnDemand Server: Store the data in an application group for subsequent retrieval.

Some highlights of MVS Download are described below.

Automatic Routing: The installation controls the routing of data sets by pairing JCL parameter values with the addresses of target AIX systems and servers in a routing-control data set. Thus, the routing process can be transparent to the job submitter, requiring little or no modification to existing JCL statements.

High-Speed Data Transfer with no DASD Requirements: MVS Download sends data to the AIX system using internal buffers and the TCP/IP socket interface, achieving a high transmission rate with no additional DASD requirements. Thus, MVS Download is suitable for transmitting large amounts of data.

Automatic Error Recovery: When an error occurs during transmission of data from the MVS system to the AIX system, MVS Download automatically retries the transmission according to installation parameters. This reduces the need for operator intervention due to transmission errors. The installation specifies the number of times to retry each failed transmission, as well as how long to wait before retrying the transmission.

Guaranteed Data Integrity: MVS Download verifies that all data has been successfully received by the AIX system before deleting a data set from the MVS system. If transmission is not successful after retry, JES holds the data set.

Restart from a Checkpoint: When requested, MVS Download takes checkpoints of a data set being transmitted from the MVS system to the AIX system. The requester specifies the interval between checkpoints. After a transmission error, MVS Download retries from the last checkpoint, thereby reducing transmission time for large data sets.

Transmission Notification: When requested, MVS Download notifies the job submitter when a data set is successfully transmitted, held by the system due to an error, or cancelled by the operator. This function is available only in certain levels of an MVS/ESA system.

Seamless System Management: The MVS operator manages MVS Download with the same Job Entry System (JES) or System Display and Search Facility (SDSF) commands used to manage PSF/MVS.

Accounting: MVS Download supports System Management Facility (SMF) accounting by recording the number of bytes transmitted and other processing information in a type-6 record extension.

Relationship to Other IBM Products

Figure 2 shows the relationship of MVS Download to other IBM Products: PSF/MVS, Network Print Facility, and NetSpool.
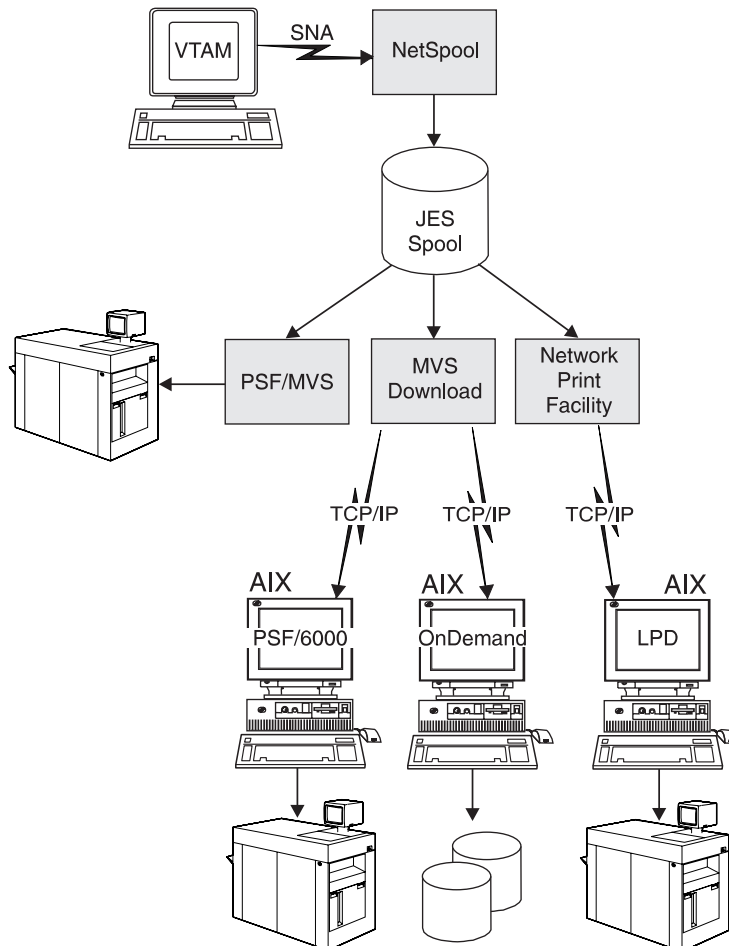
Figure 2. Relationship of MVS Download to other IBM Products

Relationship to PSF/MVS: Both PSF/MVS and the MVS Download feature of PSF/MVS select output data sets from the JES spool for printing. PSF/MVS formats data using AFP resources and manages printing of the formatted data on an AFP printer. MVS Download, on the other hand, does not format data or provide any printer-driver services. Instead, MVS Download transmits the data sets, with the associated JCL parameters, to PSF/6000 on an AIX system, which formats and prints the data using AFP resources accessible to the AIX system.

Relationship to Network Print Facility (NPF): NPF, a feature of TCP/IP for MVS, and the MVS Download feature both select output data sets from the JES spool and transmit them to AIX systems in the TCP/IP network for printing. NPF transmits data to the **lpd** daemon on the AIX system at a slower data-transmission rate suitable for smaller jobs. MVS Download transmits data directly to a PSF/6000 or OnDemand server at a higher data-transmission rate suitable for larger jobs. Other differences between MVS Download and NPF are that NPF requires DASD storage, does not perform checkpointing of data or accounting, and requires special spool management and queueing on the MVS system.

Relationship to NetSpool: NetSpool, which is also a feature of PSF/MVS, and MVS Download perform complementary functions. NetSpool intercepts output data from VTAM applications, such as Customer Information Control System (CICS) and Information Management System (IMS), and places the data on the JES spool, along with JCL parameters specified during NetSpool configuration. The MVS Download output writer can select NetSpool data from the JES spool and transmit it to an AIX system for printing or archival.

Chapter 2. Using MVS Download for Printing or Archiving

This chapter describes how a job submitter uses MVS Job Control Language (JCL) to transmit a data set to PSF/6000 or OnDemand on an AIX system.

If you are printing with PSF/6000, you should be familiar with concepts of advanced function printing (AFP), such as form definitions, page definitions, and fonts. Refer to *Print Services Facility/MVS: Application Programming Guide* for an introduction to advanced function printing and the MVS JCL used to print with PSF/MVS.

MVS Download transmits all types of data streams, performing no modification of the data except to add a record length field as required by the AIX system. You can use MVS Download to transmit any type of data stream that you can print or archive on an AIX system, including:

- MO:DCA-P data
- S/370 line data
- S/370 mixed-mode data
- PostScript data

Using Job Control Language

In most cases, you can use the same JCL parameters as you do currently, with little or no modification. This section describes considerations in the following areas that might require JCL modification:

- Directing output to an AIX system and server
- Directing output to more than one AIX system or server
- Specifying a checkpointing interval
- Specifying archiving options to OnDemand
- Specifying printing options to PSF/6000
- Using AFP resources for printing with PSF/6000
- Determining defaults for printing with PSF/6000

Directing Output to an AIX System and Server

To transmit your output to an AIX system, you must direct the output to the MVS Download output writer. To do this, you specify the JES work-selection criteria defined by your installation for the MVS Download output writer on either the DD or OUTPUT JCL statements for the data set. For example, you might need to specify a particular output class to direct output to the MVS Download output writer in your installation. Consult your system programmer for the appropriate values to specify.

You direct an output data set to a particular AIX system and to a particular PSF/6000 or OnDemand server on that system by specifying the appropriate routing criteria as defined by your installation in the routing-control data set. The routing criteria can include one or more of the following:

- Output class
- Destination name
- Form name

You specify these criteria on either the DD or OUTPUT JCL statements for the data set. Consult your system programmer to determine the values to specify.

Each combination of class, destination, and form name you specify may direct the data set to a different AIX system and to a different server on that system. See "Directing Output to an AIX System and PSF/6000 or OnDemand Server" on page 22 for an example of how to use class, form, or destination to direct output to an AIX system.

Directing Output to More Than One AIX System or Server

To transmit an output data set to more than one AIX system or to more than one server on the same AIX system, you can create multiple output data sets. You do this easily using multiple OUTPUT JCL statements. On each OUTPUT statement, specify the class, form, or destination name that corresponds to the AIX system and PSF/6000 or OnDemand server to which you want that data set transmitted.

See "Directing Output to Multiple AIX Systems or Servers" on page 23 for an example of how to transmit a data set to more than one AIX system or server at the same time.

Specifying a Checkpointing Interval

You can request that MVS Download perform checkpointing of the MVS data set while the data set is transmitted to the AIX system. If checkpointing is requested, MVS Download can restart transmission from the checkpoint if an error occurs.

Because MVS Download does not format data into pages, you must specify a checkpointing interval in seconds, not in pages as you can when printing on an MVS system. Specify the CKPTSEC parameter instead of the CKPTPAGE parameter on the OUTPUT JCL statement. Your installation may have defined a default checkpointing interval to be used when you do not request checkpointing.

Specifying Options to OnDemand

MVS Download transmits values you specify in JCL parameters to the OnDemand servers on the AIX system. MVS Download transmits the same parameters to both the PSF/6000 and OnDemand servers, even though most of the parameters relate to printing options. This allows you to pass a parameter required by OnDemand, such as an application group name, with each transmitted data set. For example, your installation might use the FORMS parameter to transmit a parameter to OnDemand. Consult your AIX system administrator for more information.

Specifying Printing Parameters to PSF/6000

MVS Download transmits values you specify in JCL parameters to the PSF/6000 servers on the AIX system. MVS Download transmits only those parameters that are supported by PSF/6000.

The system programmer can also specify additional job information for MVS Download to transmit to PSF/6000 servers. See "Writing an Installation Exit" on page 53 for more information.

Printing Parameters and Corresponding AIX Parameters

The printing parameters transmitted to the AIX system can be used by one or more of the print commands in an AIX system. The AIX system administrator, in the AIX shell script for the server, determines which command is to print the data set: **psfin**, **enq**, **lp**, or **qprt**. The sample shell script distributed by IBM with PSF/6000 invokes the **psfin** command to print the data.

Table 1 lists each JCL parameter and the corresponding parameter of the **psfin** job script or the AIX print commands.

Table 1. JCL Parameters and Corresponding AIX Printing Parameters		
JCL Parameter	**psfin Command Job Script Keyword**	**enq, lp, qprt Command Option Flag**
ADDRESS		-oaddress1, -oaddress2, -oaddress3, -oaddress4
BUILDING		-obuilding
CHARS	a_Chars	-ochars
CKPTSEC	Not transmitted to the AIX system.	
CLASS	o_Passthru class	-opassthru class
COPIES	o_Copies	-ocopies
DATACK	o_DataCk	-odatack
DCB=RECFM	a_Cc a_Cctype	-occ -occtype
DCB=OPTCD=J	a_Trc	-otrc
DEPT		-odepartment
DEST	o_Passthru dest	-opassthru dest
FCB	a_Pagedef	-opagedef
FORMDEF	oa_Formdef	-oformdef
FORMS	o_Passthru forms	-opassthru forms
NAME		-oname
NOTIFY	Not transmitted to the AIX system.	
OUTBIN	o_Outbin	-ooutbin
PAGEDEF	a_Pagedef	-opagedef
PRMODE	a_Prmode	-oprmode
ROOM		-oroom
SEGMENT	o_Passthru segmentid	-opassthru segmentid
Note: The SEGMENT value is not transmitted to the AIX system. However, a segment identifier is transmitted.		
SYSOUT	o_Passthru class o_Passthru forms	-opassthru class -opassthru forms
TITLE		-otitle
TRC	a_Trc	-otrc
UCS	a_Chars	-ochars

Printing Parameters Not Transmitted to an AIX System

MVS Download ignores DD and OUTPUT statement parameters other than those described in Table 1 on page 9. If you are familiar with the JCL described in *Print Services Facility/MVS: Application Programming Guide*, you know that you can specify additional parameters when printing on an MVS system. Following is a list of those JCL parameters that MVS Download ignores if specified:

- BURST, which allows you to request bursting on a continuous-form printer.

  Print commands on an AIX system do not have a comparable option.

- COMSETUP, which allows you to specify a microfilm setup resource.

  MVS Download does not support transmitting microfilm data sets to an AIX system.

- COPIES Group Values, which allow you to print multiple copies of selected pages.

  Print commands on an AIX system do not have a comparable option. Instead, specify copy group values in a form definition.

- FLASH, which allows you to request a specific forms flash on a 3800 printer.

  PSF/6000 does not support the 3800 printer.

- PIMSG, which allows you to request suppression of error messages and also allows you to request termination of processing after a certain number of error messages.

  On the AIX system, all error messages print by default.

- USERLIB, which allows you to use resources located in an MVS user library.

  Either include these resource inline, or request that the AIX system administrator make these resources available for printing on the AIX system.

Using AFP Resources for Printing with PSF/6000

You can either use default AFP resources or name specific resources in JCL parameters, as you can when printing on an MVS system. If you use resources other than the default resources, consider the following differences:

- The required AFP resources, such as page definitions, form definitions, and fonts, must be accessible to the AIX system. The AIX system administrator can make MVS resources accessible to the AIX system with the Network File System (NFS) mount command. See your AIX administrator for more information.

- PSF/6000 can *not* print data sets that contain S/370 line data or S/370 mixed-mode data along with inline resources. Therefore, before transmitting such data sets to PSF for AIX, use the AFP Conversion and Indexing Facility (ACIF) to convert the data streams to MO:DCA-P data streams. Refer to *AFP Conversion and Indexing Facility: Application Programming Guide* for more information.

- If you specify a form definition or page definition name of DUMMY in the FORMDEF or PAGEDEF parameter, the output data set must contain an inline form definition or page definition. If you specify DUMMY when no inline form definition or page definition exists, PSF/6000 tries to find a form or page definition named DUMMY in the AIX resource directories.

When you print with PSF/MVS and specify a name of DUMMY, PSF/MVS uses the default form or page definition if no form definition or page definition is sent inline.

- If you specify a font in the UCS or CHARS parameter, and the page definition used to format the data set also specifies a font, PSF/6000 uses the font in the page definition, whether or not that page definition is the system default page definition.

  When you print with PSF/MVS, PSF/MVS uses the font you specify in the UCS or CHARS parameter if the page definition used to format the data set is the system default page definition.

- The filenames of page definitions, form definitions, and fonts are case-sensitive on the AIX system. Because values specified in JCL parameters are in upper-case characters, ensure that the filenames on the AIX system are also in upper case.

If you use default AFP resources, see "Determining Defaults for Printing with PSF/6000."

Determining Defaults for Printing with PSF/6000

When you use MVS Download to print on an AIX system, defaults for AFP resources and printing options might be different than the defaults defined for printing with PSF/MVS on an MVS system. The MVS system programmer as well as the AIX system administrator can define defaults for AFP resources and printing options.

The MVS system programmer can define a default page definition and font for the MVS Download output writer in JES initialization statements and in the MVS Download startup procedure. The MVS system programmer can define a default form definition and data-check option for the MVS Download output writer in the MVS Download startup procedure. If the MVS system programmer has not specified a default, the AIX system administrator can specify a default for each PSF/6000 server or AIX print queue. Consult your MVS system programmer and AIX system administrator to determine what defaults have been defined.

JCL Reference

This section describes all of the JCL parameters that you might specify on the DD or OUTPUT JCL statements when you use MVS Download.

Note: Some of the JCL parameters described in this section specify printing options for PSF/6000 and may have no significance if you are transmitting a data set to an OnDemand server.

Figure 3 summarizes the JCL parameters you might consider using when transmitting a data set for printing with PSF/6000.

```
ADDRESS=(address_lines)
BUILDING=building
CHARS=(font_names)
CKPTSEC=seconds
CLASS=class
COPIES=nnn
DATACK=BLOCK | UNBLOCK | BLKCHAR | BLKPOS
DCB=OPTCD=J
DCB=RECFM=A | M
DEPT=department
DEST=name
FCB=pagedef_name
FORMDEF=formdef_name
FORMS=form_name
NAME=name
NOTIFY=(node.userid)
OUTBIN=bin_number
PAGEDEF=pagedef_name
PRMODE=SOSI1 | SOSI2 | aaaaaaaa
ROOM=room
SEGMENT=page_count
SYSOUT=(class,,form_name)
TITLE=title
TRC=YES | NO
UCS=font_name
```

Figure 3. JCL Parameters for PSF/6000

Figure 4 summarizes the JCL parameters you might consider using when transmitting a data set for archiving with OnDemand for AIX.

```
CKPTSEC=seconds
CLASS=class
DEST=name
FORMS=form_name
NOTIFY=(node.userid)
SEGMENT=page_count
SYSOUT=(class,,form_name)
```

Figure 4. JCL Parameters for OnDemand

MVS Download transmits all of the parameters shown in Figure 3 to each server on the AIX system, with the exception of the CKPTSEC, NOTIFY, and SEGMENT parameters.

You specify the JCL parameters described in this section on one or both of the following JCL statements:

- DD statement
- OUTPUT statement

The examples included with each parameter show on which JCL statements you can specify each parameter. If you specify the same parameter on both the DD and the OUTPUT JCL statements, the parameter on the DD statement is used.

For more details about how to code the parameter values, refer to the *JCL Reference* for your MVS system.

ADDRESS=(*address_lines***)**

Specifies up to four lines of address information. Each line of address information can contain 1 to 60 characters, separated with commas. PSF/6000 can print each address on a separate line of the header, trailer, or separator pages, if the correct user exit is activated.

Default: None.

Example:

```
//OUTDS  OUTPUT ADDRESS=('J. Plant','123 Main St.','BOULDER, CO','80301')
```

BUILDING=*building*

Specifies 1 to 60 characters of building information. PSF/6000 can print the building information on the header, trailer, or separator pages, if the correct user exit is activated.

Default: None.

Example:

```
//OUTDS  OUTPUT BUILDING='920'
```

CHARS=(*font_names***)**

Specifies the names of from 1 to 4 coded fonts that PSF/6000 is to use to print a data set containing line data. Do not include the 2-character prefix of the coded-font name (X0 through XG).

The fonts that you specify must be in an AIX directory specified as part of PSF/6000's search path, or be resident in the printer. PSF/6000 can *not* print data sets that contain S/370 line data or S/370 mixed-mode data with inline fonts. Before transmitting a data set with an inline font, use the AFP Conversion and Indexing Facility (ACIF) to convert it to a MO:DCA-data stream. Refer to *AFP Conversion and Indexing Facility: Application Programming Guide* for more information.

You can specify a font name in either the CHARS parameter or the UCS parameter. If you specify a font in both parameters, the font on the CHARS parameter is used. If the page definition that PSF/6000 uses to print a data set specifies a font, then PSF/6000 uses that font and ignores the font specified in the CHARS parameter.

Default: If no fonts are specified in the page definition, and if you do not specify either the CHARS or the UCS parameters, the default is the font set during MVS Download configuration. If no default was set, PSF/6000 uses the default font defined for the printer.

Examples: You can specify the CHARS parameter on the DD and OUTPUT statements, as shown.

```
//DD1   DD CHARS=(GT15,GT12)

//OUTDS  OUTPUT CHARS=(GT15,GT12)
```

CKPTSEC=*seconds*

Specifies the number of seconds to be taken between checkpoints of the data set as it is being transmitted to the AIX system; specify a number from 1 to 32 767, inclusive.

Note: Do not specify the CKPTPAGE parameter, because MVS Download does not support checkpointing by page. If you specify both CKPTPAGE and CKPTSEC:

- JES2 ignores the CKPTSEC parameter, unless your installation specified during JES2 initialization that checkpoints are to be based only on time.

- JES3 ignores the CKPTSEC parameter.

Consider the following performance impacts when choosing an interval:

- If the interval number is too low, resulting in many checkpoints, performance may be reduced due to the checkpointing overhead.

- If the number of seconds between intervals is too high, errors that require retransmittal of large amounts of data may reduce performance.

Default: MVS Download uses the default checkpoint interval specified during MVS Download configuration. If no default is specified, no checkpoints are taken.

Example:

```
//OUTDS  OUTPUT CKPTSEC=30
```

CLASS=*class*

Specifies the class of the data set; specify 1 alphanumeric character. PSF/6000 can print the class on the header, trailer, or separator pages, if the correct user exit is activated.

MVS Download may use the class you specify, along with the destination and form names, to route the data set to a particular AIX system and PSF/6000 or OnDemand server. Consult your system programmer to determine the correct class to specify, depending on how MVS Download was configured.

You can specify an output class on two JCL statements:

- The SYSOUT parameter on the DD statement.

- The CLASS parameter on an OUTPUT statement assigned to that DD statement. To specify a class on the OUTPUT statement, you must enter a null class in the DD SYSOUT parameter: SYSOUT=(,).

Note: Although this parameter is optional, you must specify either a class, form name, or destination name to direct the output to an AIX system and server.

Default: If you do not specify a class value in either the OUTPUT or the DD statement, the default class is A.

Example:

```
//OUTDS  OUTPUT CLASS=C
//DD1    DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

COPIES=_nnn_

Specifies the number of copies you want to print, from 1 to 255.

MVS Download ignores any group values you specify on this parameter; instead, specify group values in a form definition.

Default: One copy.

Examples: You can specify the COPIES parameter on the DD and OUTPUT statements, as shown.

