Print Services Facility for z/OS

Diagnosis

Version 4, Release 5.0

G550-0428-04

Note:
Before using this information and the product it supports, read the information in "Notices" on page 165.

This edition applies to the IBM Print Services Facility Version 4 Release 5 Modification 0 for z/OS, Program Number 5655-M32, and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces G550-0428-03.

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About this publication

This publication helps you communicate with the IBM® Support Center representatives as they work to isolate the source of a problem in Print Services Facility™ (PSF) for z/OS®, hereafter called PSF. The information in this publication is provided by IBM for diagnostic purposes and is subject to change as a result of maintenance and other activity. This publication does not give enough information to change or correct program logic.

Who should read this publication

Use this publication if you are a system programmer, a system analyst, or an application programmer responsible for diagnosing problems in PSF.

How this publication is organized

- Chapter 1, "Who can answer questions about PSF" describes the roles of the people involved and the steps they should take when diagnosing a problem with PSF.
- Chapter 2, "Building a keyword string" describes how to build a keyword string to help you communicate with the IBM Support Center.
- Chapter 3, "Using PSF operator interface commands" describes how to initialize the operator interface, stop and start traces, stop printer functional subsystem applications (FSAs), and display printer information and TCP/IP status.
- Chapter 4, "Using the PSF diagnostic tools" describes the diagnostic procedures, storage dumps, and traces that you can use to diagnose PSF software problems.
- Chapter 5, "Working with PSF Traces" describes how to start, stop, and format and print trace data.
- Appendix A, "Message-to-module cross-reference" associates the messages issued by PSF with the module or modules that detected the need for the messages.
- Appendix B, "Cross-reference of IPDS printer commands and structured fields" lists the printer commands built by PSF, as well as the source of the data.
- Appendix C, "PSF reason codes" presents the reason codes and return codes that PSF uses.
- Appendix D, "Printer information reports and system log output" shows examples of printer information in hardcopy and softcopy reports and in the system log. It also shows all possible record formats of the softcopy report.
- Appendix E, "Accessibility" describes the accessibility features available in z/OS.
- A notices section, glossary, bibliography, and index are included. The Bibliography lists the publications containing additional information about Advanced Function Presentation (AFP) printers, PSF, and related products.

Understanding the syntax notation used in this publication

The following notational conventions are used in the examples of job control language (JCL) parameters and PSF operator interface commands shown in this publication:

- Type uppercase letters, uppercase words, and the following symbols exactly as they appear in the command syntax:

comma ,

equal sign =

parentheses ( )

period .

- The variable data you must provide is printed in *italics*. Enter specific data to replace the characters in italics; for example, for PRT*nnnn*, you could enter PRT2.
- Parentheses show that the data they enclose is a list of subparameters. Enclose your own subparameter list in parentheses unless you select a single keyword subparameter or the default.
- Do not type any of the following symbols as part of a command or a JCL statement:

  Braces { }

  Brackets [ ]

  Underscore __

  Vertical bar |

  These symbols define the command format and have the following meanings:
  - Braces {} around items mean that you must select one of the items.
  - Brackets [] around a single item mean that the item is optional. Brackets around more than one item mean that you can select one or none of the items.
  - An underscored value is the default value. Unless you specify another value, PSF uses the underscored value.
  - A vertical bar | between options means that you must select one option.

Related information

Publications that are referred to in this document or that contain more information about AFP and related products are listed in the "Bibliography" on page 183. For information about all z/OS product publications, see *z/OS Information Roadmap*.

For more information about z/OS and PSF for z/OS go to these web pages:

- z/OS website at `http://www.ibm.com/systems/z/os/zos/`
- z/OS output management software at `http://www.ibm.com/systems/z/zos/printsoftware/`
- IBM Print Services Facility (PSF) for z/OS at `www.ibm.com/systems/z/zos/printsoftware/psfhome_z_ww.html`

To obtain the latest documentation updates for z/OS base elements and optional features that result from DOC APARs and PTFs, go to the DOC APARs and ++HOLD DOC web page at:

`http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/Shelves/ZDOCAPAR`

To obtain the latest documentation updates for PSF for z/OS, see the appropriate SYS1.SAMPLIB members in Table 1.