```
//DD1  DD COPIES=14
```

```
//OUTDS  OUTPUT COPIES=14
```

DATACK=<u>BLOCK</u> | UNBLOCK | BLKCHAR | BLKPOS

Specifies whether you want the printer to block print-positioning and invalid-character errors.

BLOCK

Specifies that the printer is not to report print-positioning or invalid-character errors.

UNBLOCK

Specifies that the printer is to report all data-check errors. If a print-positioning error occurs, the exception is highlighted on the printed page to help you locate where the attempt to print outside the valid printable area occurred.

BLKCHAR

Specifies that the printer is not to report invalid-character errors. Print-positioning errors are reported normally.

BLKPOS

Specifies that the printer is not to report print-positioning errors. Invalid-character errors are reported normally.

Default: A default can be specified during MVS Download configuration. If no default was specified, the default is BLOCK.

Example:

```
//OUTDS  OUTPUT DATACK=UNBLOCK
```

DCB=OPTCD=J

Specifies that the print data set contains table reference characters (TRCs). You can also specify TRCs on the TRC parameter of the OUTPUT statement.

Default: If you omit the TRC parameter as well as this parameter, the default is TRC=NO.

Example:

```
//DD1  DD DCB=OPTCD=J
```

DCB=RECFM=A | M
Specifies whether ANSI or Machine carriage-control characters exist in a data set containing line data. If the data set contains AFP resources (such as page segments), specify that either ANSI or Machine carriage controls exist.

Default: None.

Example:

```
//DD1  DD DCB=RECFM=A
```

DEPT=_department_
Specifies a 1 to 60 character department name. PSF/6000 can print the department information on the header, trailer, or separator pages, if the correct user exit is activated.

Default: None.

Example:

```
//OUTDS  OUTPUT DEPT='PAYROLL'
```

DEST=_name_
Specifies a destination name for the print data set. Specify either a 1 to 8 character destination name, or a node and destination name. PSF/6000 can print the destination name on the header, trailer, or separator pages, if the correct user exit is activated.

MVS Download may use the destination you specify, along with the class and form names, to route the data set to a particular AIX system and PSF/6000 or OnDemand server. Consult your system programmer to determine the correct destination to specify, depending on how MVS Download was configured.

Note: Although this parameter is optional, you must specify either a class, form name, or destination name to direct the output to an AIX system and server.

If you specify the DEST parameter on the DD statement, you must also specify the SYSOUT parameter; otherwise, the system ignores the DEST parameter after checking it for syntax.

Examples: You can specify the DEST parameter on the DD and OUTPUT statements, as shown.

```
//DD1  DD SYSOUT=R,DEST=PSF6000
```
```
//OUTDS  OUTPUT DEST=PSF6000
```

FCB=_pagedef_name_
Specifies the 1 to 4 character name of the page definition to format a data set containing line data. Do not add the P1 prefix to the name of the page definition, because MVS Download adds the system prefix P1 to the name.

Because the FCB parameter allows a maximum of only 4 characters, the PAGEDEF parameter is preferred. See the description of the PAGEDEF parameter for more information.

FORMDEF=_formdef_name_
Specifies the name of the form definition that you want to use; specify a 1 to 6 character name. Do not add the F1 prefix to the name, because MVS Download adds F1 to the name specified in this parameter.

If the data set contains a MO:DCA-P data stream, the form definition that you specify must be in an AIX directory specified as part of PSF/6000's search path or can be included inline. To use an inline form definition, specify the name of the inline form definition or specify DUMMY as the name. If you specify DUMMY, PSF/6000 uses the first inline form definition found; however, if no inline form definition is found, PSF/6000 looks for a form definition named DUMMY in the AIX resource directories.

If the data set contains S/370 line data or S/370 mixed-mode data, the form definition that you specify must be in an AIX directory specified as part of PSF/6000's search path. PSF/6000 can *not* print data sets that contain S/370 line data or S/370 mixed-mode data with an inline form definition. Before transmitting a data set with an inline form definition, use the AFP Conversion and Indexing Facility (ACIF) to convert it to a MO:DCA-P data stream. Refer to *AFP Conversion and Indexing Facility: Application Programming Guide* for more information.

Default: The default is the form definition name specified during MVS Download configuration. If no default was specified, PSF/6000 uses the default established by the AIX system administrator.

Example: This example specifies F1USER10 as the form definition.

```
//OUTDS  OUTPUT FORMDEF=USER10
```

FORMS=form_name

Specifies the 1 to 8 character form name. PSF/6000 can print the form name on the header, trailer, or separator pages, if the correct user exit is activated.

The form name you specify does not result in any forms setup messages on either the MVS or AIX systems.

MVS Download may use the form name you specify, along with the class and destination values, to route the data set to a particular AIX system and PSF/6000 or OnDemand server. Consult your system programmer to determine the correct form name to specify, depending on how MVS Download was configured.

Note: Although this parameter is optional, you must specify either a class, form name, or destination name to direct the output to an AIX system and server.

Default: If you do not specify a form name on either the OUTPUT or the DD statement, JES uses an installation default.

Example:

```
//OUTDS  OUTPUT FORMS=BILLS
```

NAME=name

Specifies a 1 to 60 character name. PSF/6000 can print the name on the header, trailer, or separator pages, if the correct user exit is activated.

Default: None.

Example:

```
//OUTDS  OUTPUT NAME='R. ROPER'
```

NOTIFY=(_node.userid_**)**

Specifies up to 4 userids whom MVS Download is to notify when the data set has been successfully or unsuccessfully transmitted to the AIX system; separate the userids with commas.

MVS Download notifies the userids when the transmission is successful, the data set is held by the system due to an error, or the operator cancels the data set. The notification message is also sent to the SYSLOG data set. This function is available only in certain levels of an MVS/ESA system.

Default: None.

Example:

```
//OUTDS  OUTPUT NOTIFY=(SEATTLE.JOE,SEATTLE.MARY)
```

OUTBIN=_bin_number_

Specifies the number of the output bin.

Default: The default is either the value in the form definition or the value established by the AIX system administrator.

Example:

```
//OUTDS  OUTPUT OUTBIN=2
```

PAGEDEF=_pagedef_name_

Specifies the name of the page definition to format a data set containing line data; specify a 1 to 6 character name. Do not specify the P1 prefix to the name because MVS Download adds P1 to the name specified in this parameter.

The page definition that you specify must be in an AIX directory specified as part of PSF/6000's search path. PSF/6000 can _not_ print data sets that contain S/370 line data or S/370 mixed-mode data with an inline page definition. Before transmitting a data set with an inline page definition, use the AFP Conversion and Indexing Facility (ACIF) to convert it to a MO:DCA-P data stream. Refer to _AFP Conversion and Indexing Facility: Application Programming Guide_ for more information.

You can also specify a page definition in the FCB parameter. If you specify a page definition in both the PAGEDEF and FCB parameters, the page definition specified in the PAGEDEF parameter is used.

Default: If you omit the FCB parameter as well as the PAGEDEF parameter, the default is the page definition name specified during MVS Download configuration. If no default was specified, PSF/6000 uses the default established by the AIX system administrator.

Example: This example specifies P1USER10 as the page definition.

```
//OUTDS  OUTPUT PAGEDEF=USER10
```

PRMODE=SOSI1 | SOSI2 | _aaaaaaaa_

Specifies the processing mode of the data set and whether PSF must perform optional processing of the data.

SOSI1

Specifies that each shift out, shift in code be converted to a blank and a Set Coded Font Local text control.

SOSI2

Specifies that each shift out, shift in code be converted to a Set Coded Font Local text control.

aaaaaaaa

Specifies any string defined in the JES initialization parameters for MVS Download. **LINE** and **PAGE** are examples of PRMODE values that JES uses for job routing information.

Note: MVS Download transmits only the SOSI1 and SOSI2 values to the AIX system.

Default: JES assigns a value of LINE or PAGE.

Example:

```
//OUTDD  OUTPUT PRMODE=SOSI1
```

ROOM=_room_

Specifies a 1 to 60 character room name. PSF/6000 can print the room information on the header, trailer, or separator pages, if the correct user exit is activated.

Default: None.

Example:

```
//OUTDS  OUTPUT ROOM='CONFERENCE ROOM'
```

SEGMENT=_page_count_

Specifies that the output data set is to be segmented into separate data sets, where *page_count* specifies the number of pages to be included in each data set. Each data set is transmitted separately to the AIX system, along with a segment ID, a number to indicate the position of the segment in the original data set.

Use this parameter only with line-mode data; do not use this parameter if you have requested conditional processing in the form definition because conditional processing is not supported across data-set boundaries.

MVS Download transmits the segment ID of each segmented data set to the AIX system. PSF/6000 can print the segment ID on the header, trailer, or separator pages, if the correct user exit is activated.

Note: SEGMENT works only on JES2 Version 4 Release 1.0 and above.

Default: The data set is not segmented.

Example:

```
//DD1  DD SEGMENT=100
```

SYSOUT=(_class,,form_name_**)**

Specifies the class and form name.

class

Specifies a 1 character alphanumeric class.

form_name

Specifies a 1 to 4 character form name.

You can also specify the output class and form name in the CLASS and FORMS parameters of the OUTPUT statement. To specify a form name longer than 4 characters, you *must* use the FORMS parameter of an OUTPUT

statement. See the description of the CLASS and FORMS parameters for more detail about these parameters.

Note: Although this parameter is optional, you must specify either a class, form name, or destination name to direct the output to an AIX system and server.

Defaults: If you do not specify a class on either the OUTPUT or the DD statement, the default class is A. If you do not specify a form name on either the OUTPUT or the DD statement, JES uses an installation default.

Examples: This example specifies class R and form name BILL.

```
//DD1   DD SYSOUT=(R,,BILL)
```

To specify class in an OUTPUT statement instead of the DD statement, code a null value for the class in the SYSOUT parameter, as shown.

```
//OUTDS   OUTPUT CLASS=R
//DD3     DD      SYSOUT=(,),OUTPUT=(*.OUTDS)
```

TITLE=_title_

Specifies a 1 to 60 character description of the output data set. PSF/6000 can print the title on the header, trailer, or separator pages, if the correct user exit is activated.

Default: None.

Example:

```
//OUTDS   OUTPUT TITLE='ANNUAL REPORT'
```

TRC=YES | <u>NO</u>

Specifies whether the print data set contains table reference characters (TRCs). You can also specify TRCs in the DCB parameter of the DD statement.

Default: If you do not specify DCB=OPTCD=J or the TRC parameter, the default is TRC=NO.

Example:

```
//OUTDS   OUTPUT TRC=YES
```

UCS=_font_name_

Specifies the name of one coded font to use for a data set containing line data. Do not include the 2-character prefix of the coded-font name (X0 through XG).

You can specify a font name in either the CHARS parameter or in the UCS parameter. If you specify a font in both parameters, the font on the CHARS parameter is used. If the page definition used to format the data set specifies a font, PSF/6000 ignores the font in the UCS parameter.

Default: If no fonts are specified in the page definition, and if you do not specify either the CHARS or UCS parameter, the default is the font specified during MVS Download configuration. If no default was specified, PSF/6000 uses the default font defined for the printer.

Examples: You can specify the UCS parameter on the DD and OUTPUT statements, as shown.

```
//DD1   DD UCS=GT15
```

```
//OUTDS   OUTPUT UCS=GT15
```

Examples

This section contains examples illustrating tasks specific to MVS Download, including:

- How to transmit an output data set to an AIX system and server
- How to transmit an output data set to multiple AIX systems or servers
- How to specify an application group name for OnDemand

The *Print Services Facility/MVS: Application Programming Guide* contains extensive examples showing how to use JCL to perform different printing tasks. All of these examples apply when printing with PSF/6000, except for the following examples:

- Specifying Whether You Want Error Messages to Be Printed.

  MVS Download does not support the PIMSG JCL parameter, which allows you to suppress PSF error messages and request processing to terminate when a certain number of errors occur. Print commands on an AIX system, by default, print all error messages.

- Printing with Resources from a User Library.

  MVS Download does not support the USERLIB JCL parameter, which allows you to use resources located in a user library on an MVS system. Instead, include these resources inline or arrange with the AIX system administrator to make these resources accessible to the AIX system.

- Specifying JCL Parameters for Microfilm Jobs.

  MVS Download does not support the COMSETUP JCL parameter, which allows you to specify a microfilm setup resource. Due to limitations on the size of file systems, MVS Download does not support transmitting microfilm jobs.

Directing Output to an AIX System and PSF/6000 or OnDemand Server

These examples show how to specify the class, destination, and form name in JCL statements to direct an output data set to a particular AIX system and PSF/6000 or OnDemand server.

Consult your MVS system programmer to determine the appropriate values to specify for the class, destination, and form name in your installation. You may not need to specify all three parameters. For example, by simply specifying a particular class, you could direct the output data set to the MVS Download output writer and also to a particular AIX system and server.

In the first example, assume that the MVS system programmer has defined the following class value:

- Class R is a JES work-selection criterion for the MVS Download output writer.

- Class R is also a routing criterion defined in the routing-control data set. Class R is associated with the address of a particular AIX system and server. See Figure 15 on page 52 for an example of a routing-control data set that defines class R as a routing criterion.

In the second and third examples, assume that the MVS system programmer has defined the following class, destination, and form values:

- Class R is a JES work-selection criterion for the MVS Download output writer.

- Destination AIXDEN and form name PSF6 are routing criteria defined in the routing-control data set. The destination and form name are associated with the address of a particular AIX system and server.

EXAMPLES

1. This example shows how to direct an output data set to an AIX system and server by specifying output class R.

   ```
   //AFPUSERA JOB ...
   //STEP1    EXEC PGM=USERA
   //DD1      DD SYSOUT=R
   ```

2. This example shows how to direct an output data set to an AIX system and server by specifying output class R, destination AIXDEN, and form name PSF6. This example shows how to specify these values on a DD statement.

   ```
   //AFPUSERA JOB ...
   //STEP1    EXEC PGM=USERA
   //DD1      DD SYSOUT=(R,,PSF6),DEST=AIXDEN
   ```

   Note: If the form name is more than 4 characters, you must specify the name on the OUTPUT statement, as shown in the third example.

3. This example shows how to direct an output data set to the same AIX system and server as in the second example. However, this example shows how to specify these values on an OUTPUT statement. Note that the DD statement must refer to the OUTPUT statement. Also, the DD statement must include a null class value when you specify the class on the OUTPUT statement.

   ```
   //AFPUSERA JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT CLASS=R,FORMS=PSF6,DEST=AIXDEN
   //DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
   ```

Directing Output to Multiple AIX Systems or Servers

This example shows how to specify multiple OUTPUT statements to transmit an output data set to different AIX systems or to different servers on one AIX system at the same time.

In this example, assume that the MVS system programmer has defined the following class, destination and form values:

- Class R is a JES work-selection criterion for the MVS Download output writer.

- Destinations AIXDEN, AIXSEAT1, and AIXSEAT2 are routing criteria defined in the routing-control data set. Each destination name is associated with the address of a different AIX system or server.

Note: Consult your MVS system programmer to determine the appropriate values to specify for the class, destination, and form name in your installation.

EXAMPLE

This example shows how to request that MVS Download transmit an output data set three times:

1. The first transmission is to the AIX system and server identified with destination AIXDEN.

2. The second transmission is to the AIX system and server identified with destination AIXSEAT1.

3. The third transmission is to the AIX system and server identified with destination AIXSEAT2.

The OUTPUT parameter on the DD statement references three OUTPUT JCL statements; therefore, MVS Download transmits the data set three times. Because class R is the class for all three transmissions, this example specifies the class in the DD statement. However, because the destination name is different for each transmission, this example specifies the destination on the three OUTPUT statements.

```
//AFPUSERA JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT DEST=AIXDEN
//OUTDS2   OUTPUT DEST=AIXSEAT1
//OUTDS3   OUTPUT DEST=AIXSEAT2
//DD1      DD SYSOUT=(R),OUTPUT=(*.OUTDS1,*.OUTDS2,*.OUTDS3)
```

Specifying an Application Group Name to the OnDemand Server

This example shows how you might pass an application group name to the OnDemand server.

Note: Consult the AIX system administrator to determine in which parameter to pass an option such as the application group name.

In this example, assume that the MVS system programmer has defined the following class value:

- Class R is a JES work-selection criterion for the MVS Download output writer.
- Class R is also a routing criterion defined in the routing-control data set. Class R is associated with the address of an OnDemand server on an AIX system.

Assume that the application group name you want to pass to OnDemand is STUDENTS.

EXAMPLE

This example shows how to pass the application group name in the FORMS parameter.

```
//AFPUSERA JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT FORMS=STUDENTS
//DD1      DD SYSOUT=(R),OUTPUT=(*.OUTDS1)
```

Chapter 3. Configuring MVS Download

This chapter provides a technical overview of MVS Download and describes the tasks the MVS system programmer must perform to configure MVS Download on an MVS system.

The AIX system administrator must configure the AIX system for MVS Download as described in *IBM Print Services Facility for AIX: Print Administration* and *IBM OnDemand: Installation and Configuration Guide*.

Overview

MVS Download consists of a program running on the MVS system and one or more servers on AIX systems. Figure 5 shows an overall picture of how MVS Download operates.
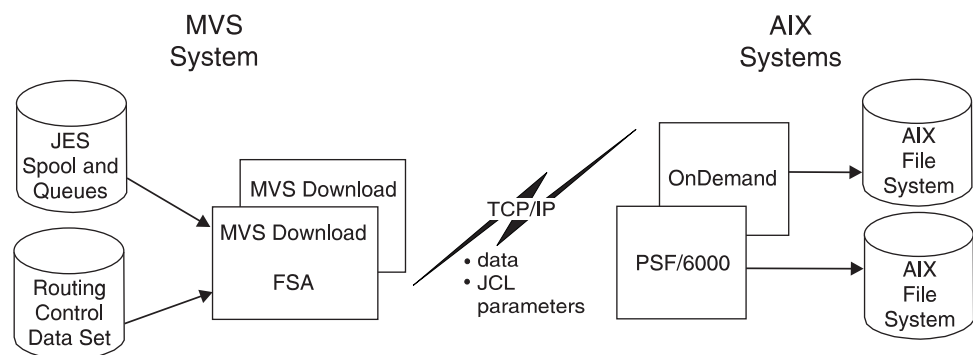
Figure 5. System Overview of MVS Download

On the MVS system, MVS Download operates as an output writer, also called a functional subsystem application (FSA), of the Job Entry Subsystem (JES). The MVS Download FSA selects output data sets from the JES spool according to work-selection criteria you define to JES2 or JES3. Several FSAs can run in one functional subsystem address space (FSS).

Without formatting data for a particular printer, MVS Download transmits output data sets to one of several AIX systems in the TCP/IP network according to routing criteria you define to MVS Download in a routing-control data set. In the routing-control data set, you specify:

* Routing criteria that correspond to JCL parameters of class, destination, and form name
* The address of the AIX system and server to which data sets matching the criteria are to be transmitted

With each data set, MVS Download transmits selected JCL parameters that correspond to PSF/6000 or OnDemand parameters. The job submitter specifies these JCL values; however, you may specify default values for some of the JCL parameters, such as default AFP resource names.

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On the AIX system, either a PSF/6000 or OnDemand server program saves each data set in one of the file systems specified by the AIX system administrator when starting the server program. After saving each data set, the server invokes an installation-defined shell script that performs functions defined by the AIX installation, such as printing or archiving the files. The server passes to the shell script a parameter list containing JCL parameters specified by the MVS job submitter. The shell script can translate these parameters into PSF/6000 printing options or OnDemand options.

PSF/6000 supplies a sample shell script for MVS Download. This shell script prints received files using the printing options specified in the JCL parameters. The AIX system administrator can create other shell scripts.

Refer to *IBM Print Services Facility for AIX: Print Administration* and *IBM OnDemand: Installation and Configuration Guide* for more information about the shell scripts and the parameter lists passed to the shell scripts.

Client/Server Relationship

MVS Download uses the client/server model for communication between the MVS and AIX systems, as shown in Figure 6.

- MVS Download running on the MVS system is the *client*. The client initiates the TCP/IP connection and sends data to the AIX system.

- The PSF/6000 or OnDemand program receiving data on the AIX system is the *server*.
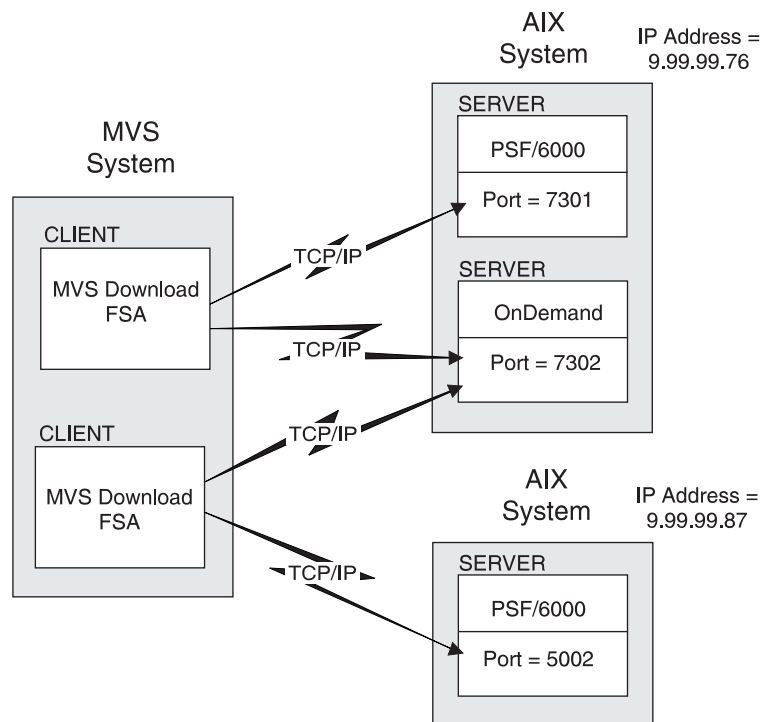

Figure 6. Client/Server Relationship of MVS Download

As shown in Figure 6 on page 26, an MVS Download FSA can transmit data to more than one AIX system, although each FSA can send only one data set at a time. Any one server can receive data from more than one client, again receiving one data set at a time. Multiple servers can run on an AIX system, and servers for both PSF/6000 and OnDemand can run on the same AIX system.

As shown in Figure 6 on page 26, each PSF/6000 or OnDemand server waits for data at a different socket address. The socket address identifies both the Internet-Protocol (IP) address of the AIX system and the port number at which the server waits for data.

MVS Download initiates a TCP/IP connection to the target AIX server when MVS Download has data to transmit and disconnects after receiving confirmation from the server that the data has been completely transmitted. If requested, both the client and server perform checkpointing of data.

If all data is not completely transmitted, MVS Download retries the transmission at the retry interval and for as many times as you have specified in the routing-control data set. If still unsuccessful, MVS Download returns the data set to JES to be held by the system.

Configuration Tasks

The tasks for configuring MVS Download on the MVS system are:

1. Verify software prerequisites and install the MVS Download program.

2. Plan the MVS Download functional subsystem.

3. Define the MVS Download functional subsystem in a JES2 or JES3 environment.

4. Create a startup procedure for each MVS Download functional subsystem.

5. Specify routing-control information to MVS Download.

6. Write an exit routine to pass additional PSF/6000 parameters to AIX servers, if necessary.

7. Update installation accounting programs, if necessary.

8. Update the MVS Program Properties Table, and re-IPL the MVS system.

These tasks are described in the following sections. See Appendix A, "Checklist of MVS Download Configuration Tasks" for a checklist of the configuration tasks.

Verifying Prerequisites and Installing MVS Download

Before you install the MVS Download feature tape, ensure that the MVS system is at or above the following levels:

- MVS/ESA at the levels supported by PSF/MVS. Refer to the *MVS Download Program Directory* for the levels supported.

- MVS TCP/IP Version 3 Release 1.0

- PSF/MVS Version 2 Release 2.0 with the fix for APAR OW13702, which contains required programs for MVS Download.

- Fix for APAR OW13246 in MVS/ESA 4.2.0 and above, which contains the SMF macro to map the file-transfer section of the SMF record type 6. You need to apply the PTF only if you plan to use the information in the MVS Download section for accounting.

Ensure that the AIX applications are at or above the following levels:

- PSF/6000 Version 2 Release 1
- OnDemand for AIX Version 1 Release 1

Refer to the *MVS Download Program Directory* for instructions on installing the MVS Download program.

Planning the MVS Download Functional Subsystem

The MVS Download feature, like the main program of PSF/MVS, operates as a JES functional subsystem. A functional subsystem is an extension of JES, which runs in its own address space. For more information about JES functional subsystems, refer to the appropriate *JES Initialization and Tuning Guide* for your system.

Because MVS Download performs a very different function from the printer-driver function performed by the main PSF/MVS program, MVS Download operates as a separate functional subsystem (FSS), as shown in Figure 7. Even though your installation has already defined one or more FSSs for PSF/MVS, you must define a separate FSS for MVS Download.
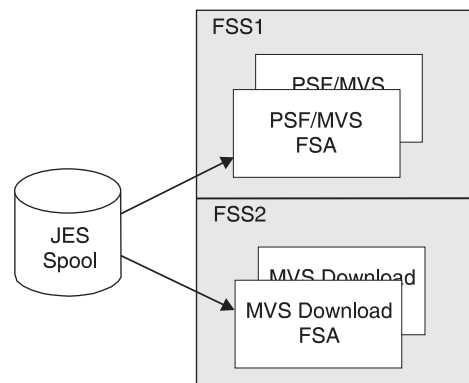

Figure 7. Relationship Between PSF/MVS and MVS Download Functional Subsystems

Within the FSS defined for MVS Download, the MVS Download program runs as a functional subsystem application (FSA), using the support facilities of the FSS to communicate with JES. Several MVS Download FSAs can run in the same FSS.

If you have already defined an FSS and FSA for PSF/MVS, see "Differences Between a PSF/MVS and MVS Download FSS" on page 33. You can modify your existing JES initialization statements and PSF startup procedure to create JES initialization statements for the MVS Download FSS and FSA and a MVS Download startup procedure.

The following sections describe planning decisions to consider before coding the JES2 or JES3 initialization statements and writing a startup procedure:

- How many functional subsystems (FSS) and functional subsystem applications (FSA) to create
- What region size to define for each FSS
- What JES work-selection criteria to specify for each FSA
- What default checkpoint interval to specify for each FSA
- What default printing options to specify for each FSA

Defining Multiple Functional Subsystems

For improved throughput and more efficient use of system resources, you can define more than one FSA within an FSS. You also can define more than one FSS. Use Table 2 on page 30 to determine the maximum number of FSSs and FSAs that are supported.

Table 2. Number of FSSs and FSAs Supported	
Number of FSSs	2000 maximum
Number of FSAs per FSS	64 maximum (see Note)
Note:	

- The actual number of FSAs per FSS may be limited by the amount of storage each MVS Download FSA requires below the 16 megabyte line. See "Selecting a Region Size" on page 30 to determine how much virtual storage size each FSA requires.
- In an MVS/XA system, JES3 supports only 1 FSA per FSS.

Selecting a Region Size

The region-size requirements for each MVS Download FSS depend on:

- Whether the trace option is active
- The number of FSAs supported by the FSS

Table 3 shows the minimum storage required for MVS Download.

Table 3. Minimum Storage Required for FSS and FSAs		
FSA	**Below 16 Megabyte**	**Above 16 Megabyte**
The **first** FSA in an FSS	1M below 16M	11M above 16M
Each **additional** FSA in the FSS	.65M below 16M	.25M above 16M

An installation option that can affect storage requirements is the size of the trace table. The default is 128K per FSA. Refer to *Print Services Facility/MVS: Diagnosis Guide and Reference* for more information on tracing.

You specify the amount of below-the-line storage required by each MVS Download FSA on the EXEC JCL statement of the startup procedure, as described on page 43.

Defining Work-Selection Criteria

You define work-selection criteria for each MVS Download FSA during JES initialization. These criteria determine which output data sets the MVS Download FSA selects from the JES2 or JES3 spool.

JES2 and JES3 allow you to specify numerous work-selection criteria, which correspond to JCL parameters. See the appropriate *JES Initialization and Tuning Guide* and *JES Initialization and Tuning Reference* for your system for information about the possible criteria. Some work-selection criteria that you might consider for data sets to be processed by MVS Download are:

- Output class of the data set
- Form name
- Destination name

You specify the work-selection criteria for each MVS Download FSA on a parameter of a JES initialization statement:

- WS parameter of the JES2 PRT*nnnn* statement
- WS parameter of the JES3 DEVICE statement

Requesting Checkpointing

When requested, MVS Download takes data-set checkpoints at specified intervals during transmission of a data set from the MVS to an AIX system. At these checkpoints, MVS Download requests that both JES and the receiving server record checkpoint data. Checkpointing data enables MVS Download to retransmit the data set to the server from the last checkpoint, if a transmission error occurs.

MVS Download restarts transmission of a data set from a checkpoint on two occasions:

- When a transmission error occurs, and you requested retry in the routing-control data set
- When MVS Download selects a data set that has been previously checkpointed by MVS Download

Selecting a Checkpoint Interval

MVS Download supports checkpointing at intervals of a specified number of seconds. If you are familiar with the PSF/MVS FSA, you know that it supports checkpointing at intervals specified in either seconds or number of pages. Because MVS Download does not transmit data as pages, MVS Download checkpoints in timed intervals only. If you or the job submitter request checkpointing at page intervals, MVS Download ignores the request.

Consider the following impacts to performance when selecting a checkpoint interval as the system default:

- If the interval number is too low, resulting in many checkpoints, performance may be reduced due to the checkpointing overhead.
- If the number of seconds between intervals is too high, retransmission of large amounts of data may reduce performance.

IBM recommends that you request checkpointing as the default to improve performance in the event of transmission errors. A starting interval of 30 seconds is recommended. If you experience very few transmission errors, consider increasing the checkpoint interval.

Specifying the Checkpoint Default

Checkpointing can be requested in two ways:

- Job submitters request checkpointing for an output data set in the CKPTSEC parameter of the OUTPUT JCL statement.
- You request checkpointing as the default for each MVS Download FSA on a parameter of a JES initialization statement:
  - CKPTSEC and CKPTMODE parameters of the JES2 PRT*nnnn* statement
  - CKPNTSEC parameter of the JES3 DEVICE statement

Defining Default Printing Options

With each data set it transmits, MVS Download transmits parameters that are specified by the job submitter on either the DD or OUTPUT JCL statement. You can specify default values for some of the printing options, namely:

- Data-check blocking option
- Font names (up to four)
- Name of the form definition
- Name of the page definition

In some cases, you may not want to define defaults on the MVS system :

- If MVS Download transmits data sets to an OnDemand server, you do not need to specify defaults for printing.

- If MVS Download transmits data sets to a PSF/6000 server, the AIX system administrator may want to specify a default in the shell script executed by the server or in some other manner.

Specifying Defaults in JES2

You may specify defaults for printing options on JES2 initialization statements (PRINTDEF and PRT*nnnn*) and on the PRINTDEV statement of the FSS startup procedure.

To specify *no* defaults in a JES2 environment, code the JES2 and PRINTDEV statements as shown in Table 4.

Table 4. Specifying No Defaults in JES2.			
Option	**PRT***nnnn* **Statement**	**PRINTDEF Statement**	**PRINTDEV Statement**
Data Check Blocking	Not applicable	Not applicable	Omit DATACK parameter
Fonts	UCS=0	Omit NIUCS parameter	Omit CHARS parameter
Form Definition	Not applicable	Not applicable	Omit FORMDEF parameter
Page Definition	Omit FCB parameter	Omit NIFCB parameter	Omit PAGEDEF parameter

Specifying Defaults in JES3

You can specify defaults on JES3 initialization statements (OUTSERV and DEVICE) and on the PRINTDEV statement of the FSS startup procedure.

In a JES3 environment, if you do not specify a default font and a default page definition in a JES3 initialization statement, JES3 sets a system default:

- The default page definition is 6.
- The default font is GS10.

Although a JES3 system always provides a default page definition and font, you have a choice as to whether to specify a default data-check option or form definition. To specify no default data-check option or form definition, simply omit the DATACK and FORMDEF parameters from the PRINTDEV statement in the startup procedure.

Differences Between a PSF/MVS and MVS Download FSS

The functional subsystem for MVS Download is similar to the functional subsystem you may already have defined for PSF/MVS. Thus, you can use similar JES initialization statements to define an MVS Download FSS and FSAs, and your MVS Download startup procedure can be similar to the existing PSF startup procedure. You must give the MVS Download FSS and FSAs different names and make modifications in the areas described below.

JES Work-Selection Criteria: You must specify different JES work-selection criteria for the MVS Download FSA than for the PSF/MVS FSA. For example, if class A is the criterion for the PSF/MVS FSA, specify a different class or a different work-selection criterion, such as destination, for the MVS Download FSA.

Checkpointing: Specify checkpointing by seconds rather than pages because MVS Download only supports checkpointing by seconds:

- In JES2, specify the CKPTSEC parameter instead of CKPTPAGE. Also specify the CKPTMODE=SEC parameter.

- In JES3, specify the CKPNTSEC parameter instead of CKPNTPG.

Printer Options: Several JES parameters allow you to specify printer-specific options. Because these parameters do not apply to an MVS Download FSA, remove the following parameters from the JES2 or JES3 initialization statement.

JES2 PRT*nnnn* **Statement**	**JES3 DEVICE Statement**
BURST | NOBURST	BURST
COPYMARK	COPYMARK
FLASH	FEATURES
MARK | NOMARK	FLASH
NPRO	HEADER
SEP | NOSEP	NPRO
SEPDS | NOSEPDS	STACKER
UNIT	XTYPE
	XUNIT

See "Defining a JES2 Functional Subsystem" on page 34 or "Defining a JES3 Functional Subsystem" on page 38 for the JES parameters that apply when you define an FSS and FSAs for MVS Download.

Printing Defaults: When you define an FSA, you can specify defaults for several printing options. However, to transmit a data set to an AIX system for either printing or archiving, you may not want to specify defaults on the MVS system. See "Defining Default Printing Options" on page 32 for more information.

Also, note that the names of resources, that is, page definitions, form definitions, and fonts, are case-sensitive on the AIX system; however, the resource names specified in JCL statements, JES statements, or in the startup procedure, are all translated to upper-case characters.

Startup Procedure: The startup procedure must specify a different program entry point for MVS Download and include a DD statement for the routing-control data set. The PRINTDEV statement is optional, and many of the parameters on the PRINTDEV statement do not apply. See "PRINTDEV Parameters" on page 44 for the PRINTDEV parameters that do apply.

Defining a JES2 Functional Subsystem

To define a functional subsystem for MVS Download in a JES2 environment, code
these JES2 initialization statements as part of JES2 initialization:

- One FSS(*fss_name*) statement to define each functional subsystem (FSS)
- One PRT*nnnn* statement for each functional subsystem application (FSA) under
  control of the FSS

Sample JES2 Initialization Statements

Figure 8 shows sample JES2 statements for one FSS named DOWNLOAD and
one associated FSA named PRT0001.

```
FSS(DOWNLOAD) PROC=APSWPROK,HASPFSSM=HASPFSSM,AUTOSTOP=YES

PRT0001  CKPTSEC=30,CLASS=R,START=NO,
         FSS=DOWNLOAD,MODE=FSS,PRESELCT=YES,
         PRMODE=(LINE,PAGE,SOSI1,SOSI2),
         TRKCELL=YES,UCS=0,WS=(CL)
```

*Figure 8. Sample JES2 Initialization Statements. These statements are commonly found in
the initialization-deck member of SYS1.PARMLIB. Continuation characters are not shown.*

Note: The example shown in Figure 8 is correct for JES2 Version 4 and above.

The following section describes the JES2 initialization statements shown in
Figure 8, including some additional parameters that you might want to specify for
an MVS Download FSS and FSA.

Note: For detailed descriptions of each of the parameters, refer to *JES2
Initialization and Tuning Reference*.

FSS(fss_name) Statement

The FSS(*fss_name*) initialization statement is optional but recommended. If you
omit it, JES2 generates a default FSS when an FSA is started.

Each FSS must have a unique name, specified as a 1 to 8 character name. In the
example, the FSS name is DOWNLOAD. This FSS name must match the FSS
name in the PRT*nnnn* statement for each associated FSA.

The FSS statement contains the following parameters for MVS Download:

PROC=*procedure_name*
> Specifies the name of the procedure for starting this FSS. This parameter is
> required.

AUTOSTOP=YES | <u>NO</u>
> Specifies whether or not the FSS address space is to be stopped automatically
> if all FSAs under control of the FSS are stopped.
>
> This parameter is optional; if you omit it, the default is NO.

HASPFSSM= <u>HASPFSSM</u>

Specifies the JES load module to be loaded into the FSS address space.

This parameter is optional. For MVS Download, either omit the parameter or specify the default value of HASPFSSM.

PRT*nnnn* Statement

A PRT*nnnn* statement is required to define each FSA. *nnnn* can be from 1 to 4 numeric characters. Each FSA must have a unique name, specified as PRT*nnnn*. In addition to the PRT*nnnn* format, MVS Download accepts the PRINT*nn* and PRINTER*n* formats.

The PRT*nnnn* statement contains the following parameters:

CKPTMODE=<u>PAGE</u> | SEC

Specifies whether checkpointing is to be based on the number of pages (PAGE) or on time (SEC). For MVS Download, specify CKPTMODE=SEC because MVS Download checkpoints only at timed intervals.

This parameter is optional. If you omit CKPTMODE but specify the CKPTSEC parameter, with or without CKPTPAGE, MVS Download checkpoints by time. If you omit the CKPTMODE and the CKPTSEC parameters, MVS Download does *not* checkpoint unless requested by the job submitter.

CKPTSEC=*nnnnn* **| <u>0</u>**

Specifies the number of seconds to elapse between checkpoints of a data set being transmitting to the AIX system. The value must be between 0 and 32767. This value does *not* cause checkpointing during printing on the AIX system. The recommended starting value is 30 seconds.

This parameter is optional. If you omit it, the default is 0, meaning that MVS Download does not checkpoint data sets unless the job submitter specifies a checkpoint value on the OUTPUT JCL statement for the data set.

CLASS | QUEUE=(*classes***)**

Specifies the output classes processed by this FSA. List all classes to be selected by this FSA; do not separate each class with a comma. If you designate CL or Q as a work-selection criterion on the WS parameter, the FSA selects data sets whose class matches one of the values specified here.

This parameter is optional. If you omit it and do not specify CL or Q as a work-selection criterion, this FSA selects data sets with any output class.

FCB=*pagedef_name*

Specifies the 1 to 4 character name of a default page definition. Do *not* code the P1 prefix of the page definition; MVS Download adds the P1 prefix when passing the name of the page definition to the AIX system. This name is translated to upper case.

This parameter is optional. If you omit it, JES2 determines the default page definition from the NIFCB parameter of the JES2 PRINTDEF statement. If no default is specified on the PRINTDEF statement, the default is that specified on the PRINTDEV statement in the FSS startup procedure.

FORMS=(_form_names_**)**

Specifies the 1 to 8 character form names processed by this FSA. List from 1 to 8 different form names that can be selected by this FSA; separate each form name with a comma.

If you designate F as a work-selection criterion on the WS parameter, the FSA selects data sets whose form name matches one of the values specified here.

This parameter is optional. If you omit it and do not specify F as a work-selection criterion, this FSA selects data sets with any form name.

FSS=_fss_name_

Specifies the name of the FSS associated with this FSA. This parameter is required.

MODE=FSS

Specifies that the FSA is managed by an FSS. This parameter is optional. The default is FSS if you code the FSS parameter.

PRESELCT=<u>YES</u> **| NO**

Specifies whether output data sets are preselected for this FSA. This parameter is optional. If you omit it, the default is YES.

PRMODE=(_processing_modes_**)**

Specifies the data-set processing modes supported by this FSA. Separate the modes with commas. List all PRMODE values to be accepted by this FSA, because the FSA will process only data sets with a mode that matches one of the values specified in this parameter:

LINE	Specifies that data sets containing line data are selected
PAGE	Specifies that data sets containing MO:DCA-P data are selected
SOSI_n_	Specifies that data sets with the shift-out/shift-in processing mode of SOSI1 or SOSI2 for double-byte fonts are selected
installation-defined	Specifies any mode that your installation has defined.

Specify both LINE and PAGE for FSAs that are to transmit both types of data sets.

This parameter is optional. If you omit it, the default is LINE.

ROUTECDE=(_destinations_**)**

Specifies the destinations processed by this FSA. List from 1 to 4 different destination names that can be selected by this FSA; separate each destination name with a comma. If you designate R as a work-selection criterion on the WS parameter, the FSA selects data sets whose destination matches one of the values specified here.

This parameter is optional. If you omit it and do not specify R as a work-selection criterion, this FSA selects data sets with any destination.

| **START=**<u>YES</u> **| NO**

| Specifies whether or not JES2 is to automatically start this FSA whenever JES2 starts. If you specify START=NO, the operator must start the FSA.

| This parameter is optional. If you omit it, START=YES is the default.

TRKCELL=YES | <u>NO</u>
Specifies whether track-cell despooling is to be used with this FSA. You specify the size of the track cell, in terms of buffers, in the TRKCELL parameter of the JES2 SPOOLDEF statement. For improved performance, IBM recommends that you specify TRKCELL=YES on this statement and TRKCELL=5 on the JES2 SPOOLDEF statement.

This parameter is optional. If you omit it, the default is NO.

UCS=_font_name_ **| 0**
Specifies the 1 to 4 character default font name. 0 specifies that no default font is passed to MVS Download.

This parameter is optional. If you omit it, JES2 determines the default font from the NIUCS parameter of the PRINTDEF statement or, if NIUCS is not specified, from the PRINTDEV statement of the startup procedure.

WS=(_work_selection_criteria_**)**
Specifies the work-selection criteria for this FSA; separate each value with a comma. Refer to the _JES2 Initialization and Tuning Reference_ for the valid values and defaults. For an MVS Download FSA, consider the following values:

CL | Q   Specifies that the FSA selects only those data sets with the same class as specified in the CLASS or QUEUE parameter of this statement.

R   Specifies that the FSA selects only those data sets with the same destination as specified in the ROUTECDE parameter of this statement.

F   Specifies that the FSA selects only those data sets with the same form name as specified in the FORMS parameter of this statement.

This parameter is optional but recommended. If you omit it, the FSA selects output data sets for processing according to default work-selection criteria.

Defining a JES3 Functional Subsystem

To define a functional subsystem for MVS Download in a JES3 environment, code these JES3 initialization statements as part of the JES3 initialization processing for the MVS system:

- One FSSDEF statement to define each functional subsystem (FSS)
- One DEVICE statement to define each functional subsystem application (FSA) under control of the FSS

Sample JES3 Initialization Statements

Figure 9 shows sample JES3 statements for one FSS named DOWNLOAD and one associated FSA named PRT0001.