Table 1. SYS1.SAMPLIB Members for PSF Documentation Updates

Member	Publication
APSGADP5	*PSF for z/OS: AFP Download Plus*, S550-0433

Table 1. SYS1.SAMPLIB Members for PSF Documentation Updates (continued)

Member	Publication
APSGCUS5	*PSF for z/OS: Customization*, S550-0427
APSGDGN5	*PSF for z/OS: Diagnosis*, G550-0428
APSGDLG5	*PSF for z/OS: Download for z/OS*, S550-0429
APSGMAC5	*PSF for z/OS: Messages and Codes*, G550-0432
APSGSEC5	*PSF for z/OS: Security Guide*, S550-0434
APSGUSR5	*PSF for z/OS: User's Guide*, S550-0435

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- Your name and address
- Your email address
- Your telephone or fax number
- The publication title and order number:
  PSF V4R5 for z/OS: Diagnosis
  G550-0428-04
- The topic and page number related to your comment
- The text of your comment

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

IBM or any other organizations will only use the personal information that you supply to contact you about the issues that you submit.

If you have a technical problem

Do not use the feedback methods listed above. Instead, do one of these:

- Contact your IBM service representative.
- Call IBM technical support.
- Visit the IBM Support web page at:
  http://www.ibm.com/systems/z/support/

Summary of changes

PSF for z/OS: Diagnosis, G550-0428-04:

This publication contains additions and changes to information previously presented in *PSF for z/OS: Diagnosis*, G550-0428-03. The technical additions and changes are marked with a revision bar (|) in the left margin.

New information:

- The PINST trace has been added. See "Notify subtask traces" on page 30, "Determining the kind of trace you want" on page 45, Table 11 on page 46, "Directing external traces" on page 47, "Specifying trace parameters in the Printer Inventory" on page 47, and Table 12 on page 49.
- In Appendix A, "Message-to-module cross-reference," on page 73, these messages are new:

APS153I	APS534I	APS540I	APS1031I
APS1032I	APS1033I	APS1034I	APS1035I
APS1036I	APS2121I	APS2608I	APS3003I
APS3004I	APS3524I	APS4506I	APS8019I

- Definitions for MO:DCA Presentation Interchange Set 1 (MO:DCA IS/1) and MO:DCA IS/3 have been added to "Glossary" on page 169.

Changed information:

- GETHOSTBYNAME has been deleted and FREEADDRINFO, GETADDRINFO, and PTON have been added to Table 9 on page 38.
- GETHOSTBYNAME has been deleted and FREEADDRINFO, GETADDRINFO, and PTON have been added to "INITIALIZING TCP/IP, TCP/IP INTERFACE CONNECTED" in Table 10 on page 41.
- FREEADDRINFO has been added to "TERMINATING TCP/IP, TCP/IP INTERFACE CONNECTED" in Table 10 on page 41.
- The *tcpip_name* and Unicode parameters have been updated in "PARM parameters on the EXEC statement" on page 50.
- A recommended block size of 27920 has been added to "Specifying trace parameters in the Printer Inventory" on page 47 and "DD statements for PSF external trace output" on page 52.
- Figure 59 on page 71 has been updated for zFS tracing support.
- In Appendix A, "Message-to-module cross-reference," on page 73, these messages have been changed:
  - APS020I: module APSHPDSP has been removed.
  - APS8000I-APS8013I: module APSJCL2 has been changed to APSJCLO.
  - APS8211I: module APSHODDS has been added.
  - APS8240I: module APSHJCL has been changed to APSJCLO.
- The BPF structured field has been added to the Execute order home state (XOH) IPDS command in Table 14 on page 95.

- "JPEG File Interchange Format (JFIF)" has been changed to "AFPC JPEG Subset (JPEG)" in "Hardcopy printer information report" on page 137 and "Softcopy printer information report" on page 150.

Deleted information:

These messages are deleted in Table 7 on page 25 and Appendix A, "Message-to-module cross-reference," on page 73:

- APS1000I
- APS1004I

Chapter 1. Who can answer questions about PSF

When problems are encountered in PSF, these people are involved in identifying and correcting the problems:

- Diagnostician
- IBM Support Center representative
- IBM specialist
- IBM change team member

This chapter describes the roles and tasks of each of the people involved in diagnosing and correcting PSF problems.

Diagnostician

The diagnostician is a system programmer, system analyst, or application programmer who is responsible for diagnosing problems in PSF. This person can use this publication to identify the IBM program causing a problem and build a keyword string describing it (see Chapter 2, "Building a keyword string," on page 3). The diagnostician then uses the string to search in IBMLink to determine whether the problem has been described previously and, if so, whether a correction (or fix) already exists for it.

The diagnostician can contact an IBM Support Center representative for help in the search.

IBM Support Center representative

The IBM Support Center representative has three responsibilities in the diagnosis and correction process:

- Help the diagnostician search for known problems and existing fixes.
- Provide a program fix if one exists.
- Refer the problem to an IBM specialist if the problem is new.

IBM specialist

The IBM specialist contacts the diagnostician, and, together, they do two things to solve the problem:

- Verify that the diagnostician used the correct keywords in building the string.
- Gather additional information about the problem. For the information that might be needed, see "Preparing APARs" on page 13.

After confirming that no previous report of the problem exists, the IBM specialist develops a bypass, if the customer requires one to continue using the product. Also, the specialist gives the customer an authorized program analysis report (APAR) number to use when sending requested information to the IBM change team.

IBM change team member

The IBM change team member does these:

- Develops fixes for valid program problems reported in APARs.
- Makes the fix available to the customer reporting the problem.

- Modifies the keyword string, if necessary, to describe the problem more accurately.
- Adds the keyword string and the program fix to the database.

Chapter 2. Building a keyword string

Often a problem you encounter with PSF is one that other users have reported and that has been fixed. Records of such problems and their fixes are stored in an online database called IBM Software Support Facility and in a microfiche database called the early warning system (EWS). To search one of these databases, you can construct a keyword string, consisting of a concise series of terms, each of which describes one aspect of the problem. By constructing an accurate keyword string, you can help make the search quick, easy, and reliable.

Preparing to build the keyword string

Before you build a keyword string, do these:

1. Ensure that the problem is in PSF. If you find that the problem results from a user error, see *PSF for z/OS: User's Guide* or *PSF for z/OS: Customization* for the information about correcting the problem.
2. If PSF has been changed since you last used it, examine the changes. If you suspect that the problem is because of incompatibilities between your program and the changed PSF program, note the area in which the incompatibility seems to occur.
3. Correct all the problems reported in messages describing incorrect user data or resources. See *PSF for z/OS: Messages and Codes*.
4. Use the applicable diagnostic aids, such as traces and storage dumps, that might help you isolate the component that contains the problem. For a description of the aids available, see Chapter 4, "Using the PSF diagnostic tools."
5. Note the sequence of events that led to the problem. This information might be useful in developing a keyword string and is needed if an authorized program analysis report (APAR) is required.
6. If you suspect a problem in the PSF program, see Figure 1 on page 5 for an explanation of the procedure for selecting keywords.

Understanding keywords

Each keyword in a keyword string is a word or abbreviation describing one aspect of a PSF program problem. The first keyword gives the name of the PSF component in which the problem is thought to have occurred. By searching IBM Software Support Facility or EWS with this keyword, you can find all the APARs written for that component of PSF. By adding other keywords to the keyword string, you reduce the number of matches and increase the chances of finding a solution to your specific problem.

A complete string of keywords contains one keyword of each of these types:

- Component identification number
- Type of problem, with qualifiers
- Module or modifier
- Environment
- Release and maintenance level

If one of the types does not seem to apply to your problem, you can go on to the next type. In general, however, do not start your search until you have a complete string of keywords.