```
FSSDEF,FSSNAME=DOWNLOAD,PNAME=APSWPROK,TYPE=WTR

DEVICE,CARRIAGE=(YES,6),CHARS=(YES,GT12),
       CKPNTSEC=30,DTYPE=PRTAFP1,
       FSSNAME=DOWNLOAD,
       JNAME=PRT0001,JUNIT=(,SYS1,UR,ON),
       MODE=FSS,PM=(LINE,PAGE,SOSI1,SOSI2),
       WC=(R),WS=(CL)
```

*Figure 9. Sample JES3 Initialization Statements. These statements are commonly found in
the initialization-deck member of SYS1.PARMLIB. Continuation characters are not shown.*

The following section describes the JES3 initialization statements shown in Figure 9, including some additional parameters that you might want to specify to define an MVS Download functional subsystem.

Note: For detailed descriptions of each of the parameters, refer to *JES3 Initialization and Tuning Reference.*

FSSDEF Statement

The FSSDEF initialization statement is optional but recommended. If you omit it, JES3 generates a default FSS when an FSA is started. The FSSDEF statement contains the following parameters for MVS Download:

FSSNAME=*fss_name*
> Specifies the name of this FSS. Each FSS must have a unique 1 to 8 character name. This FSS name must match the FSS name in the DEVICE statement for each associated FSA.
>
> This parameter is required.

MSGDEST (*dest_class* **| JES)**
> Specifies the console destination class for messages concerning this FSS. This parameter is optional; if you omit it, the default is JES.

PNAME=*procedure_name*
> Specifies the name of the procedure for starting this FSS.

SYSTEM=*system_name*
> Specifies the JES3 processor on which the FSS will run. This parameter is optional. JES determines the default from the DEVICE statement.

TERM=YES | <u>NO</u>

YES specifies that the FSS will terminate if the JES3 global address space is terminated by a *RETURN or *DUMP operator command. This parameter is optional; if you omit it, the default is NO.

TYPE=WTR

Specifies that the FSS is an output writer. This parameter is required.

DEVICE Statement

A DEVICE statement is required to define each FSA. The DEVICE statement contains the following parameters:

CARRIAGE=(<u>YES</u> | NO,*pagedef_name***)**

Specifies the JES default page definition.

YES	Specifies that the page definition can be changed during writer execution.
NO	Specifies that the page definition cannot be changed during writer execution.
pagedef_name	Specifies the 1 to 4 character name of the page definition be used as a default. Do *not* code the P1 prefix of the page definition; MVS Download adds the P1 prefix when passing the page definition name to the AIX system.

This parameter is optional. If you omit it, JES3 determines the default page definitions from the CARRIAGE parameter of the JES3 OUTSERV initialization statement. If you omit the CARRIAGE parameter in the OUTSERV statement, the default is 6, that is, page definition P16.

CHARS=(YES | NO,*font_name***)**

Specifies a 1 to 4 character default font name.

This parameter is optional. If you omit it, JES3 determines the default font from the CHARS parameter of the JES3 OUTSERV initialization statement. If you omit the CHARS parameter of the OUTSERV statement, the default is GS10.

CKPNTSEC=*nnnnn*

Specifies the number of seconds to elapse between checkpoints of a data set being transmitting to the AIX system. The value must be between 1 and 32 767. This value does *not* cause checkpointing during printing on the AIX system. The recommended starting value is 30 seconds.

This parameter is optional; if not specified, MVS Download does not checkpoint data sets unless the job submitter specifies a checkpoint value on the OUTPUT JCL statement for the data set.

DGROUP=*destination_name*

Specifies a 1 to 8 character destination processed by this FSA. If you designate destination as a work-selection criterion on the WS parameter, this FSA selects data sets that match the value specified here.

This parameter is optional. Specify this parameter only if you specify destination as a work-selection criteria on the WS parameter.

DTYPE=PRTAFP1
Specify PRTAFP1 as the device type for an MVS Download FSA. This parameter is required.

DYNAMIC=YES | <u>NO</u>
Specifies whether JES3 is to start and stop this FSA dynamically.

YES Specifies that JES3 is to start this FSA whenever work is available for it. JES3 stops this FSA, and deactivates the address space when no work is available.

NO Specifies that the operator is to start and stop this FSA. Specify NO to keep the address space active between transmission of data sets.

This parameter is optional. If you omit it, the default is NO.

FORMS=(<u>YES</u> | NO,*form_name***)**
Specifies the form name processed by this FSA.

NO Specifies that the form name cannot be changed during writer execution.

YES Specifies that the form name can be changed during writer execution.

form_name Specifies the 1 to 8 character name of the form to be processed by this FSA. If you designate FORMS as a work-selection criterion on the WS parameter, the FSA selects data sets whose form name matches the value specified here.

This parameter is optional. If you omit it and do not specify forms as a work-selection criteria, this FSA selects data sets with any form name.

FSSNAME=*fss_name*
Specifies a unique FSS associated with this FSA. This value must match the value coded for the FSSNAME parameter in the corresponding FSSDEF statement.

This parameter is optional. If you omit it, the default is the name of this FSA, as specified in the JNAME parameter.

JNAME=*fsa_name*
Specifies the unique 1 to 8 character name of this FSA. This parameter is required.

JUNIT=(*device address,main,destination_class,***<u>ON</u> | OFF)**
Specifies:

device_address For MVS Download, do *not* specify a device address.

main The name of the processor to which the device is attached.

destination_class A destination class for messages about the FSA.

<u>ON</u> | OFF Specifies whether the device is initially online or offline.

This parameter is required.

MODE=FSS
Specifies that this FSA is managed by an FSS. This parameter is required.

PM=(_processing_modes_**)**

Specifies the data-set processing modes supported by this FSA. Separate the modes with commas. List all PRMODE values to be accepted by this FSA because the FSA will process only data sets with a mode that matches one of the values specified in this parameter:

LINE	Specifies that line-format data sets are selected
PAGE	Specifies that composed-page data sets are selected
SOSI_n_	Specifies that data sets with the shift-out/shift-in processing mode of SOSI1 or SOSI2 for double-byte fonts are selected
installation-defined	Specifies any mode that your installation has defined.

This parameter is optional. If you omit it, the default is LINE,PAGE.

WC=(_classes_**)**

Specifies the output classes processed by this FSA. List all classes to be selected by this FSA; separate each class with a comma. If you designate CLASS as a work-selection criterion on the WS parameter, this FSA selects data sets that match the values specified here.

This parameter is optional. If you omit it, this FSA selects data sets with any output class.

WS=(_work_selection_criteria_**)**

Specifies the work-selection criteria for this FSA; separate each value with a comma. Refer to the _JES3 Initialization and Tuning Reference_ for the valid values and the default.

For an MVS Download FSA, consider the following values:

CL	Specifies that the FSA selects only those data sets with the same class as specified in the WC parameter of this statement.
D	Specifies that the FSA selects only those data sets with the same destination as in the DGROUP parameter of this statement.
F	Specifies that the FSA selects only those data sets with the same forms name as specified in the FORMS parameter of this statement.

This parameter is optional but recommended. If you omit it, the FSA selects output data sets for processing according to default work-selection criteria.

Creating an MVS Download Startup Procedure

Before starting an MVS Download FSS, you must create a cataloged startup procedure. The startup procedure identifies:

- Program name, region size, time-out value, and tracing parameters.

- Location of the routing-control data set. You can specify a different routing-control data set for each FSS.

- Defaults for printing with PSF/6000, such as page and form definitions, fonts, and data-check option. You can define different defaults for each FSA. See "Defining Default Printing Options" on page 32 for more information on defining defaults to JES.

Include the startup procedure in a library known to either JES2 or JES3. Refer to the appropriate *JES Initialization and Tuning Guide* for your installation for more information on procedure libraries.

Sample Startup Procedure

Figure 10 shows a sample MVS Download startup procedure for an FSS with one FSA. The same sample procedure is provided in SYS1.SAMPLIB.

The JES2 initialization statements for this FSS are shown in Figure 8 on page 34; the JES3 initialization statements are shown in Figure 9 on page 38. The startup procedure name is APSWPROK and the FSA name is PRT0001.

```
//APSWPROK PROC
//*** THIS STARTUP PROCEDURE DEFINES THE JCL AND PRINTDEV **********
//*** STATEMENTS TO START 1 MVS DOWNLOAD FSS WITH 1 ASSOCIATED FSA **
//STEP01   EXEC PGM=APSKAFPD,REGION=4096K,TIME=NOLIMIT
//ROUTFILE DD DSN=SYS1.SAMPLIB(APSWRCF),DISP=SHR
//******** THE FOLLOWING STATEMENTS ARE OPTIONAL. *******************
//PRT0001  CNTL
//PRT0001  PRINTDEV CHARS=(GF10,
//         GS10,TU10,GU10),        /* DEFAULT JES2 FONT SET      */
//         DATACK=UNBLOCK,         /* DEFAULT DATA CHECK         */
//         FORMDEF=A10110,         /* DEFAULT FORM DEFINITION    */
//         PAGEDEF=V06483,         /* DEFAULT JES2 PAGE DEFINITION */
//         TRACE=NO                /* NO INTERNAL TRACE          */
//PRT0001  ENDCNTL
```

Figure 10. Sample Startup Procedure

Notes:

1. This sample JCL assumes that the MVS Download programs are in a data set that is part of the standard MVS search order; if this is not the case, include a STEPLIB statement to identify the data set.

2. To use a Print Parameters (APSUX15) exit routine, include a STEPLIB statement to identify the data set containing the exit, unless the data set is part of the standard MVS search order.

JCL Statements

This section describes the statements and parameters shown in Figure 10 on page 42.

proc_name **PROC**

Names a catalogued procedure. *proc_name* must match the procedure name in a JES initialization statement for this FSA:

- PROC parameter of the JES2 FSS(*fss_name*) statement
- PNAME parameter of the JES3 FSSDEF statement

label **EXEC**

PGM=APSKAFPD,REGION=*size***,TIME=NOLIMIT,[,PARM=(***trace_parms***)]**

Invokes the MVS Download program. This statement is required.

PGM=APSKAFPD	Specifies the MVS Download program entry point.
REGION=*size*	Specifies the amount of below-the-line storage required by this FSS. See "Selecting a Region Size" on page 30 for more information.
TIME=NOLIMIT	Specifies TIME=NOLIMIT to prevent TIMEOUT abends.
PARM=(*trace_parms***)**	Specifies tracing values. See "Using the PSF/MVS Trace Facility with MVS Download" on page 63 for information about these values.

ROUTFILE DD DSN=*data_set_name***,DISP=SHR**

Specifies the routing-control data set that MVS Download uses to transmit data sets to an AIX system and server. Specify DISP=SHR to allow more than one FSS to access this data set.

This DD statement is required.

fsa_name **CNTL**

Specifies the beginning of optional program control statements for an MVS Download FSA. Repeat the CNTL, PRINTDEV, and ENDCNTL statements for each FSA under control of the FSS.

fsa_name	Specifies the FSA name. The FSA name on the CNTL statement must match the label on the subsequent PRINTDEV and ENDCNTL statements. The name must match the FSA name specified in a parameter of the JES initialization statement for this FSA:

- The name of the JES2 PRT*nnnn* statement
- The JNAME parameter of the JES3 DEVICE statement

This statement is optional. Specify CNTL, PRINTDEV, and ENDCNTL statements only if you want to specify PRINTDEV parameters.

fsa_name **PRINTDEV** *parameters*

Specifies default printing parameters, turns tracing on or off, and requests a conditional dump.

fsa_name	Specifies the FSA name.
parameters	See "PRINTDEV Parameters" on page 44 for a description of the PRINTDEV parameters.

This statement is optional.

fsa_name **ENDCNTL**
Specifies the end of the program control statements for the FSA.

fsa_name   Specifies the FSA name.

This statement is optional.

PRINTDEV Parameters

PRINTDEV parameters allow you to define default printing options for all data sets transmitted by an FSA. You can also set internal PSF tracing on or off and request a conditional dump. The PRINTDEV parameters are:

CHARS=(*font_names***)**
Specifies up to four default font names to be used if JES has not already determined a default font during initialization. A font name must be from 1 to 4 characters; separate each font name with a comma. The font names are translated to upper case.

This parameter is optional in JES2. If you omit it in JES2, MVS Download does not transmit a default font to the AIX system unless you have specified another default font on JES2 initialization statements.

This parameter is ignored in a JES3 environment, because JES3 always sets a default font during JES initialization.

Example:

```
CHARS=(TN15,GT15,GF15,GS15)
```

DATACK=BLOCK | UNBLOCK | BLKCHAR | BLKPOS
Specifies the data-check exceptions the printer reports to PSF/6000.

BLOCK	Specifies that the printer will not report data-check exceptions.
UNBLOCK	Specifies that the printer will report all data-check exceptions.
BLKCHAR	Specifies that the printer will not report invalid-character exceptions. (The printer will report only print-positioning exceptions.)
BLKPOS	Specifies that the printer will not report print-positioning exceptions. (The printer will report only invalid-character exceptions.)

This parameter is optional. If you omit it, MVS Download does not transmit a default data-check option to the AIX system.

Example:

```
DATACK=UNBLOCK
```

DUMP=(*reason_code* **| ABD***0nnnn,msgid,count***)**
> Specifies a conditional dump of the FSS address space when a reason code, restartable abend, or message occurs. Refer to *Print Services Facility/MVS: Diagnosis Guide and Reference* for more information about this parameter.
>
> This is an optional parameter. If you omit it, no conditional dump occurs.
>
> **Example**:
>
> DUMP=(,APS994I,1)

FORMDEF=*formdef_name*
> Specifies a default form definition. Omit the F1 prefix from the name of the form definition. The name of the form definition is translated to upper case.
>
> This is an optional parameter. If you omit it, MVS Download does not transmit the name of a default form definition to the AIX system.
>
> **Example**:
>
> FORMDEF=A10110

PAGEDEF=*pagedef_name*
> Specifies a default page definition to be used if JES has not already determined a default page definition during JES initialization. Omit the P1 prefix from the name of the page definition. The name of the page definition is translated to upper case.
>
> This is an optional parameter. If you omit it in JES2, MVS Download does not transmit the name of a default page definition to the AIX system, unless you specified another default page definition during JES2 initialization.
>
> This parameter is ignored in a JES3 environment, because JES3 always sets a default page definition during JES3 initialization.
>
> **Example**:
>
> PAGEDEF=L06060

TRACE=YES | NO
> Specifies whether MVS Download is to record internal trace data. Refer to *Print Services Facility/MVS: Diagnosis Guide and Reference* for more information on using traces.
>
> This is an optional parameter. If you omit it, the default is NO.
>
> **Example**:
>
> TRACE=YES

Specifying Routing Information

MVS Download uses installation-defined routing criteria to determine a target AIX system and server for each data set. You define routing criteria and the associated AIX systems and servers in a routing-control data set accessible to MVS Download on the MVS system.

MVS Download transmits an output data set to only one AIX server. To transmit an output data set to more than one AIX system or server, the job submitter must specify multiple OUTPUT JCL statements, thereby creating multiple output data sets. On each OUTPUT statement, the job submitter must specify different routing criteria, corresponding to the different target servers.

Defining Routing Criteria

The routing criteria you specify correspond to the following JCL parameters, which the job submitter specifies on either the DD or OUTPUT statements:

- CLASS - output class
- DEST - destination
- FORMS - form name

You can specify these routing criteria individually or as a set. For example, suppose you want to route data sets to different MVS Download servers on different AIX systems. You might define class and destination values as shown in Table 5:

Table 5. Sample Routing Criteria		
Criteria	**AIX System**	**Server**
CLASS=1 and DEST=PSF6000	AIX system 1	PSF/6000 server
CLASS=1 and DEST=ONDEMAND	AIX system 1	OnDemand server
CLASS=2 and DEST=PSF6000	AIX system 2	PSF/6000 server
CLASS=2 and DEST=ONDEMAND	AIX system 2	OnDemand server

The class and destination values shown are only examples. You might want to define simple routing criteria that match the JCL values already specified by the job submitters. For example, if data sets to be transmitted to a particular server are submitted with a unique output class, specify that output class as the routing criterion for that server.

Defining Socket Addresses

You identify each target MVS Download server by the socket address at which the server waits for data. The socket address identifies both:

- The internet address (IP address) of the target AIX host
- The port number through which the target server communicates with TCP/IP

The AIX administrator assigns the socket address, using port numbers that are not reserved or used by other applications on the AIX system. The valid range of port numbers is: 5001 through 64000. However, avoid 5001, 8251, and 8253, which PSF/6000 uses for other purposes.

MVS Download running on the MVS system and each PSF/6000 or OnDemand server must use the *same* port number when communicating with each other. The

PSF/6000 or OnDemand user specifies the matching port number of the server when starting the AIX server programs. Refer to *IBM OnDemand: Installation and Configuration Guide* and *IBM Print Services Facility for AIX: Print Administration* for information about the command to start the servers to receive data from MVS Download.

Allocating the Routing-Control Data Set

If you have defined more than one MVS Download functional subsystem (FSS), you can create a different routing-control data set for each FSS. You identify the routing-control data set when you start each FSS.

The routing-control data set is a sequential file with:

- Record format (RECFM) of fixed block
- Logical record length (LRECL) of 80

The name of the DD statement identifying the data set must be ROUTFILE. See the description of the ROUTFILE DD statement on page 43.

Sample Routing-Control Data Set

SYS1.SAMPLIB contains a basic routing-control data set in member APSWRCF. Figure 11 shows this routing-control data set.

```
DEST=destid,                  /* Matching criterion - destination
CLASS=q,                      /* Matching criterion - class
IPADDR=nn.nn.nn.nn,           /* Target IP address
PORTNUM=nnnn;                 /* Target port number
```

Figure 11. Routing-Control Data Set in SYS1.SAMPLIB

Figure 12 shows a sample routing-control data set with two routing statements and optional parameters. The values shown are for example only and are not recommended values.