Your search will be most successful if you:
- Use only the keywords presented and described in this publication.
- Spell the keywords exactly as they are spelled here.
- Follow the keyword procedures in the order shown.

Throughout these procedures, each keyword string is highlighted in **bold** type. Each section provides a partial keyword string describing what is known so far about the problem. For some keywords, you might need to add a specific piece of information, for example, replacing the *x* of the MSGx keyword with the identifier of the message received. Continue to develop the keyword string until you are instructed to use it as a search argument.

The position of the keywords is not important; however, you do need to separate them with spaces.

The procedure for building and using a keyword string is diagrammed in Figure 1 on page 5. After reviewing this figure, see "Specifying component identification numbers" on page 6 to begin building a keyword string.

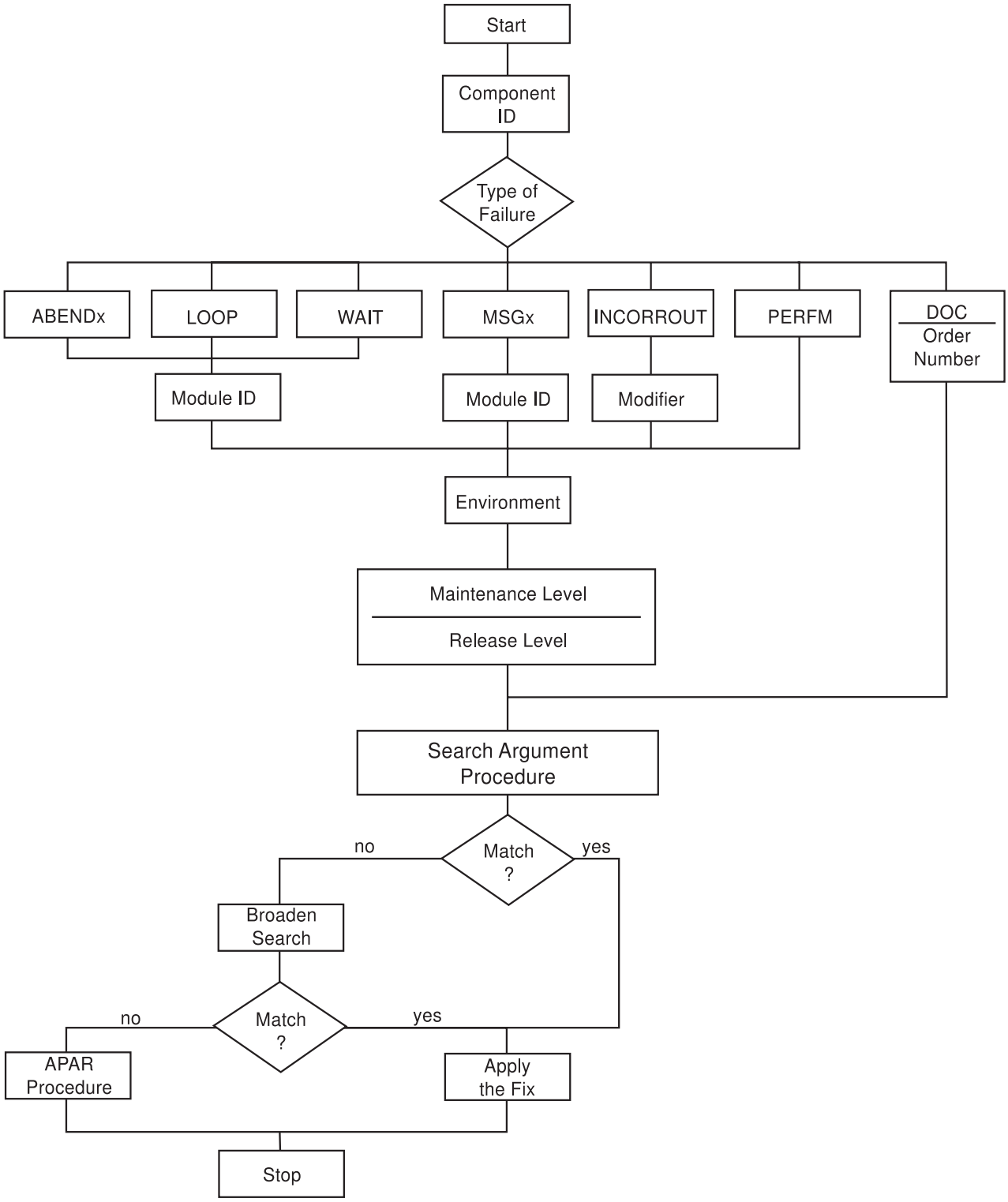

Figure 1. Building and using a keyword string

Specifying component identification numbers

1. Use the component identification (ID) number as the first keyword in a keyword string. Whenever you suspect that the problem is in PSF, use the component ID number for PSF, which is **5655M3201**.
2. Indicate the type of problem that occurred. See Specifying type-of-failure keywords.

Specifying type-of-failure keywords

The type-of-failure keyword identifies the type of program problem. The possibilities are:

ABEND*x*
Abnormal end of PSF. See "Using ABENDx."

LOOP Uncontrolled program looping. See "Using LOOP" on page 7.

WAIT Unexpected program suspension. See "Using WAIT" on page 7.

MSGx An error signaled by or associated with messages. See "Using MSGx" on page 8.

INCORROUT
Incorrect or missing output unrelated to a message. See "Using INCORROUT" on page 9.

PERFM
Performance degradation. Use this keyword only when no other keyword seems applicable. See "Using PERFM" on page 10.

DOC Documentation problem. See "Using DOC" on page 11.

Select the keyword that best describes the problem. If you are not certain which of two keywords to use, use the one listed first in the list. The following sections explain the situations that govern which type-of-failure keyword to use.

Using ABENDx

Use the ABENDx keyword when the host system, PSF, or any program that services PSF ends abnormally. If the abnormal end was forced by the host system or by the operator because of a prolonged wait state or an endless loop, do not use this keyword. In these situations, see the keyword descriptions of "Using LOOP" on page 7 and "Using WAIT" on page 7.

To specify the ABENDx keyword:

1. Replace the *x* in the ABENDx keyword with the ABEND code (in a dump, the last 3 hexadecimal numerals in the system completion code). For example, if the system completion code is 0C4, use ABEND0C4. If the code is 024, 027, or 0A6 (0A6 applies to the Page Printer Communication Component, [PPCC]), indicating that PSF ended abnormally, add RC and the reason code: in a dump, the last 4 hexadecimal numerals in register 15 at the time of the error. Thus, if the system completion code is 024, and register 15 reads 000194, use ABEND024 RC0194.

   The format of the keyword string might now be:

   ```
   5655M3201 ABEND024 RC0194
   ```

   where the first keyword is the component ID number, the second is the type of error, and the third is the reason code.

2. Determine which module failed. See “Specifying module keywords” on page 11.

Using LOOP

If a PSF program suspends activity for no clear reason, PSF might be in either a loop or a wait state. An example of a loop is a page of output that repeats endlessly. Use the LOOP keyword if part of PSF seems to go into an endless loop. For an endlessly repeated message, first use the MSGx keyword to conduct the search (see “Using MSGx” on page 8). If no match is found, use the LOOP keyword. If an intentional loop is used to wait for a resource, use the WAIT keyword (see “Using WAIT”) rather than the LOOP keyword.

Recommendation: Before requesting a dump, start the generalized trace facility (GTF) with the SYS and JOBNAME options to keep the trace overhead to a minimum. For details about how to obtain and print a GTF trace, see the Service Aids publication for your operating system.