```
/******** Name of the TCP/IP Address Space ****************************
TCPNAME=TCPIP;
/******** Routing Criteria #1 ****************************************
CLASS=QR,               /* All data sets with CLASS of Q or R
DEST=PSF6000,           /* and with destination PSF6000
IPADDR=9.99.201.35,     /* Transmit to AIX system at this address
PORTNUM=5002,           /* Transmit to the server at this port number
RETRYNUM=3,             /* Retry 3 times if transmission fails
RETRYINTV=600;          /* Wait 600 seconds between retries
/******** Routing Criteria #2 ****************************************
CLASS=QR,               /* All data sets with CLASS of Q or R
FORMS=BILLS,            /* and with form name BILLS
     RECEIPTS,          /* or form name RECEIPTS
IPADDR=9.99.201.35,     /* Transmit to the AIX system at this address
PORTNUM=7302,           /* Transmit to the server at this port number
RETRYNUM=3,             /* Retry 3 times if transmission fails
RETRYINTV=600;          /* Wait 600 seconds between retries
```

Figure 12. Sample Routing-Control Data Set

Routing Control Statements

You code two types of control statements in the routing-control data set:

- One TCP/IP statement. The TCP/IP statement identifies the name of the TCP/IP address space in the MVS system.

- Multiple routing statements. Each routing statement associates a set of routing criteria with the socket address of a target AIX system and server.

  Usually, you would define one routing statement for each target server; however, if you want to route data sets with varying combinations of criteria to the same server, you can code more than one statement per server.

The TCP/IP statement contains one parameter:

TCPNAME=_tcpip_name_**;**
 Specifies the 1 to 8 character job-name of the TCP/IP address space. Usually the job-name is TCPIP, but it may have been changed by your installation.

 This statement is optional. If you omit it, the default is TCPIP.

Figure 13 summarizes the parameters of a routing statement.

 [CLASS=_classes_**]**
 [DEST=_destination_names_**]**
 [FORMS=_form_names_**]**
 IPADDR=_host_address_
 PORTNUM=_port_number_
 [RETRYINTV=_retry_interval_ **| 0]**
 [RETRYNUM=_number_of_retries_ **| 0]**
 [SEND_REC_LENGTH=YES | NO]

Figure 13. Parameters of the Routing Statement

The parameters of the routing statement are:

CLASS=_classes_
 Specifies up to 8 class values. Each class is 1 alphanumeric character. Do _not_ separate the class values by commas. MVS Download compares each value specified to the value on the CLASS parameter of the DD or OUTPUT JCL statement.

 This parameter is optional; however, if you do not specify CLASS, you must specify either DEST or FORMS, or both. If you omit CLASS, MVS Download ignores the output class specified on the DD or OUTPUT JCL statement.

 Example:

 ```
 CLASS=QR
 ```

DEST=_destination _names_
 Specifies up to 8 destination names, separated by commas. Each destination name is 1 to 8 characters. MVS Download compares each value specified to the value on the DEST parameter of the DD or OUTPUT JCL statement.

 This parameter is optional; however, if you do not specify DEST, you must specify either CLASS or FORMS, or both. If you omit DEST, MVS Download ignores the destination specified on the DD or OUTPUT JCL statement.

Example:

```
DEST=AIX1,AIX2
```

FORMS=_form_names_

Specifies up to 8 form names, separated by commas. Each form name is 1 to 8 alphanumeric characters. MVS Download compares each value specified to the value on the FORMS parameter of the DD or OUTPUT JCL statement.

This parameter is optional; however, if you do not specify FORMS, you must specify either CLASS or DEST, or both. If you omit FORMS, MVS Download ignores the form name specified on the DD or OUTPUT JCL statements.

Example:

```
FORMS=BILLS,RECEIPTS
```

IPADDR=_host_address_

Specifies the IP address of the target AIX system. The address is in dotted-decimal notation, with the format: _nnn.nnn.nnn.nnn_

This parameter is required.

Example:

```
IPADDR=20.97.8.201
```

PORTNUM=_port_number_

Specifies the port number of the target server on the AIX system. This port number must not be used by other applications in the AIX system and must match the port number specified on the command used to start the AIX server. The valid range of port numbers is: 5001 through 64000. Avoid 5001, 8251, and 8253, which PSF/6000 uses for other purposes.

This parameter is required.

Example:

```
PORTNUM=6001
```

RETRYINTV=_retry_interval_ **| 0**

Specifies the number of seconds between retries. Specify a number between 0 and 99 999.

This parameter is optional. If you omit it, the default is 0, meaning that MVS Download retries the transmission immediately.

Example:

```
RETRYINTV=600
```

RETRYNUM=_number_of_retries_ **| 0**

Specifies the maximum number of times MVS Download is to retry a failed transmission to the AIX system. Specify a number between 0 and 999. If, after the specified number of retries, the transmission is still unsuccessful, MVS Download releases the data set to JES to be held by the system.

This parameter is optional. If you omit it, the default is 0, meaning that MVS Download does not retry a failed transmission.

Example:

```
RETRYNUM=3
```

| **SEND_REC_LENGTH=<u>YES</u> | NO**
| Specifies whether or not each record is to be prefixed with a length field.

| Specify YES if the target server is a PSF/6000 server. Specify NO *only* if MO:DCA-P documents are being transmitted to an OnDemand server, because MO:DCA-P records already contain a record length. The AFP Conversion and Indexing Facility (ACIF), for example, creates MO:DCA-P documents. Specifying NO may improve performance for OnDemand applications.

| This parameter is optional. If you omit it, the default is YES.

| **Example**:

| SEND_REC_LENGTH=NO

Note: If you specify more than one of the three routing criteria (that is, CLASS, DEST, or FORM) on one routing statement, data sets must match *all* of the specified criteria to be routed to the associated server.

Syntax Rules

Follow these rules when coding routing-control statements:

- Code all parameters in uppercase, including the parameter values.

- Code each parameter on a separate line.

- End each parameter with a comma, unless the parameter is the last in the statement.

- End the last parameter of a routing statement with a semi-colon.

- Do not include blanks in a statement, except for leading and trailing blanks on a line. For example, do not include blanks before or after an equal sign, or before a comma or a semi-colon,

- Begin each comment with: /*

- Comments do not need to end with */

- Code a comment on a separate line or after the parameter.

Carefully review the values you specify. MVS Download checks the parameter names for validity, but does not check the validity of the values specified.

Hierarchy of Statements

A data set to be routed might meet the routing criteria of several control statements in the routing-control data set. In this event, MVS Download selects the routing-control statement to use according to the following hierarchy:

1. The first statement with matching DEST, CLASS, and FORMS values.

2. The first statement with matching DEST and CLASS, but with no FORMS parameter specified.

3. The first statement with matching DEST and FORMS, but with no CLASS parameter specified.

4. The first statement with matching CLASS and FORMS, but with no DEST parameter specified.

5. The first statement with matching DEST, but with no CLASS or FORMS parameter specified.

6. The first statement with matching CLASS, but with no DEST or FORMS parameter specified.

7. The first statement with matching FORMS, but with no DEST or CLASS parameter specified.

Figure 14 illustrates the hierarchy of control statements.

```
/**** Route data sets with destination PSF01 or PSF02 *************
DEST=PSF01,PSF02,      /* Data sets with destination PSF01 or PSF02
CLASS=Q,               /* and class Q
IPADDR=1.2.3.4,        /* Route to AIX system with this IP address
PORTNUM=5555;          /* Route to server at this port number
/**** Route data sets with any destination ************************
CLASS=Q,               /* Data sets with class Q
IPADDR=5.6.7.8,        /* Route to AIX system with this IP address
PORTNUM=7777;          /* Route to server at this port number
```

Figure 14. Sample Routing-Control Data Set. This example illustrates the hierarchy of control statements.

As seen in Figure 14, MVS Download first uses routing statements with the most criteria:

- If the job submitter specifies destination PSF01 or PSF02 for a data set in class Q, MVS Download transmits the data set to the IP address and port number in the first statement.

  A data set with destination PSF01 or PSF02 and class Q also satisfies the criteria in the second routing statement; however, MVS Download uses the first routing statement because the first statement specifies more matching criteria.

- If the job submitter specifies a destination other than PSF01 or PSF02 or does *not* specify a destination for a data set in class Q, MVS Download transmits the data set to the IP address and port number in the second statement.

Testing the Routing-Control Data Set

After you have created the routing-control data set, start one MVS Download FSA to check the parameter names. The MVS Download FSA checks the parameter names during initialization and sends error messages to the JES console. To check the IP addresses and port numbers, transmit at least one data set to each server.

Figure 15 on page 52 shows a sample routing-control data set and JCL for a job that uses the IEBGENER utility to create an output data set. The SYSUT2 DD statement in the example specifies output class R to transmit the output data set to the AIX system whose address is specified in the routing-control data set. This example assumes that class R is also defined as a JES work-selection criterion for the MVS Download output writer.

```
/**** Routing-Control Data Set for MVS Download *******************
TCPNAME=TCPIP;
/**** Route Data Sets with Class R To AIX System ******************
CLASS=R,                /* All data sets with class R
IPADDR=9.99.12.30,      /* Transmit to AIX system with this IP address
PORTNUM=5002,           /* Transmit to server at this port number
RETRYNUM=3,             /* Retry 3 times if transmission fails
RETRYINTV=600;          /* Wait 600 seconds between retries
/**** End of Routing-Control Data Set ****************************

//TEST     JOB ...
//STEP1    EXEC  PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSIN    DD DUMMY
//SYSUT2   DD SYSOUT=R
//SYSUT1   DD *
This is a test of the MVS Download routing-control data set.
```

Figure 15. Routing-Control Data Set and JCL to Transmit a Data Set to an AIX System

Modifying the Routing-Control Data Set

You can modify the contents of the routing-control data set while MVS Download
FSAs are running. However, to use the modified routing-control data set, you must
stop the MVS Download FSS and restart each FSA under its control. See
Chapter 4, "Operating MVS Download" for information about how to stop the MVS
Download FSS and restart the FSAs.

Writing an Installation Exit

This section contains product-sensitive programming-interface information.

MVS Download provides a Print Parameters exit (APSUX15), which you can use to transmit additional job information to PSF/6000 servers on AIX systems. MVS Download transmits the information provided by the exit in the -opa parameter, which corresponds to the PSF/6000 *passthru* parameter.

MVS Download calls the Print Parameters (APSUX15) exit once for each data set processed. Upon return from the exit, MVS Download appends the string containing additional job information to the -opa parameter for transmission to the AIX system.

If no additional job information is provided in an exit, MVS Download transmits only the following fields in the -opa parameter: class, destination, forms, and segmentid (if the data set is segmented). The alternate PSF/6000 exit programs support these passthru fields.

To receive additional fields in the -opa parameter from MVS Download, the PSF/6000 administrator might need to write a PSF/6000 user exit program. Refer to *IBM Print Services Facility for AIX: Print Administration* for information about the PSF/6000 passthru parameter and how to customize PSF/6000 with user exit programs.

Control Blocks

The Print Parameters (APSUX15) exit has access to the PSF/MVS control blocks used by all PSF/MVS exit routines:

- APSGEXTP Area
- APSUECA - Exit-Communications Area
- APSUECE - Exit-Communications Area Extension
- APSUCOM - Exit Table

DSECTs for these PSF/MVS common control blocks are provided in assembler language. Refer to chapter "Using Installation Exits" in *Print Services Facility/MVS: System Programming Guide* for an explanation of the fields in these control blocks.

APSUECA - Exit-Communications Area

Two fields in the APSUECE (Exit-Communications Area Extension) contain valid information only when the MVS Download exit is called. The format of these fields is:

Offsets	Type	Length	Name	Description
204 (CC)	Address	4	ECEX15P	Address of exit APSUX15
216 (D8)	Character	12	ECEDSID	FSI GETDS data set ID

Job Separator Page Data Area

The Print Parameters (APSUX15) exit also has access to JES control blocks that contain job and data set information. For example, the JES job separator page data area (IAZJSPA) contains job-level information for a data set that generates JES separator pages.

You can use IAZJSPA to obtain job information to pass to PSF/6000. Refer to *Using the Functional Subsystem Interface* for more information on the contents of the IAZJSPA. The *Print Services Facility/MVS: System Programming Guide* also contains information about the IAZJSPA.

Input to Print Parameters Exit

At entry to the Print Parameters (APSUX15) exit, the registers contain the following information:

Register 1   Pointer to the address of the APSGEXTP area

Register 13   Pointer to an 18-word save area in field ECAUSAVE for saving the caller's registers

Register 14   Return address

Register 15   Entry-point address

The following fields in APSGEXTP are valid when the Print Parameters (APSUX15) exit is called:

XTPECAP   Address of the exit-communications area (APSUECA)

XTPJSPAP   Address of the job separator page data area for the data set being processed (IAZJSPA)

The following fields in APSUECA are valid when the Print Parameters (APSUX15) exit is called:

ECAUCOMP   Address of the exit table, APSUCOM

ECAECEP   Address of the exit-communications area extension (APSUECE)

ECAUSAVE   The save area for the exit

The following fields in APSUECE are valid when the MVS Download exit is called:

ECEPDEVK   Address of the scheduler work block (SWB) token for the PRINTDEV statement

ECEOUTTK   Address of the scheduler work block (SWB) token for the print data set's OUTPUT JCL statement

ECEJDVTN   Print data set JDVT name

ECETUPTR   Address of the SWBTU for the data set's OUTPUT JCL statement

ECETULEN   Length of the SWBTU

ECEX15P   Address of the Print Parameters (APSUX15) exit routine

ECEDSID   Data set ID assigned by JES. JES provides this ID to MVS Download in the functional subsystem interface (FSI) GETDS parameter list, in field GDSDSID. Refer to *Using the Functional Subsystem Interface* for more information on the GETDS parameter list.

Output from Print Parameters Exit

At return from the Print Parameters (APSUX15) exit, restore the contents of all registers. Do not set a return code in register 15.

Set the following fields in the exit-communications area (ECAUECA):

ECARECAD   Pointer to an EBCDIC string of additional PSF/6000 passthru fields in ECAWKBUF.

ECARECLN   Length of the string of additional PSF/6000 fields, or zero if no additional fields are to be transmitted.

ECAWKBUF   An EBCDIC string of additional PSF/6000 passthru fields

The string of passthru fields might look like the following:

```
devname=prt6000,outgrp_name=2
```

In this example, the final format of the -opa parameter might look like:

```
-opa=forms=STD,class=Q,destination=PRT6,devname=PRT6000,outgrp_name=2
```

Note: If you include blanks or nulls (X'00') in the EBCDIC string, MVS Download removes them because blanks and nulls cause PSF for AIX to terminate the passthru parameter string. You can replace blanks and nulls with X'1C'; PSF for AIX does not generate a print character for a X'1C'.

Programming Considerations

Consider the following points when coding the Print Parameters (APSUX15) exit:

- You should be an experienced programmer who is aware of overall system implications.

- Do not issue an explicit or implied WAIT in the exit routine, because it puts the MVS Download FSA into a WAIT state.

- MVS Download runs above the 16-megabyte line. The exit can run in either 24-bit or 31-bit addressing mode. However, 31-bit addressing is recommended, to allow more MVS Download FSAs to run in an address space. If the exit is AMODE 24, MVS Download and JES allocate their control blocks, which are passed to the exit, below the 16-megabyte line.

- Use only the control blocks passed to this exit.

- Code references to fields in control blocks using the names associated with each field in the DSECT control block. Do not use absolute displacements, because these displacements can change from one release of PSF/MVS to another.

- Code the exit routine to be reentrant.

- The exit routine runs in supervisor state with a protection key of 1. Thus, you can use all system services available in supervisor state.

- Use register 12 as a base register and place the module name (in printable EBCDIC) in the object code, starting at the sixth byte. If you do this, the module name appears in the SDUMP title page if an abend occurs. (ESTAE is in effect during execution of the exit.)

- If the APSUECA work buffer (ECAWKBUF) is too small to contain the EBCDIC string of additional passthru fields, you can expand the buffer as described under "Exit Table (APSUCOM)" in the *Print Services Facility/MVS: System Programming Guide*.

Note: PSF program maintenance may require the reassembly of the exit.

Sample Exit

MVS Download provides a sample exit, APSUX15X.ASSEMBLE, written in assembler language, in SYS1.SAMPLIB. You can either view the sample online or print it. You can then modify, assemble, and install the exit routine to provide your own version of the exit. Object code for this sample exit is not provided.

The sample exit returns two pieces of job information to MVS Download for transmission in the -opa parameter:

- MVS Download FSA name
- JES output group name

Installing the Exit Routine

To install the Print Parameters (APSUX15) exit, compile and link-edit the exit, as follows:

- Specify APSUX15 as the name.
- Specify the RENT and LET link-edit attributes.
- Link-edit the exit into an authorized library.

You can identify the library containing the APSUX15 exit routine in either:

- A STEPLIB statement in the MVS Download startup procedure

  You can provide a different exit routine for each MVS Download FSS by using a unique STEPLIB for each startup procedure.

- A TASKLIB, STEPLIB, or JOBLIB statement concatenated with SYS1.LINKLIB.

You can use a single exit routine for all MVS Download FSSs running in the MVS/ESA operating system by placing the exit in an MVS LINKLIST data set.

Using Accounting Information

MVS Download writes a System Management Facility (SMF) type 6 record after successful transmission of a data set to an AIX system. The format of the record is the same as the SMF type 6 record for Print Services Facility, with an additional file-transfer section. Refer to the *MVS System Management Facilities (SMF)* publication for the format of the SMF type 6 record for PSF/MVS.

In addition to the base section, MVS Download writes the following sections:

- Common section
- Enhanced SYSOUT Support (ESS) section
- File-transfer section

Use SMF macro IFASMFR available in the fix for APAR OW13246 in MVS/ESA 4.2.0 and above to map the file-transfer section.

Note: MVS Download does *not* support a user exit to allow modification of the SMF record.

Field SMF6PAD1 indicates whether the file-transfer section is present, as shown in Table 6.

Table 6. SMF Type 6 Record—Section Indicator Field

Offsets		Name	Length	Format	Description	
61	3D	SMFPAD1	1	binary	**Bit**	**Meaning**
					4	File-transfer section present.

The file-transfer section for MVS Download has the format shown in Table 7.

Table 7. SMF Type 6 File-Transfer Section

Offsets		Name	Length	Format	Description
0	0	SMF6LN6	2	binary	Length of file-transfer section, including this field.
2	2	SMF6BYTE	4	binary	Total number of bytes transmitted.
6	6	SMF6IP1	1	binary	First segment of IP address of target system
7	7	SMF6IP2	1	binary	Second segment of IP address of target system
8	8	SMF6IP3	1	binary	Third segment of IP address of target system
9	9	SMF6IP4	1	binary	Fourth segment of IP address of target system
10	A		12		Reserved

Updating the MVS Program Properties Table

As part of MVS system configuration, you must define the program properties of MVS Download to the MVS system. To do so, update the MVS Program Properties Table (PPT) by adding the entry shown in Figure 16 to the SCHEDxx member of SYS1.PARMLIB.

Note: You must re-IPL the MVS system to activate the PPT entry for MVS Download.

```
/**********************************************************************/
/*    Program Properties Table addition for MVS Download              */
/*                                                                    */
/*    The following defaults are taken for this entry:                */
/*        NOPRIV              Not a privileged job                    */
/*        CANCEL              Cancellable                             */
/*        PASS                Requires password protection            */
/*        AFF(NONE)           No affinity to a particular processor   */
/**********************************************************************/
/*                                                                    */
    PPT     PGMNAME(APSKAFPD) /* Add program name APSKAFPD to the PPT  */
            KEY(1)            /* Protection key 1                      */
            NODSI             /* Does not require data set integrity   */
            NOPREF            /* No preferred storage required         */
            NOSWAP            /* Non-swappable                         */
            SYST              /* System task                           */
```

Figure 16. SCHEDxx Entry to Update the Program Properties Table

The values shown for the PPT entry are the recommended values. Modification of these values may result in JES abending; or, other unexpected results may occur. Refer to *MVS/ESA: Initialization and Tuning Reference* for more information about how to update the Program Properties Table.

Chapter 4. Operating MVS Download

This chapter describes how to operate the MVS Download functional subsystem (FSS) and the function subsystem applications (FSAs) that are under its control, including how to:

- Start the MVS Download FSS and associated FSAs
- Cancel the current activity on an MVS Download FSA
- Stop the MVS Download FSS and associated FSAs
- Monitor the status of data transmission

You operate an MVS Download FSS and FSA just as you operate a PSF/MVS FSS and FSA, or any other JES output writer. For more information about the JES2 and JES3 commands described in this chapter and additional JES commands that you can use to manage an output writer, refer to *JES2 Commands* or *JES3 Commands* for your system. For more information about the MVS commands described in this chapter, refer to *System Commands* for your system.

Although this chapter shows only MVS and JES commands, you can also use System Display and Search Facility (SDSF) commands or the commands of a comparable product to start and stop FSAs and to display and cancel data sets. Refer to *System Display and Search Facility Guide and Reference* for more information about SDSF commands.

Starting the MVS Download Functional Subsystem

Before you start an MVS Download functional subsystem (FSS) and the functional subsystem applications (FSAs) under its control, your installation must:

- Define an MVS Download FSS
- Define one or more MVS Download FSAs under control of the FSS
- Create a cataloged start procedure for each FSS

These tasks are described in Chapter 3, "Configuring MVS Download."

After these tasks are accomplished, you can enter commands at the operator console to start each MVS Download FSA. You do not need to enter a special command to start the FSS, because JES starts the FSS automatically when you start the first FSA under control of that FSS.

In JES2, if the FSA was defined with the START=YES parameter on the JES2 PRT*nnnn* statement, JES2 automatically starts the FSA when you bring up the MVS system. JES3 does not support the automatic start option.

Starting an MVS Download FSA requires some coordination with TCP/IP and the servers on the AIX system. Following are the steps for starting an MVS Download FSA:

1. Verify that TCP/IP is started on the MVS system. You can start TCP/IP by entering the following MVS command:

       S *tcpip_name*

   Replace *tcpip* with the job-name of the TCP/IP address space. The job-name of the address space is TCPIP, unless changed by your installation.

2. Ensure that the communications controller between the MVS system and the AIX system is varied online.

3. Verify that the receiving servers on the AIX system are started. The start commands for the PSF/6000 and OnDemand servers are described in *IBM Print Services Facility for AIX: Print Administration* and *IBM OnDemand: Installation and Configuration Guide*.

   A server can be started *after* you start the FSA; however, the server should be started before the FSA attempts to transmit any data to that server. Otherwise, a TCP/IP error occurs.

   Note: The command used to start a server designates the port number at which the server receives data from MVS Download. The port number on the start command must match the port number defined for that server in the routing-control data set. If the port numbers do not match, a TCP/IP error might occur when MVS Download tries to initiate a connection to the server.

4. Start the MVS Download FSA and the FSS by entering the following JES2 or JES3 start command:

   JES2:

   ```
   $S fsa_name [,fsa_name ... ]
   ```

   JES3:

   ```
   *CALL WTR,OUT=fsa_name
   ```

   Replace *fsa_name* with:

   - In JES2, the name of the PRT*nnnn* statement, for example, PRT0001
   - In JES3, the JNAME parameter of the DEVICE statement

Cancelling a Data Set Transmission

Use the JES cancel command to stop the transmission of a data set to an AIX system. The data set currently being transmitted is purged from the JES spool and from the file system on the AIX system.

Enter the following JES2 or JES3 command:

JES2:

```
$C fsa_name [,fsa_name ... ]
```

JES3:

```
*CANCEL fsa_name
```

Stopping an MVS Download Functional Subsystem

You need to stop MVS Download FSAs and the FSS that controls them when one of the following situations occurs:

- The system programmer modifies the routing-control data set used by the FSA. If you want an FSA to use the modified data set, you need to stop all FSAs under control of the FSS and also stop the FSS before restarting.

- An error requires that you restart the FSS. You must stop the FSAs and also stop the FSS before restarting.

Before stopping the MVS Download FSS, you need to stop each FSA under its control. You can stop an FSA after it finishes transmitting the current data set to the AIX system, or you can stop it immediately.

Stopping an FSA After Current Data Set is Transmitted

Use the following JES2 or JES3 commands to stop the FSA *after* transmission of the current data set is complete:

JES2:

```
$P fsa_name [,fsa_name ... ]
```

JES3:

```
*VARY,fsa_name [,fsa_name ... ],OFFLINE
*CANCEL,fsa_name
```

The *VARY command makes the FSA unavailable for transmitting data sets but allows the current data set to finish. The *CANCEL command stops the FSA.

Stopping an FSA Immediately

Use the following JES2 or JES3 commands to stop an MVS Download FSA immediately:

JES2:

```
$C fsa_name [,fsa_name ... ]
$P fsa_name [,fsa_name ... ]
```

The $C command cancels the current data set. The $P command stops the FSA.

JES3:

```
*CANCEL,fsa_name,T
```

The *CANCEL command cancels the current data set; the T option stops the FSA.

Stopping the FSS

Before stopping an FSS, you should stop all FSAs under its control, as described in the previous sections.

In a JES2 environment, if the FSS was configured with the AUTOSTOP=YES option on the JES2 FSS(*fss_name*) statement, JES2 stops the FSS automatically after you have stopped all FSAs. If AUTOSTOP=YES was not specified, you must stop the FSS with an MVS operator command.

In a JES3 environment, JES automatically stops the FSS after you stop all FSAs under its control; therefore, you should not need to stop the FSS using an MVS operator command.

If JES has not automatically stopped the FSS, use the following MVS operator command to stop the FSS after you have stopped all FSAs under its control.