To determine whether PSF is in a loop:

1. Run the job again and request a storage dump. Whenever possible, the dump should contain the z/OS system trace table and the PSF internal trace table (see “TRACE parameter on the PRINTDEV statement” on page 50). For details about how to include the PSF internal trace table, see Chapter 4, “Using the PSF diagnostic tools.”
2. Check the dump for the z/OS system internal trace table, the PSF internal trace table, or both. If the trace tables are not contained in the dump and you are unable to determine whether the problem is a wait or a loop, but you can re-create the problem, do these:
   a. Start the PSF internal trace. See “TRACE parameter on the PRINTDEV statement” on page 50.
   b. Redefine the trace table size to be as large as feasible.

   For details, see Chapter 4, “Using the PSF diagnostic tools.”
3. Run the job again and use the z/OS system DUMP command to request a dump, as described in the system commands publication for your operating system. Ensure that the SDATA operand of the command contains RGN (region). If the job is not in a loop, see “Using WAIT.”
4. Add the LOOP keyword to the string. The format of the keyword string might now be:

   ```
   5655M3201 LOOP
   ```

   where the first keyword is the component ID and the second specifies the type of problem.
5. Determine which module contains the problem. See “Specifying module keywords” on page 11.

Using WAIT

Use the WAIT keyword when the host system, PSF, or a program that services PSF suspends activity without issuing a message. Do not use this keyword if the wait occurs after an abnormal end, as the result of an unanswered message, or because of an endless loop in PSF; instead, use the ABEND or LOOP keywords (see “Using ABENDx” on page 6 or “Using LOOP”).

To determine if PSF is in a wait state:

1. Use the z/OS system DUMP command to request a dump, as described in the system commands publication for your operating system. Ensure that the SDATA operand of the command contains RGN (region) and that the dump contains the z/OS system trace table and the PSF internal trace table (see "TRACE parameter on the PRINTDEV statement" on page 50). For details about how to include the PSF internal trace table, see Chapter 4, "Using the PSF diagnostic tools."
2. Inspect the dump to see whether the wait bit is on in the program status word (PSW).
3. If the wait bit is on in the PSW, add the WAIT keyword to the string. The format of the keyword string might now be:

   ```
   5655M3201 WAIT
   ```
4. Identify the module that contains the problem. See "Specifying module keywords" on page 11.

Using MSGx

Use the MSGx keyword when one of these happens:

- A message is issued when it should not have been.
- A message is not issued when it should have been.
- A message contains data that is not valid or missing data.
- The corrective action suggested in *PSF for z/OS: Messages and Codes* does not correct the problem.

A set of 7 or 8 characters in the form "**APS***nnns*" or "**APS***nnnns*" identifies each PSF message. APS identifies the component; *nnn* or *nnnn* identifies the message serial number; and *s* identifies the message type.

Hint: If PSF issues a message when it should not, you can request a conditional dump for that message. See "Conditional dump" on page 22.

To specify the MSGx keyword:

1. Replace the *x* in the MSGx keyword with the message identifier. For example, if the message identifier is APS022I, the MSG keyword is:

   ```
   MSGAPS022I
   ```
2. Identify the module that detected the reason for the message. See Appendix A, "Message-to-module cross-reference."
3. Add the module name to the keyword string. If more than one module can issue the message, you might be able to isolate the issuing module by comparing the message context with the module functions.

   For example, message APS120I indicates an input record or resource that is not valid, and both the message variables and the associated messages show the type of input or resource. This message can be issued by any of these modules: APRENVAZ, APRCS2AZ, APRCP2AZ, APRCF2AZ, and APRFDPAZ.

   Note: The module that issued the message is not necessarily the module that contains the problem.

   The format of the keyword string might now be:

   ```
   5655M3201 MSGAPS052I APSPPGDS
   ```

   Or, if the reason for the message can be detected by more than one module:

   ```
   5655M3201 MSGAPS120I APRENVAZ
   5655M3201 MSGAPS120I APRCS2AZ
   ```
4. Select the correct environment keyword. See "Specifying environment and printer keywords" on page 12.

Using INCORROUT

Use the INCORROUT keyword when the output is not received or is not what you expected. Do not use this keyword for output that is repeated endlessly; instead, use the LOOP keyword (see "Using LOOP" on page 7).

To specify the INCORROUT keyword:

1. Ensure that the output is really incorrect, not just undesirable in appearance.
2. Add the INCORROUT keyword to the string. The format of the keyword string might now be:

   ```
   5655M3201 INCORROUT
   ```

3. Use modifier keywords, in the following order, to describe the incorrect output:
   a. Select one modifier keyword from Table 2 to describe the document in which the incorrect output occurred.

Table 2. Modifier keywords: Description of document

Modifier Keyword	Document
LINE	The document consisted of one or more line format pages, optionally including structured fields.
COMPOSED	The document consisted of one or more composed-text pages, such as the output from DCF or OGL. XML input produces composed-text pages.
MIXED	The document consisted of both line-format and composed-text pages.

   b. Select one or more modifier keywords from Table 3 to describe the part that is incorrect. For example, if the incorrect output involves a page segment in an overlay, specify **OVERLAY SEGMENT**.

Table 3. Modifier keywords: Description of incorrect part

Modifier Keyword	Incorrect Part
BIN	You did not get the bin number you specified.
DBLFONT	You did not get the double-byte font you specified.
DOCUMENT	You did not get the document as you specified it.
DUPLEX	You did not get the simplex or duplex printing you specified.
EXIT	You did not get the user exits you requested.
SNGLFONT	You did not get the single-byte font you specified.
GROUP	You did not get the correct number of identical copies of a form.
IMAGE	You did not get the image you specified, the image was not in the orientation or position you specified, a scaling (double dot) error occurred, or the image was not repeated correctly.
MARGIN	The side, top, or bottom margin is not what you specified.
MOD	Data was not correctly added to or suppressed in selected copies of certain pages of the data set.
OVERLAY	You did not get the electronic overlay you specified, the overlay was not in the orientation or position you specified, or part of the overlay (to be described by using one or more additional keywords) was wrong.
PAGE	You did not get the page as you specified it.
RULE	The position, direction, length, or weight of one or more rules is not what you specified.

Table 3. Modifier keywords: Description of incorrect part (continued)

Modifier Keyword	Incorrect Part
SEGMENT	You did not get the page segment you specified, or you did not get the orientation or position you specified.
TEXT	The content, position, line spacing, or orientation of the text is not what you specified.

c. Select one or more modifier keywords from Table 4 to describe what is wrong with the incorrect part.

Table 4. Modifier keywords: Description of how the part is incorrect

Modifier Keyword	How Part is Incorrect
CONTENT	The content of the part was wrong.
DIRECTION	The rule direction was wrong.
EXTRA	An extra part was included in the output.
LENGTH	The rule length was wrong.
LINESPACE	The line spacing for a document, a page, or a text string was wrong.
MISSING	The part was missing from the output.
ORIENT	The orientation of the part was wrong.
POSITION	The position of the part was wrong.
REPEAT	The repetition of text or image cells was wrong.
SCALE	A scaling (double dot) error in an image occurred.
SIZE	The size of the part was wrong.
WEIGHT	The rule weight was wrong.

The format of the keyword string that describes the case of extra, identical copies of one or more sheets of data would be:

```
5655M3201 INCORROUT LINE GROUP EXTRA
```

4. Narrow the search if you want by defining the incorrect output more precisely. These are a few examples of INCORROUT strings:
   - In a composed-text page, the text in an included page segment was not in the expected orientation:

     ```
     5655M3201 INCORROUT COMPOSED SEGMENT TEXT ORIENT
     ```

   - On a line data page, an image specified as double-dot was printed in the normal size:

     ```
     5655M3201 INCORROUT LINE IMAGE SCALE
     ```

   - On a line data page, an overlay that was specified was not printed:

     ```
     5655M3201 INCORROUT LINE OVERLAY MISSING
     ```

5. Select the correct environment keyword. See "Specifying environment and printer keywords" on page 12.

Using PERFM

Use the PERFM keyword when part of PSF performs below your expectations and the performance problem cannot be corrected by system tuning. Use this keyword only when no other keyword seems applicable. Ensure that the application programs, the JCL, and the data set definitions have been thoroughly examined.