```
C fss_name
```

Replace the *fss_name* with:

- In JES2, the name on the FSS(*fss_name*) statement
- In JES3, the name in the FSSNAME parameter of the FSSDEF statement

Monitoring Data-Set Transmission

MVS Download issues messages to the console when errors occur during transmission. MVS Download also issues a message to the SYSLOG data set when a data set has been transmitted to an AIX system, if the user requested notification on the NOTIFY keyword of the OUTPUT JCL statement.

Displaying Current Activity

In a JES2 environment, you can use the SDSF printer display command to display the total and running page/record count of the data set currently being transmitted by an MVS Download FSA. Note that SDSF displays the status of the MVS Download FSA only if the MVS Download feature is performing checkpointing. See "Requesting Checkpointing" on page 31 for more information on checkpointing.

Locating Transmitted Files on AIX File Systems

To locate a data set that has been successfully saved on the target AIX system, the AIX user can examine the files on the AIX file system designated to receive data sets from MVS Download. Note, however, that the AIX server receiving data from MVS Download may have deleted the data set from the file system after processing it.

The filename of each data set successfully saved on an AIX file system has the following format:

`MVS_system.jobname.dataset_name.form_name.yyddd.hhmmsst.ARD|PRD`

where:

system
    Specifies the identifier of the MVS system.

jobname
    Specifies the name of the job on the MVS system.

dataset_name
    Specifies the name of the MVS data set transmitted.

form_name
    Specifies the form name.

yyddd.hhmmsst
    Specifies the time of the transmission.

ARD|PRD
    Is a suffix identifying the type of server. ARD identifies an OnDemand server; PRD identifies a PSF/6000 server.

Chapter 5. Diagnosing Errors in MVS Download

This chapter contains information to help the diagnostician identify a problem in the MVS Download feature and report it to IBM. This chapter describes:

- How to use the PSF/MVS trace facility with the MVS Download feature
- A message to module cross-reference table

Refer to *Print Services Facility/MVS: Diagnosis Guide and Reference* for complete information about diagnosing problems in PSF/MVS.

Using the PSF/MVS Trace Facility with MVS Download

You can use the same PSF/MVS dump and trace facilities as you use with PSF/MVS. These facilities are described in *Print Services Facility/MVS: Diagnosis Guide and Reference*.

You specify trace parameters in the MVS Download startup procedure and on the MODIFY operator command, as you do in PSF/MVS. If you suspect the problem is in the MVS Download feature, IBM recommends that you request an FSA full external trace, tracing all components. A full external trace includes an internal wrap trace and a recording of all events occurring on the functional subsystem interface (FSI) interface.

For example, to start a full external trace, enter the following operator command:

```
MODIFY fss_name,TRACEON,fsa_name,MODE=FULL,COMP=ALL
```

To specify a full external trace during the startup procedure, specify the PARM parameter on the EXEC JCL statement as shown:

```
//STEP01    EXEC PGM=APSKAFPD,PARM=(,FULL)
```

Note: Do *not* request the Notify Subtask Trace (NST) or FSA synchronization (SYNC) traces, because these traces do not apply to the MVS Download feature. Also, do not request a component trace. The MVS Download feature does not have a separate component identifier.

Message-to-Module Cross-Reference

Table 8 lists the messages issued by MVS Download and the modules that produce each message.

Table 8. Message-to-Module Cross-Reference	
Message	**Module**
APS022I	APSKAFPD
APS023I	APSKFSA
APS024I	APSKODR
APS031I	APSKDSP
APS032I	APSKDSP
APS033I	APSKDSP
APS034I	APSKDSP
APS035I	APSKDSP
APS041I	APSKODR
APS042I	APSKODR
APS043I	APSKODR
APS046I	APSKAFPD
APS047I	APSKSMF
APS048I	APSKAFPD
APS049I	APSKSMF
APS057I	APSKDVP
APS062I	APSKNTFY
APS068I	APSKNTFY
APS069I	APSKNTFY
APS070I	APSKNTFY
APS071I	APSKNTFY
APS072I	APSKNTFY
APS095I	APSUEXTI
APS986I	APSKDVP
APS987I	APSKDSP
APS988I	APSKNTFY
APS989I	APSKDSP, APSKDVP
APS990I	APSKROUT
APS991I	APSKROUT
APS992I	APSKFSA
APS993I	APSKNTFY
APS994I	APSKNTFY
APS995I	APSKAFPD, APSKDVP
APS996I	APSKROUT

Chapter 6. MVS Download Messages

This chapter describes the new messages and abend codes issued by MVS Download. For information about messages and codes issued by MVS Download that are not described in this chapter, as well as information about the problem determination codes listed for the messages, refer to *Print Services Facility/MVS: Messages and Codes*.

Message Format

The messages have a seven-character message identifier followed by the message text, as shown below: **APS***nnnt* **MESSAGE TEXT**

APS   Identifies PSF messages

nnnn   Four-digit message number

t   One-character type code

Type code	Meaning
A	Message requiring operator action
I	Information message

System console messages have additional information inserted between the message ID and the message text. This additional information identifies which functional subsystem application issued the message. System console messages have the following format:

APS*nnnt jobname jobstep fsa_name* **TCP** **MESSAGE TEXT**

Where:

jobname   The jobname of the startup procedure.

jobstep   The FSS name within the job.

fsa name   The name of the MVS Download FSA.

TCP   Indicates an MVS Download message.

Messages

APS095I   INSTALLATION EXIT APSUX15 WILL NOT BE INVOKED

Explanation: The initialization of the MVS Download exit routine failed because insufficient length was specified in the APSUCOM table, the APSUCOM module could not be located, or a BLDL macro failed.

System Action: Processing continues without the installation exit.

User Response: No response is necessary.

System Programmer Response: Evaluate any changes made to the APSUCOM module (static table), to the exit routine, or to the methods used to establish the tables or routines in the system. Other messages may contain BLDL macro return and reason codes.

Operator Response: Inform your system programmer that this error occurred.

Problem Determination: 1, 3

APS986I   NO MVS DOWNLOAD ROUTING RECORD MATCHED FOR JOB (jobname**), DATASET (**data set name**).**

Explanation: The class, form name, or destination specified in the JCL for the data set does not match any of the routing records in the MVS Download routing-control data set. MVS Download cannot determine the AIX system to which to route this data set.

System Action: MVS Download releases the data set back to JES and requests that it be held by the system.

User Response: No response is necessary.

System Programmer Response: Consider adding a routing statement in the MVS Download routing-control data set to match the data set's class, form name, or destination. After modifying the routing-control data set, stop the FSS and restart the MVS Download FSAs to use the modified routing-control data set.

Operator Response: Release the held data set after the system programmer has modified the routing-control data set to add the class, destination, or form name of the data set. If the system programmer does not want to modify the routing-control data set, you can process the held data set by releasing it with a class, form name, or destination that matches an existing routing statement in the routing-control data set. For example, to release output group 2.1.1 of job 13 to class C:

`$T O J13,OUTGRP=2.1.1,REL=SYS,Q=C`

Problem Determination: None.

APS987I   TOTAL BYTES SENT DOES NOT MATCH TOTAL BYTES RECEIVED BY THE MVS DOWNLOAD SERVER.

Explanation: There is a discrepancy between the number of bytes sent by MVS Download and the number of bytes received by the target server.

System Action: MVS Download attempts to retransmit the data set according to the retry interval and retry number specified in the matching routing record of the MVS Download routing-control data set. If retry is not requested or is not successful, MVS Download releases the data set back to JES and requests that it be held by the system.

User Response: No response is necessary.

System Programmer Response: Ensure that TCP/IP is functioning correctly. If the problem persists, call the IBM Support Center.

Operator Response: Inform your system programmer that this error occurred.

Problem Determination: 1, 2, 17, 19

APS988I   MVS DOWNLOAD SENT nnnn **BYTES TO** nnn.nnn.nnn.nnn**—JOB=**jobname **STEP=**jobstep **ID=**jobid**.**

Explanation: A data set with the indicated number of bytes was transmitted to the AIX system with the IP address indicated in the message. The job submitter requested that this message be sent to the user IDs specified in the NOTIFY keyword in the JCL for the data set. When the job submitter specifies the NOTIFY keyword, this message is sent also to the SYSLOG data set.

System Action: MVS Download verifies that all data was received by the server on the AIX system before purging the data set from the JES spool.

User Response: No response is necessary.

System Programmer Response: No response is necessary.

Operator Response: No response is necessary.

Problem Determination: None.

APS989I   MVS DOWNLOAD SOCKET xxxxxx **COMMAND FAILED FOR IPADDR=**nnn.nnn.nnn.nnn**, PORTNUM=**nnnn**, RETURN CODE=** nn**, ERROR NUM=** nnnn**.**

Explanation: The named socket API call failed with the return code and error number indicated. The IP address and port number of the target AIX system and server are indicated in the message.

System Action: MVS Download retransmits the data set according to the retry interval and retry number specified in the matching routing record of the MVS Download routing-control data set. If retry is not requested or is not successful, MVS Download releases the data set back to JES and requests that it be held.

User Response: No response is necessary.

System Programmer Response: To interpret the return code and error number in the message, refer to *IBM TCP/IP for MVS: Application Programming Interface Reference*.

Ensure that the PSF/6000 server or the OnDemand server with the IP address and port number indicated in the message is running. If the server is down, restart the server. You usually do not need to restart MVS Download.

When restarting the server, the AIX user should specify the same AIX file systems to store files received from MVS Download. If the same file systems are not specified, transmission of the interrupted file restarts from the beginning of the file instead of from the checkpoint.

Operator Response: Inform your system programmer that this error occurred. Stop the MVS Download FSS and restart the FSAs if necessary.

Problem Determination: 1, 2, 17, 19

APS990I   INVALID KEYWORD (*xxxxxx*) SPECIFIED IN THE MVS DOWNLOAD ROUTING-CONTROL DATASET. THE KEYWORD IS IGNORED.

Explanation: MVS Download detected an invalid keyword in the MVS Download routing-control data set.

System Action: MVS Download ignores the invalid keyword and continues processing the other keywords.

User Response: No response is necessary.

System Programmer Response: Correct the invalid keyword in the routing-control data set. To use the modified routing-control data set, stop the MVS Download FSS and restart the FSAs.

Operator Response: Inform your system programmer that this error occurred.

Problem Determination: None.

APS991I   MVS DOWNLOAD ROUTING STATEMENT NUMBER *nn* DOES NOT CONTAIN ALL THE REQUIRED KEYWORDS. THE STATEMENT IS IGNORED.

Explanation: A routing statement in the MVS Download routing-control data set does not contain the required keywords. *nn* indicates the number of the statement in the routing-control data set; a statement

consists of a series of keywords ending with a semi-colon.

System Action: MVS Download ignores the routing statement and continues processing the other routing statements, if any.

User Response: No response is necessary.

System Programmer Response: Correct the invalid routing statement. Then, stop the MVS Download FSS and restart the FSAs to use the modification.

Operator Response: Inform your system programmer that this error occurred.

Problem Determination: None.

APS992I   MVS DOWNLOAD FACILITY INITIALIZED

Explanation: The MVS Download feature was initialized successfully.

User Response: No response is necessary.

System Action: The MVS Download FSA is ready to receive data sets from the JES spool and transmit them to servers on AIX systems.

System Programmer Response: No response is necessary.

Operator Response: No response is necessary.

Problem Determination: None.

APS993I   MVS DOWNLOAD REQUEST CANCELLED. JOB=*jobname* STEP=*jobstep* ID=*jobid* AT *system-id*.

Explanation: The operator cancelled processing of the data set indicated in the message. The job submitter requested that this message be sent to the user IDs specified in the NOTIFY keyword in the JCL for the data set. When the job submitter specifies the NOTIFY keyword, this message is sent also to the SYSLOG data set.

System Action: MVS Download continues processing the next data set.

User Response: Contact the system operator to determine why the operator cancelled the data set.

System Programmer Response: No response is necessary.

Operator Response: No response is necessary.

Problem Determination: None.

APS994I MVS DOWNLOAD REQUEST MARKED UNPRINTABLE. JOB=jobname **STEP=**jobstep **ID=**jobid **AT** system-id**.**

Explanation: MVS Download has determined that the data set identified in the message is not transmittable. The job submitter requested that this message be sent to the user IDs specified in the NOTIFY keyword in the JCL for the data set. When the job submitter specifies the NOTIFY keyword, this message is sent also to the SYSLOG data set.

System Action: MVS Download releases the data set back to JES and requests that it be held by the system.

User Response: Contact the system operator to determine why the data set is being held.

System Programmer Response: No response is necessary.

Operator Response: See the associated messages to determine the correct action to take.

Problem Determination: None.

APS995I MVS DOWNLOAD SOCKET xxxxxx **COMMAND FAILED WITH RETURN CODE=** nn**, ERROR NUM=** nnnn**.**

Explanation: The named socket API call failed with the return code and error number indicated.

System Action:

- If xxxxxx is INITAPI, MVS Download terminates.

- If xxxxxx is SOCKET, MVS Download retransmits the current data set according to the retry interval and retry number specified in the matching routing record of the MVS Download routing-control data set. If retry is not requested or is not successful, MVS Download releases the data set back to JES and requests that it be held by the system.

User Response: No response is necessary.

System Programmer Response: To interpret the return code and error number in the message, refer to *IBM TCP/IP for MVS: Application Programming Interface Reference.*

Operator Response: Inform your system programmer that this error occurred.

- If xxxxxx is INITAPI, start TCP/IP and then start MVS Download again.

- If xxxxxx is SOCKET, stop the MVS Download FSS and then restart the FSAs. Before restarting the FSAs, ensure that TCP/IP is running and the communication controller between the MVS system and AIX system is online.

Problem Determination: 1, 2, 17, 19

APS996I INVALID PARAMETER SPECIFIED FOR KEYWORD (xxxxxx**) AT LINE NUMBER (**nnn**) IN THE MVS DOWNLOAD ROUTING CONTROL DATASET. THE KEYWORD IS IGNORED.**

Explanation: MVS Download detected an invalid parameter in the MVS Download routing-control data set. nnn is the number of the line (80-character record) in the routing-control data set.

System Action: MVS Download ignores the keyword associated with the invalid parameter and continues processing the other keywords.

User Response: No response is necessary.

System Programmer Response: Correct the invalid parameter in the routing-control data set. To use the modified routing control data set, stop the MVS Download FSS and restart the FSAs.

Operator Response: Inform your system programmer that this error occurred.

Problem Determination: None

Abend Codes

This section describes the MVS Download abend codes that can appear in message APS050I.

0EA0

Explanation: This abend is issued by module APSKDVP—
Following a socket INITAPI call failure, the termination call to JES failed.

System Action: MVS Download processing terminates abnormally.

System Programmer Response: If this error persists, contact your service representative in the IBM Support Center or use your electronic link with IBM service for assistance regarding this error code.

0EA1

Explanation: This abend is issued by module APSKROUT—
MVS Download is unable to open the routing-control data set.

System Action: MVS Download processing terminates abnormally.

System Programmer Response: Ensure that the DD name for the routing-control data set is ROUTFILE in the MVS Download startup procedure.

0EA2

Explanation: This abend is issued by module APSKROUT—
The RECFM of the routing-control data set is not FB.

System Action: MVS Download processing terminates abnormally.

System Programmer Response: Reallocate the routing-control data set with fixed blocked record format.

0EA3

Explanation: This abend is issued by module APSKROUT—
The LRECL of the routing-control data set is not 80.

System Action: MVS Download processing terminates abnormally.

System Programmer Response: Reallocate the routing-control data set with a record length of 80 bytes.

0EA4

Explanation: This abend is issued by module APSKROUT—
MVS Download cannot get storage for the data control block (DCB) for the MVS Download routing-control data set.

System Action: MVS Download processing terminates abnormally.

System Programmer Response: This code indicates that the region size should be increased. Increase the REGION parameter specified in the MVS Download startup procedure.

0EA5

Explanation: This abend is issued by module APSKLNK—
MVS Download cannot get storage to store the routing statements from the routing-control data set.

System Action: MVS Download processing terminates abnormally.

System Programmer Response: This code indicates that the region size should be increased. Increase the REGION parameter specified in the MVS Download startup procedure.

0EA6

Explanation: This abend is issued by module APSKAFPD—
The MVS Download feature is not installed.

System Action: MVS Download processing terminates abnormally.

System Programmer Response: Install the MVS Download feature correctly.

0EA7

Explanation: This abend is issued by module APSKAFPD—
The socket INITAPI call failed.

System Action: MVS Download processing terminates abnormally.

System Programmer Response: Take the action recommended for the error indicated in message APS995I.

Table 9 lists additional abend codes issued by MVS Download and the modules that produce each code. Refer to *Print Services Facility/MVS: Messages and Codes* for a description of these abend codes.

Table 9. Abend Code-to-Module Cross-Reference	
Abend Code	**Module**
0004	APSKAFPD
0008	APSKAFPD
0010	APSKAFPD
000C	APSKAFPD
000D	APSKAFPD
0030	APSKAFPD
0034	APSKAFPD
0038	APSKAFPD
0100	APSKFSA
0102	APSKFSA
0108	APSKFSA
010A	APSKFSA
010D	APSKFSA
010F	APSKFSA
0112	APSKFSA
0114	APSKIFA
0116	APSKDVP
0118	APSKFSA
0122	APSKFSA
012A	APSKDVP
0130	APSKDSP
0134	APSKDSP
0138	APSKODR
013C	APSKODR
0140	APSKODR
0160	APSKFSA
0164	APSKFSA
016C	APSKFSA
0178	APSKODR
01A8	APSKDVP
01AC	APSKDSP
01D4	APSKFSA
01F8	APSKIFA

Appendix A. Checklist of MVS Download Configuration Tasks

This checklist summarizes the tasks involved in configuring the MVS Download feature for your installation, along with the number of the page that describes the task.

___ 1. Check the software prerequisites, page 28.

___ 2. Install the MVS Download program; refer to the *MVS Download Program Directory*.

___ 3. Plan the MVS Download functional subsystem.

    ___ Decide how many functional subsystems (FSS) and functional subsystem applications (FSAs) to create, page 29.

    ___ Determine the region size for each FSS, page 30.

    ___ Decide on the JES work-selection criteria for each FSA, page 30.

    ___ Decide on a default checkpointing interval for each FSA, page 31.

    ___ Decide on default printing options, if any, for each FSA, page 32.

___ 4. Define the MVS Download functional subsystem

    JES2

    ___ Create an FSS(*fss_name*) statement for each FSS, page 34.

    ___ Create a PRT*nnnn* statement for each FSA, page 35.

    JES3

    ___ Create an FSSDEF statement for each FSS, page 38.

    ___ Create a DEVICE statement for each FSA, page 39.

___ 5. Create a startup procedure for each MVS Download FSS, page 42.

___ 6. Create a routing-control data set.

    ___ Decide on routing criteria to use: class, form, and destination for each server, page 46.

    ___ Determine the socket address of each associated AIX server, page 46.

| ___ 7. Write an exit routine to pass additional job information to PSF/6000, if necessary, page 53.

___ 8. Modify installation accounting routines, if necessary, page 57.

___ 9. Update the MVS Program Properties Table (PPT) and re-IPL the MVS system, page 58.

___ 10. Start the AIX servers and MVS Download, page 59.

Appendix B. Related Publications

This section lists publications, by category, that may be helpful to you as you configure and use MVS Download.

Print Services Facility/MVS (PSF/MVS)

Title	Order Number
AFP Conversion and Indexing Facility: Application Programming Guide	G544-3824
MVS Download Program Directory	
Print Services Facility/MVS: Application Programming Guide	S544-3673
Print Services Facility/MVS: Diagnosis Guide and Reference	LH40-0205
Print Services Facility/MVS: Licensed Program Specifications	G544-3674
Print Services Facility/MVS: Messages and Codes	S544-3675
Print Services Facility/MVS: System Programming Guide	S544-3672

Print Services Facility for AIX (PSF/6000)

Title	Order Number
IBM Print Services Facility for AIX: Print Administration	S544-3817
IBM Print Services Facility for AIX: Print Submission	S544-3878

OnDemand for AIX

Title	Order Number
IBM OnDemand: Administrator's Reference	G544-5293
IBM OnDemand: Installation and Configuration Guide	G544-5280
IBM OnDemand: Introduction and Planning Guide	G544-5281

TCP/IP

Title	Order Number
IBM TCP/IP for MVS: Customization and Administration Guide	SC31-7134
IBM TCP/IP for MVS: Application Programming Interface Reference	SC31-7187
IBM TCP/IP for MVS: Network Print Facility	SC31-8074

MVS/Enterprise Systems Architecture (MVS/ESA) Version 4

Title	Order Number
MVS/ESA SP V4 JCL Reference	GC28-1654
MVS/ESA SP V4 JES2 Commands	GC23-0084
MVS/ESA SP V4 JES3 Commands	GC23-0090
MVS/ESA SP V4 System Commands	GC28-1626
MVS/ESA SP V4 Initialization and Tuning Reference	GC28-1635
MVS/ESA SP V4 JES2 Initialization and Tuning Guide	SC23-0082
MVS/ESA SP V4 JES2 Initialization and Tuning Reference	SC23-0083
MVS/ESA SP V4 JES3 Initialization and Tuning Guide	SC23-0088
MVS/ESA SP V4 JES3 Initialization and Tuning Reference	SC23-0089
MVS/ESA SP V4 System Management Facilities	GC28-1628
MVS/ESA SP V4 Using the Functional Subsystem Interface	GC28-1638

MVS/Enterprise Systems Architecture (MVS/ESA) Version 5

Title	Order Number
MVS/ESA SP V5 JCL Reference	GC28-1479
MVS/ESA SP V5 JES2 Commands	GC23-1443
MVS/ESA SP V5 JES3 Commands	GC23-1444
MVS/ESA SP V5 System Commands	GC28-1442
MVS/ESA SP V5 Initialization and Tuning Reference	GC28-1452
MVS/ESA SP V5 JES2 Initialization and Tuning Guide	SC23-1453
MVS/ESA SP V5 JES2 Initialization and Tuning Reference	SC23-1454
MVS/ESA SP V5 JES3 Initialization and Tuning Guide	SC23-1455
MVS/ESA SP V5 JES3 Initialization and Tuning Reference	SC23-1456
MVS/ESA SP V5 System Management Facilities	GC28-1457
MVS/ESA SP V5 Using the Functional Subsystem Interface	SC28-1505

Others

Title	Order Number
System Display and Search Facility Guide and Reference	SC23-0408

Appendix C. PSF/MVS Version 2 New Functions and Enhancements

This appendix summarizes the new functions that have shipped or will ship with PSF/MVS Version 2. The new functions are listed in the order they shipped, with the most recent listed first. For any corequisite or prerequisite software or microcode, see each individual feature or APAR.

- **MVS Download Record Length Support (OW17839)**

  You can now request that MVS Download not append the record length to records transmitted to an AIX system. This parameter may improve performance for certain OnDemand for AIX applications.

- **OS/390 Support (OW18774)**

  A subset of PSF/MVS, which you can use only to print online IBM publications, is now part of OS/390 Version 1 Release 2. For full PSF function, however, you must purchase a PSF/MVS license.

- **Support for User Defined Characters (OW17564)**

  You can now print double-byte outline fonts that contain user defined characters (UDCs). The AFP Font Collection (5648-113) International Fonts and Programs Feature 6208 contains information on creating UDCs.

- **MVS Download Installation Exit (OW17525)**

  You can now use an installation exit for MVS Download to pass additional job information to the PSF server on the AIX system.

- **Additional Support for Inline Resources (OW17669)**

  You can now use an inline form definition, page definition, and microfilm setup resource without specifying the name in your user JCL. The first such resource in the print data set is selected when the user JCL does not specify this resource.

- **Outline Font Cookbook**

  Using Outline Fonts with PSF/MVS - An Introduction for Users and System Programmers contains information about the AFP products and outline fonts to help you understand and start using outline fonts. It explains outline fonts: what they are, why they should be used, and how to get started with them. This document is available from your IBM representative.

- **7913 Twinax Support**

  You can now use one printer for both your PSF/MVS system and your PSF/400 system. PSF/MVS supports both the COAX and TWINAX connection of the 7913 on the IBM 4028 model AS1 printer, the IBM 6400 models 004, 008, and 012 printers, and on future printers that support the i-data 7913 Printer LAN Attachment.

- **Bar Code Support in Page Definitions (OW17445)**

  You can now generate bar codes in page definitions by specifying that a field in a line data record be presented as a bar code.

- **Support for TCP/IP Address Space Names (OW16914)**

  You can now specify a TCP/IP address space name other than the default name "TCPIP" when printing on TCP/IP-attached printers. You specify the TCP/IP address space name in the PARM field of the EXEC statement in your writer procedure.

| - **SOSI Support in Page Definitions (OW16843)**

| If you use both single-byte and double-byte fonts in line data, you can now switch to a specific double-byte font on a line or field basis. This new function allows you to use more than one single-byte and double-byte font per page when using shift-in and shift-out codes to switch fonts.

| - **Switching Non-N_UP Jobs to N_UP (OW16432)**

| You can now interrupt ($I) a job on a printer that is running with a non-N_UP form definition and complete it on a printer using an N_UP form definition.

| - **Printer Sharing (OW15018)**

| For network-attached printers, PSF/MVS now supports another method of sharing printers with other print drivers. The port-switching method is available for printers that support multiple active ports. For example, the 3130 with Release 2 microcode supports multiple host drivers simultaneously sending one IPDS data stream and multiple PCL or PostScript data streams to the printer.

| In addition, using the new PRINTDEV keyword CONNINTV, you can limit how long PSF continues to retry starting a session or dialog with the printer.

| - **Font Capture (OW14128)**

| PSF now supports the font-capture function available on printers such as the 3130 with Release 2 microcode. Such printers can store raster and single-byte outline fonts downloaded by PSF, so that PSF does not need to download these fonts each time they are used.

| - **Resident Double-Byte Outline Fonts (OW14128)**

| PSF/MVS now supports printer-resident double-byte outline fonts as well as single-byte outline fonts and raster fonts. Outline font technology is resolution independent, meaning that it can be used by any printer that supports outline fonts regardless of the resolution.

| Outline fonts can be scaled to the size desired by the user. With raster fonts, PSF/MVS requires a different font character set for each different point size; however, with outline fonts, a single font character set can be scaled to the sizes desired. Outline fonts are scaled larger or smaller at the printer. When the printer uses the font character set, the printer creates the rasterized bitmap at the printer's resolution, in addition to rotating the character as instructed.

| - **PSF Abend Information (OW12092)**

| When PSF abends, more information is now provided. The module that abended is identified in the APS050I or APS055I message, the PSF dump title contains the abending module name instead of APSPEFSA, and the PSF dump title contains the system reason code for non-PSF abend codes.

| - **Huffman Compression (OW13534,OW17625)**

| You can now enable the Huffman compression algorithm in exit APSUX07 to compress data at the host. The data is decompressed by the printer. This function requires a certain level of printer microcode. If you are printing using slow speed communication lines such as 9.6 kb/sec or 19.2 kb/sec, Huffman compression may improve performance because less data is sent to the printer across the communication line.

- **NetSpool (Feature Number 9580 or 9582)**

Using the NetSpool feature, you can send output from VTAM applications (such as CICS and IMS output that is usually printed on SNA-network printers) to the JES spool for printing or distribution using JES or PSF/MVS, without modifying the application code.

| • **TCP/IP (OW15599)**

| You can now print on TCP/IP-attached printers, including printers attached using the i-data 7913
| Printer LAN attachment. Once the TCP/IP network is configured and the printer is added to the
| network, all you need to do is specify the IP address of the printer on the PRINTDEV statement for the
| printer.

| The TCP/IP attached printers act like SNA-attached printers. The PRINTDEV parameters
| MGMTMODE (except MGMTMODE=DIALIN), DISCINTV, and TIMEOUT are supported. Each
| TCP/IP-attached printer is controlled by a PRINTDEV statement; jobs are selected from the JES spool
| as for any other printer.

| • **Reduce CSA storage usage when using PDSEs (OW01421)**

| This function reduces CSA (common storage area) storage usage if you use PDSEs (partitioned data
| set extended) for your resource libraries.

• **3160 Support (OW13387)**

Support for the 3160 is now available.

• **MVS Download (Feature Number 9581 or 9583)**

The MVS Download feature provides automatic, high speed transmission of data sets with guaranteed
data integrity from the JES spool to an AIX system using TCP/IP. A cooperating print server or
archive server running on the AIX system receives the data sets for printing using PSF for AIX or for
archiving using AFP OnDemand. MVS Download is a priced feature of PSF/MVS; APAR OW13702 is
a prerequisite.

• **Microfilm Devices (OW13627)**

PSF/MVS can now send AFP data to microfilm devices running in deferred printing mode. After you
establish a PSF startup procedure for microfilm, the microfilm device appears to PSF to be a
continuous-forms N_UP printer running in simplex mode.

• **6408 and 6412 Support (OW04104)**

PSF/MVS now supports the 6408 and 6412 printers.

• **Redirecting the Message Data Set (OW10066)**

You can now put the message data set in a SYSOUT data set or direct it to a specified CLASS or
DEST. Modify the OUTPUT statement for the message data set in your writer procedure and specify
PIMSG=NO and any additional OUTPUT parameter such as CLASS or DEST. All message data sets
(not interrupt pages) are redirected to a SYSOUT data set with all these attributes. Also, an additional
field has been added in installation exit APSUX07 to allow selective redirecting of message datasets
on a print data set basis.

• **Adding a 4-Digit Year to Separator Pages (OW08944)**

This APAR enables you to print the entire 4-digit year (1995) on your PSF separator pages, rather
than the 2-digit year (95) currently printed.

• **Single-Byte Outline Fonts (OW08340)**

PSF/MVS now supports single-byte outline fonts as well as raster fonts. Outline fonts can be
downloaded or activated in printers that support outline fonts. Outline-font technology is resolution
independent, meaning that it can be used by any printer that supports outline fonts, regardless of the
resolution.

Outline fonts can be scaled to any size needed. (For raster fonts, PSF/MVS needs a new font
character set for each different point size.) With outline fonts, the printer scales an outline font
character set to the size needed, creates the rasterized bitmap at the printer's resolution, and rotates
the character as instructed.

- **SNA LU1 Suppression of a 2BA Abend (OW10887)**

  If you get ABEND024 RC02BA abends when you use SNA LU1 printers, this new function should prevent these abends. PSF recognizes an SNA intervention sense in an IPDS session as a protocol error, and PSF abends with reason code 2BA. Many of the LU1 printers send this SNA sense, when in fact they should be sending the IPDS intervention NACK. Most, if not all, of the printers are correcting this problem.

  If you have hundreds or thousands of these printers, upgrading the printer microcode is a nightmare. However, if you add this new function, PSF creates the IPDS intervention NACK when the SNA intervention sense is received, eliminating the 2BA abend.

- **IOCA Replicate and Trim (OW10903)**

  PSF/MVS now supports the IOCA replicate and trim mapping option. When PSF/MVS converts IM1 image data containing shaded areas to IOCA data, PSF sends large amounts of data to the printer if the shaded areas are large or wide-spread, which may degrade printer throughput. With the IOCA replicate and trim mapping option, the amount of data sent to the printer and the transmission time for the data sent is reduced. PSF/MVS converts IM1 shading cells into resolution-independent IOCA data. PSF can then send a single small cell that represents an entire shaded area rather than expanding the cell to fill the area before sending it to the printer. The result for images with large or wide-spread shaded areas is less processing and less storage required by PSF, as well as less transmission time across communication lines.

- **3800 Media Origin (OW10928)**

  The media origin on the AFP continuous-forms printer can now be set the same as the media origin on the 3800 printer. One of the major differences between the 3800 and other AFP continuous-forms printers is the location of the media origin. The media origin is different on the two printers when the leading edge is the long side of the paper or when you use a form definition with a PRESENT/DIRECTION other than PORTRAIT/ACROSS, and the leading edge of the paper is the short side.

  With the addition of a new field that can be set in installation exit APSUX07, you can assist migrating from the 3800 printer to an AFP continuous-forms printer by having PSF set the printer media origin to match that of the 3800. Using this new function, the process of migrating your form definitions for your new AFP continuous-forms printer can be done slowly instead of all at once.

- **3112/3116 Printer Support (OW11499)**

  PSF/MVS now supports the 3112 and 3116 printers.

- **Adding Copy-Level Recovery for JES Commands (OW09054)**

  If you print multiple copies of pages and lose some of these copies when you enter an operator command such as $ZPRTxxx or *S DEV,L=0, then this new copy-level recovery function should prevent loss of copies of a page. JES commands issue a SYNCH order to PSF without any SYNCH information set, which causes PSF to SYNCH to the operator observation point in the printer. Printing copies of the current page ends, and printing resumes on the next page in the job, thus possibly causing the loss of some of the copies of the page. Adding copy-level recovery for such JES commands prevents loss of copies of a page. Copy-level recovery is not added for any operator commands such as FORWARD SPACE, BACKSPACE, or INTERRUPT.

- **PSF Direct (OW08338)**

  PSF DIRECT is a function of PSF/2 or PSF/6000 that enables PSF, using the LU6.2 protocol, to print remotely on PSF/2 or PSF/6000 printers. PSF sends the print data stream directly to the PSF/2 or PSF/6000 printer, bypassing the OS/2 or AIX spool. The PSF/MVS operator controls printing on the PSF/2 or PSF/6000 printers, as though the printers were attached directly to PSF/MVS.

- **255 Input Bins (OW08127)**

  PSF/MVS now supports up to 255 input bins, on printers that support multiple input bins.

- **New Printer NACKs (OW08853)**

  PSF/MVS now supports additional action code X'22' NACKs sent by printers when the intervention timer expires.

- **3800 Line Mode Perforation-to-Perforation Printing (OW08438)**

  If you are using the 3800 line-mode conversion function of PSF/MVS, and you want perf-to-perf printing, this is the support you need. With this support, if the FCB indicates perf-to-perf printing, PSF ignores the bytes in the FCB indicating the top and bottom 1/2 inch margin, which allows perf-to-perf printing.

- **Indicate Last or Only Data Set to Exits (OW07738)**

  PSF installation exits can now determine when they have encountered the last data set of a multi-data set job. A new field indicates to the exits that a data set is the last or only data set in the job. This indication can be used to determine when a job has completed and all pages have been printed and stacked.

- **Add Job Page Counters (OW07446)**

  PSF/MVS now provides new job counters. Previously, counters were available for each data set, but they were reset at the start of the next data set. Thus, if you had a multiple data set job, you could not obtain accurate page counters for the entire job.

  PSF now provides 3 new job page counters in the exits: the number of logical pages in the job, the number of impressions (sides of sheets) in the job, and the number of physical sheets in the job. You can use APSUX05 to put these counts in the SMF6 record or use APSUX02 to place these counts on the job trailer sheet.

- **CPU Performance Improvement (OW07305)**

  PSF/MVS now improves CPU utilization for GROUP3 and 3800 parallel- or ESCON channel-attached printers.

- **Selecting the Media Destination (Output Bin) (OW07348)**

  To select the media destination (output bin) for a job or data set, on a printer with more than 1 output bin, set the JCL keyword OUTBIN on your OUTPUT statement to the correct bin number (1 to 65 535).

- **Suppressing Interrupt Message Pages (OW06631)**

  To suppress printing of the interrupt message page in the middle of your output, you can now set a new field in installation exit APSUX07 to suppress this page.

- **Blank Compression (OW07350)**

  Blank Compression may improve your printer throughput if you print line data containing many blanks over slower-speed attachment communication lines. By compressing blanks, less data is handled by the attachment, and performance may be improved.

  In your PRINTDEV statement, set the JCL keyword COMPRESS=YES, to activate blank compression. In line data where six or more contiguous blanks occur, PSF compresses the blanks to a single blank plus control information for the printer to use to decompress the blanks.

- **Enhanced N_UP (OW03243)**

  Using N_UP printing, you can place up to eight pages on a duplexed sheet. On wide printers, you can place up to four 8 1/2 x 11 pages on a duplexed sheet. N_UP printing defines 1-4 partitions per side of a sheet.

  With Enhanced N_UP, you can place pages at any location on either side of the sheet. You can place a page relative to any partition origin on either side of the sheet, in any orientation, and in any size that fits on the sheet. You can place overlays relative to any partition origin, with or without variable page data from the application. You can use different rotations for each page and different overlays for each page. New options are also available to specify how page ejects are to be handled between medium maps (copy groups).

- **ESCON Channel Attachment for Printers (OY67183,OW04452)**

  PSF/MVS now supports connecting a printer to the new fiber optics ESCON (Enterprise Systems Connection) channel, in addition to supporting S/390 parallel channel-attached printers capable of handling 16K I/O buffers.

  The ESCON attachment provides improvements in data rate, physical path-length, space requirements, and overall system connectivity. The ESCON attachment also exploits the dynamic path function, which provides reliability and performance improvements due to the multiple paths defined to the device.

- **Basic N_UP Printing (2.2.0 base)**

  With N_UP printing, you can reduce the number of sheets of paper in your jobs (and thereby reduce your printing costs) by placing up to eight pages on a duplexed sheet. On wide printers, you can place up to four 8 1/2 x 11 pages on a duplexed sheet. N_UP printing defines 1-4 partitions per side of a sheet of paper.

  With Basic N_UP, you accept the default placement of the pages in the partitions. The pages must be the correct size to fit within the fixed partition areas.

- **Input Bin Selection at a COPY SUBGROUP Level (2.2.0 base)**

  Now you can specify the input bin (media source) in the COPY SUBGROUP (LCC) in the form definition, which enables you to select a different input bin for each copy of a page. Previously, you could specify BIN only at the COPYGROUP level.

- **Including Overlays and Page Segments in a Page Definition (2.2.0 base)**

  Now you can include a page overlay in your line data by using the OVERLAY subcommand of the PRINTLINE command in the page definition, if the page overlay is to be used in the same location each time it is included on a logical page. This enables you to position overlays relative to text lines, without putting AFP structured fields in the print job data.

  To include a page segment in your line data, use the SEGMENT subcommand of the PRINTLINE command, if the page segment is to be used in the same location each time it is included on a logical page. This enables you to position page segments relative to text lines, without putting AFP structured fields in the print job data.

- **PTF Number in the Text Deck (2.2.0 base)**

  PSF/MVS now puts PTF numbers in the text decks, to enable you to easily determine the maintenance level of the modules in your PSF system. The PTF number appears in all modules that have maintenance applied and in all module entry and exit external trace entries for modules that have a PTF number available. If the module is at the base level (no maintenance applied), the compile date appears in the entry and exit external trace entries.

- **New Printer NACKs (OW03663,OW08946)**

  PSF/MVS now supports the new refresh-printer-supplies intervention-required action code '22'x NACKs sent by printers like the 3900 or 3835, when they are RPM 2.0- or PSF DIRECT-attached and have the large mail room function enabled.

- **Add Reason Code Returned by SDUMP to APS044I (OW02543)**

  PSF issues message APS044I when PSF receives a return code of 8 or greater after using the SDUMP macro. PSF/MVS now includes the return code and reason code in the message text.

- **Enhance PSF Trace for Trace Analyzer (OY65090)**

  You can now use the IPDS Analyzer to report printer performance characteristics of an application by processing a PSF/MVS trace.

- **3900 Duplex and 3900-0W1 (Wide) Support (OY67184)**

  PSF/MVS now supports the 3900 Duplex and 3900-0W1 printers.

- **3935 and 3130 Support (OY67182)**

  PSF/MVS now supports the 3935 and 3130 printers.

- **3930 Resident Fonts (OW02108)**

  PSF/MVS now supports the 3930 resident fonts (feature number 4850). Sample APSRMARK jobs are provided to mark code pages and font character sets in host font libraries, to enable you to use their equivalent resident fonts.

- **Mark Forms on the Interrupt Message Page (OY66646)**

  With the addition of new fields set in installation exit APSUX07, you can offset stack the interrupt message page, on cut-sheet printers that support the alternate offset stacking order. Or, with printers that support the mark form order, you can mark the interrupt message pages as well as produce multiple copies of the interrupt message page to allow the markings to be more visible from the side of a stack of paper. Or, you can offset stack, forms mark, and produce multiple copies of the interrupt message page in the same job.

- **NPRO for SNA Printers (OY67531)**

  You can now apply the NPRO JES keyword to your SNA-attached printer. With this support, PSF, while waiting for the NPRO or SNA disconnect interval to expire, verifies whether a manual NPRO has been done at the printer, as it does for channel-attached printers.

- **Inline Resources (OY67181)**

  With inline resources, you can place page definitions, form definitions, fonts (coded fonts, code pages, and character sets), overlays, and page segments inline in your data set.

  PSF allows user data sets to include these inline resources for use on that data set and ensures that the inline resources are used for that data set only and are not retained in the printer after the data set completes.

- **Externalize Block Letter Table (OW00105, OW08336)**

  PSF has externalized the translate tables that control the block letters printed on your header and trailer separator pages. Now you can change the block letters, add additional characters, create new block letters, and use world trade characters.

- **3930 and 3916 Support (OY66024)**

  PSF/MVS now supports the 3930 and 3916 printers.

- **3800 Line Mode (OY65917)**

  If you are migrating from a 3800 printer to an AFP continuous-forms printer, you may want the PSF/MVS 3800 Line Mode Conversion function to assist your migration. All 3800 printers can operate in "line mode" as non-AFP printers. Print jobs that run in line mode do not use PSF or AFP resources such as page definitions and form definitions. Instead, they use 3800 line mode resources such as FCBs and GRAPHMODs.

  Without the PSF 3800 Line Mode Conversion function, migrating to the AFP print environment could require many of the resources for the 3800 Line Mode job to be manually converted to AFP resources. The PSF 3800 Line Mode Conversion function can reduce changes required to resources, JCL, and application line data and enable you to use a limited set of standard AFP functions that are not available on the 3800 Line Mode printer.

- **4-Digit Device Numbers (OY65559)**

  Because MVS now supports 4-digit device numbers, PSF/MVS now also supports 4-digit device numbers for channel-attached printers in both deferred and direct-printing modes.

- **Jam Message after Intervention (OY63355)**

  If you are missing your interrupt message page with an error message (for example, APS711I) on it, and multiple repositioning errors occurred back-to-back, this enhancement should retrieve the missing interrupt message page. The interrupt message page is missing due to another repositioning error (for example, Print Adjust at the printer, which does not generate an interrupt message page) occurring on the original interrupt message page. This enhancement ensures that the original interrupt message is printed, even if another repositioning error occurs.

- **3800 Change to Load an Overlay Following a Synchronous Data Stream Error (OY66422)**

  If your 3800 printer with SEF (storage expansion feature) is running out of storage, and you are using overlays, this function may help. Currently, the 3800 with SEF considers an overlay not loaded if a synchronous data stream error occurs while the printer is loading it. However, the 3800 keeps the overlay in storage. If the overlay is used on multiple pages, PSF reloads the overlay for each page. Eventually the 3800 runs out of storage, because it stores multiple copies of the same overlay.

  With this support, the 3800 senses that the overlay is loaded. PSF recognizes when a 3800 with SEF has this change, recognizes that the overlay is loaded, and does not reload it.

- **Image Plus Tolerance (OY65159)**

  If you have jobs that contain structured fields created by Image Plus, you can now run these jobs with PSF/MVS. Image Plus is an IBM program product that manages, stores, archives, retrieves, and prints images. Now PSF ignores the unsupported structured fields created by Image Plus.

- **Headers Not Required for Distributed Print Function (DPF) (OY63029)**

  No longer are PSF headers and trailers required when a printer is attached through Distributed Print Function (DPF). DPF requires that PSF indicate job boundaries. To do this, PSF required you to set the JES job header and trailer parameters and to have PSF separator exit routines, even when you didn't want a separator page.

  Now JES2 4.1.0 and above indicates the last data set of a group (job), meaning that headers and trailers are no longer required to determine job boundaries. If the JES level is earlier than JES2 4.1.0, you must still specify job separator pages. Regardless of the level of JES, PSF no longer requires dummy separator exits to support DPF. If you do not want PSF to generate separator pages, you must delete or modify the separator page exits.

- **3829 Support (OY60184)**

  PSF/MVS provides HCD support for the 3829 printer, which is an AFP1 channel-attached printer.

- **Mark Aliases with APSRMARK (OY59748)**

  If you are using APSRMARK to mark members of your font library, but the aliases are not getting marked, this new support also marks the aliases. Now, when a font library contains the actual font name plus aliases, the actual font name (primary member) and the aliases are marked by APSRMARK.

- **Selectable Media Modification (SMM) Support for Post-Processors (OY56083)**

  PSF/MVS now recognizes Selectable Medium Modifications (SMM) IDs specified in a form definition and applies the specified modifications to the applicable pages, if the printer supports SMM IDs.

- **Enhance PSF Tracing of Exits (OY63398,OW06775)**

  PSF/MVS now traces all installation exits in the PSF internal and external traces, making debugging of installation exits easier. Before, PSF/MVS traced only installation exit APSUX07.

- **Enhance the MODIFY FORCE Command to Cancel an Active FSA (OY59953)**

  The PSF/MVS MODIFY FORCE command now always cancels an individual active FSA.

- **Distributed Print Function (DPF) (OY51438)**

  DPF is a component of PSF/2 you can use to print jobs sent to PSF/2 from PSF/MVS. DPF receives host PSF output and resources for spooling and printing with PSF/2. DPF also stores PSF/MVS resources in the DPF resource library, so that the host system does not need to send PSF resources each time documents are spooled. Through DPF, PSF/2 under OS/2 2.0 provides a function similar to that provided by Remote PrintManager (RPM) Version 3.0 under DOS.

- **RMF Common Storage (OY58676)**

  Now PSF/MVS supports the RMF common storage reporting function available with MVS/ESA 4.3.0.

- **Supporting Bins 3 and 4 (OY57164)**

  Currently, PSF supports printers with a primary bin (BIN 1), alternate bin (BIN 2), manual feed (BIN 100), and envelope bin (BIN 65). Support has been added for printers with an auxiliary bin (BIN 3) or a fourth bin (BIN 4) installed.

- **Stack Received Pages (SRP) (OY56148)**

  If your continuous-forms printer hesitates while performing a software nonprocess runout (NPRO), you need to use the Stack Received Pages (SRP) IPDS command. Before, when PSF performed a software NPRO, PSF sent a group of 2 or 3 blank pages to the printer, followed by more groups of 2 or 3 blank pages until the NPRO was complete. This sequence caused the printer to hesitate between the groups of blank pages, which could cause problems with some post-processing equipment attached to the printer.

  By sending the Stacked Received Pages (SRP) IPDS command, the printer performs the same function as the manual NPRO, pushing the blank pages through the printer in one group and eliminating all hesitations.

- **4230 Code Pages (OY56466)**

  PSF/MVS now supports code pages 875 and 1026, as supported by the 4230.

- **Recovery on a Non-Zero Return Code from BLDL (OY55821)**

  Now, PSF/MVS upon receiving a non-zero return code from a BLDL request, closes the resource, reopens it, and retries the BLDL request. Also, PSF more often recovers when a resource data set is moved, deleted, or defrag'ed. This should help eliminate the APS532I messages received when you attempt to use resource libraries that have been updated while PSF is running.

- **New Page Definitions and Form Definitions (OY66888, OY57166)**

  PSF/MVS has new definitions and form definitions you can use to select a third and fourth input bin, to specify a 0,0 offset, for HP-CL4 and PPDS printers, for duplex compatibility between cut-sheet and continuous-forms printers, and to support 3-hole punched paper.

- **GOCA Data Objects in Page Segments (OY44308)**

  Graphics products such as GDDM produce page segments that may contain objects beginning with the BGR (Begin Graphics Object) structured field. PSF/MVS now supports GOCA graphics objects in page segments. DCF also allows page segments containing GOCA objects to be included in formatted documents.

- **Burster-Trimmer-Stacker (BTS) Support (OY49641)**

  PSF/MVS now supports the burster-trimmer-stacker (BTS) and offset stacker for a host-connected channel-attached 3900 printer running in deferred printing mode.

- **Tier Pricing (OY50270)**

  You can now use the PSF Point Counting Tool (PPCT) to help determine your printer tier level for PSF Version 2 tier pricing.

- **Update APS433I for Color (OY45100)**

  If you submit jobs containing GOCA objects that use colors other than black and white, you need the updated message text for APS433I. Some printers do not suppress the NACK for unsupported colors in GOCA objects, and they print the object correctly. PSF error message APS433I, which is reported as a result of this NACK, did not mention unsupported colors as a possible cause. APS443I now mentions unsupported colors as a possible cause.

Glossary

Source Identifiers

This publication includes terms and definitions from the *IBM Dictionary of Computing,* ZC20-1699.

Definitions reprinted from the *American National Dictionary for Information Processing Systems* are identified by the symbol (A) following the definition.

References

The following cross-references are used in this glossary:

Contrast with. This refers to a term that has an opposite or substantively different meaning.

Synonymous with. This appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

A

ACIF. (1) AFP conversion and indexing facility. (2) A PSF utility program that converts a print file into AFP, MO:DCA-P, creates an index file for input data, and collects resources used by an AFP document into a separate file.

Advanced Function Presentation (AFP). A set of licensed programs, together with user applications, that use the all-points-addressable concept to print on presentation devices. AFP includes creating, formatting, archiving, retrieving, viewing, distributing, and printing information.

AFP. Advanced Function Presentation.

AIX operating system. IBM's implementation of the UNIX operating system. The RISC System/6000 system, among others, runs the AIX operating system.

API. (1) Application program interface. (2) Application programming interface.

B

burst. To separate continuous-forms paper into single sheets.

C

carriage control character. An optional character in an input data record that specifies a write, space, or skip operation.

case-sensitive. Able to distinguish between uppercase and lowercase letters.

checkpoint. A point at which information about the status of a job and the system can be recorded so that the job step can be restarted later. For any data set being transmitted to an AIX system, the user can specify that MVS Download take checkpoints based on the number of processing seconds elapsed.

client. In a distributed file system environment, a system that is dependent on a server to provide it with programs or access to programs.

client/server. In communications, the model of interaction in distributed data processing in which a program at one site sends a request to a program at another site and awaits a response. The requesting program is called a client; the answering program is called a server.

conditional processing. A page-definition function that allows input data records to partially control their own formatting.

connection. In TCP/IP, the path between two protocol applications that provides reliable data stream delivery service. In Internet communications, a connection extends from a TCP application on one system to a TCP application on another system.

copy group. (1) One or more copies of a page of paper. Each copy can have modifications, such as text suppression, page position, forms flash, and overlays.

D

daemon. In the AIX operating system, a process begun by the root user or by the root shell that can be stopped only by the root user. Daemon processes generally provide services that must be available at all times, such as sending data to the printer. A daemon runs continuously, looking for work to do, performing that work, and waiting for more work. A daemon does not have a controlling terminal associated with it.

data check. A synchronous indication of a condition caused by invalid data or incorrect positioning of data. Reporting of some data checks can be suppressed.

data stream.   A continuous stream of data elements being transmitted, or intended for transmission, in character or binary-digit form using a defined format.

default.   A value, attribute, or option that is assumed when no alternative is specified by the user.

dotted decimal notation.   The syntactical representation for a 32-bit integer that consists of four 8-bit numbers written in base 10 with periods (dots) separating them.   It is used to represent IP addresses.

double-byte coded font.   A font in which the characters are defined by 2 bytes; the first defining a coded font section, and the second defining a code point.   Double-byte coded fonts are required to support languages requiring more than 256 graphic characters. Two bytes are required to identify each graphic character.   Kanji is printed using a double-byte font. Contrast with *single-byte coded font*.

download.   To transfer data from one computer for use on another one.   Typically, users download from a larger computer to a diskette or fixed disk on a smaller computer or from a system unit to an adapter.

drain.   An operator action to halt the flow of jobs to a printer, usually to stop the printer or to change print options.

exception highlighting.   The markings placed on the printed page to indicate the location of a data-stream error.

F

font.   (1) A family or assortment of characters of a given size and style; for example, 9 point Bodoni Modern. (A)   (2) One size and one typeface in a particular type family, including letters, numerals, punctuation marks, special characters, and ligatures. (3) A paired character set and code page that can be used together for printing a string of text characters.   A double-byte font can consist of multiple pairs of character sets and code pages.

form definition.   A resource used by PSF that defines the characteristics of the form, which includes such functions as overlays to be used (if any), paper source (for cut-sheet printers), duplex printing, text suppression, the position of MO:DCA-P data on the form, and the number and modifications of a page.

FSA.   Functional subsystem application.

FSS.   Functional subsystem.

functional subsystem (FSS).   The MVS Download address space created by JES.

functional subsystem application (FSA).   An area within the MVS Download functional subsystem that transmits data sets to AIX systems.

I

inline resource.   A resource contained in the print data set.

Internet.   A wide area network connecting thousands of disparate networks in industry, education, government, and research.   The Internet network uses TCP/IP as the protocol for transmitting information.

Internet Protocol (IP).   A protocol used to route data from its source to its destination in an Internet environment.

IP.   Internet Protocol.

J

JCL.   Job control language.

JES.   Job entry subsystem.

JES2.   An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system.   In an installation with more than one processor, each JES2 processor independently controls its job input, scheduling, and output processing.

JES3.   An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system.   In complexes that have several loosely coupled processing units, the JES3 program manages processors so that the global processor exercises centralized control over the local processors and distributes jobs to them via a common job queue.

job control language (JCL).   A language of control statements used to identify a computer job or describe its requirements to an operating system.

job entry subsystem (JES).   An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system.

job script.   A pre-defined file similar to an AIX shell script that contains the options required to run a print job.

L

line data. Data prepared for printing on a line printer such as a 3800 Model 1 Printing Subsystem. Line data is usually characterized by carriage-control characters and table reference characters. Contrast with MO:DCA-P data.

line printer daemon (LPD). In the AIX operating system, the printer server that allows other hosts to access its printer.

LPD. Line Printer Daemon

M

MO:DCA-P data. Print data that has been composed into pages. Text formatting programs can produce composed text data consisting entirely of structured fields.

mount. To make a file system accessible.

MVS Download. A feature of PSF/MVS that allows the PSF/MVS program to automatically send data sets from the JES spool, without formatting them, directly to either PSF/6000 or OnDemand for AIX, using the TCP/IP protocol. PSF/6000 and OnDemand servers on AIX systems receive the data sets into files, which can be automatically formatted and printed by PSF/6000 or loaded into OnDemand for AIX.

MVS/ESA. Multiple Virtual Storage/Enterprise System Architecture.

N

NetSpool. A feature of PSF/MVS that allows an installation to automatically direct VTAM application data targeted for a network printer to the JES spool, without changing the VTAM applications. From the JES spool, the data set can be printed on a JES or PSF/MVS printer or sent to another location for printing.

network. A collection of data processing products that are connected by communication lines for information exchange between locations.

Network File System (NFS). A protocol developed by Sun Microsystems that uses Internet Protocol to allow a set of cooperating computers to access each other's file system as if they were local.

NFS. Network File System.

Network Print Facility (NPF). In IBM TCP/IP for MVS, a feature that routes VTAM, JES2, or JES3 printer output to printers in a TCP/IP network.

NPF. Network Print Facility

O

OnDemand for AIX. A client/server application that you can use to replace hard copy reports and microfiche, and provide fast, online access to information. An OnDemand server manages electronic archives of reports and documents. You can use an OnDemand client program to search for information and view, print, and FAX copies of reports and documents.

OnDemand server. The server that is part of OnDemand for AIX and receives files from MVS Download.

output writer. A part of the job entry subsystem that receives job output from the system spool.

P

page definition. A resource used by PSF that defines the rules of transforming line data into MO:DCA-P data and text controls.

parameter. Information that the user supplies to a panel, command, or function.

port. (1) A part of the system unit or remote controller to which cables for external devices (display stations, terminals, or printers) are attached. The port is an access point for data entry or exit. (2) A specific communications end point within a host. A port is identified by a port number.

PostScript. A page description language with graphics capabilities that was developed by Adobe Systems, Incorporated.

print queue. In the AIX operating system, a file containing a list of the names of files waiting to be printed.

Print Services Facility (PSF). A licensed program that manages and controls the input data stream and output data stream required by supported IBM page printers. PSF combines print data with other resources and printing controls to produce AFP output.

protocol. A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication.

PSF. Print Services Facility.

psfin. A PSF/6000 print command that allows you to submit jobs:

- Stored on tape as well as files
- Enabled for all PSF/6000 job-management functions

- Using all PSF/6000 print options in a job script file

PSF/6000. An intelligent printer driver that provides AFP capabilities for the AIX operating system on the RISC System/6000. AFP capabilities include electronic forms, images, graphics, and typographical fonts. Also called PSF for AIX.

PSF/6000 printer. A printer supported by the PSF/6000 licensed program.

PSF/6000 server. The server that is part of PSF/6000 and receives files from MVS Download.

R

resource. A collection of printing instructions used by Print Services Facility in addition to the print data set, to produce the printed output. PSF resources include coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions.

RISC System/6000. A family of workstations and servers based on IBM's POWER architecture. They are primarily designed for running multi-user numerical computing applications that use the AIX operating system.

routing-control data set. In MVS Download, a data set containing routing statements that associate routing criteria of class, destination, and form name with the socket addresses of PSF/6000 or OnDemand servers.

S

SDSF. System Display and Search Facility

server. (1) On a network, the computer that contains the data or provides the facilities to be accessed by other computers on the network. (2) A program that handles protocol, queuing, routing, and other tasks necessary for data transfer between devices in a computer system.

shell script. In the AIX operating system, a series of commands, combined in a file, that carry out a particular function.

shift-out, shift-in (SOSI). Special EBCDIC control codes that exist in the data stream to indicate the switches between double-byte and single-byte fonts.

single-byte coded font. A font in which the characters are defined by a 1-byte code point. A single-byte coded font has only one coded font section. Contrast with *double-byte coded font*.

| **SMF**. System management facilites.

SNA. Systems Network Architecture

socket address. In the AIX operating system, a data structure that uniquely identifies a specific communications end point. A socket address consists of a port number and an IP address.

spool. Simultaneous peripheral operation online.

startup procedure. A procedure used to start MVS Download and to specify initialization parameters and the routing-control data set.

syntax. The grammatical rules for constructing a command,

System Display and Search Facility (SDSF). An IBM-licensed program that provides a menu-driven full screen interface to obtain detailed information about the jobs and resources in an MVS/JES2 system.

| **System management facilities (SMF)**. An optional
| control program feature of OS/VS that provides the
| means for gathering and recording information that can
| be used to evaluate system usage.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.

T

table reference character (TRC). An optional control character in an input record that identifies the font to be used to print the record. The table reference character corresponds to a font number defined in a page definition font list or to the order of font names listed in the job control CHARS parameter.

TCP. Transmission Control Protocol.

TCP/IP. Transmission Control Protocol/Internet Protocol.

trace. A record of the execution of a computer program. It exhibits the sequences in which the instructions were executed. (A)

Transmission Control Protocol (TCP). A communications protocol used in Internet and in any network that follows the U.S. Department of Defense standards for inter-network protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It assumes that the Internet protocol is the underlying protocol.

TRC. Table reference character.

U

UCS. Universal character set.

universal character set (UCS). A printer feature that permits the use of a variety of character arrays. Synonymous with *font*.

V

Virtual Telecommunications Access Method (VTAM). An IBM licensed program that controls communication and the flow of data in an SNA network. It provides single-domain, multiple-domain, and interconnected network capability.

VTAM. Virtual Telecommunications Access Method.

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Print Services Facility/MVS:
MVS Download Guide

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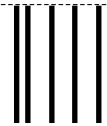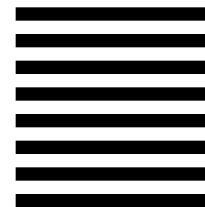
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