The speed with which a job is processed can be affected by the number and complexity of the resources used. Also, if you are running a 3800 printer under compatibility mode and then switch to all-points-addressable (APA) mode, you might note a difference in performance. This difference is not necessarily caused by a performance problem.

To specify the PERFM keyword:

1. Add the PERFM keyword to the string. The format of the keyword string might now be:

   ```
   5655M3201 PERFM
   ```

2. Select the correct environment keyword. See "Specifying environment and printer keywords" on page 12.

Using DOC

Use the DOC keyword when a programming problem seems to have been caused because information in a PSF publication is vague, incorrect, or missing.

To specify the DOC keyword:

1. After the DOC keyword, skip one space and add the order number of the publication. Do not use hyphens; that is, rather than G550-0428-03, type G550042803. The format of the keyword string might now be:

   ```
   5655M3201 DOC G550042803
   ```

2. If you find too many matches, add keywords unique to the documentation error you suspect. For example, add MSG*x* as a keyword if you are looking for a particular message because you suspect its contents are incorrect or unclear, or because it is not documented in *PSF for z/OS: Messages and Codes*.
3. If the search is unsuccessful, replace the suffix numerals in the order number ("01" in Step 1) with two asterisks, and search again. By including the asterisks, you are requesting a search for document errors in all the editions of a publication.

Specifying module keywords

The module keyword identifies the module related to the program problem. However, note that the module associated with the program problem is not necessarily the module that contains the problem.

If you have a storage dump, use this procedure to find the name of the module associated with the program problem:

1. In the storage dump, find the instruction address at which the abend occurred, the supervisor call instruction (SVC) for the WAIT was issued, or the LOOP occurred.
2. Back up from that instruction until you find a 6- to 8-character module ID (such as APSPPDVP) followed by a module date. Include this module ID as part of the keyword string.

   The format of the keyword string might now be:

   ```
   5655M3201 ABEND024 RC0194 APSPPDVP
   ```

3. Select the correct environment keyword. See "Specifying environment and printer keywords" on page 12.

Specifying environment and printer keywords

The environment and printer keywords describe both the environment under which PSF was running when the problem occurred and the type of printer that was specified.

To specify the environment and printer keywords:

1. Select one keyword according to the JCL used:

   DEFERRED
   You specified deferred-printing mode in the JCL (SYSOUT=).

   DIRECT
   You specified direct-printing mode in the JCL (UNIT=).

   Note: TCP/IP-attached printers and SNA-attached printers run only in deferred-printing mode under the Job Entry Subsystem (JES). All other printers run either in deferred-printing mode under JES or in direct-printing mode.

2. Specify the type of printer:

   D/T*xxxxmmm* where:
   xxxx = Printer number
   mmm = Model number

   For example, **D/T4312** specifies a 4312. You can use D/T3800 as a keyword for all models of the 3800.

   The format of the keyword string might now be:

   ```
   5655M3201 WAIT APSDLOAD DIRECT
                           D/T4312
   ```

3. Select the correct keywords for the version, release, and maintenance level of PSF. See "Specifying version, release, and maintenance level keywords."

Specifying version, release, and maintenance level keywords

The keywords of this type give exact details about the version, release, and maintenance level of PSF your installation is using. The System Modification Program/Extended (SMP/E) consolidated software inventory (CSI) data set contains the ID of the latest program temporary fix (PTF) that has been applied to your program. This ID, composed of two letters and five numerals, gives the maintenance level of your program. For help in finding the PTF ID, see the *SMP/E for z/OS User's Guide*.

To specify the version, release, and maintenance level keywords:

1. Specify, as a 3-digit code, the PSF version, release, and modification level from the cover of the *Program Directory for Print Services Facility for z/OS*, GI10-0281. For example, 420 represents Version 4 Release 2 Modification 0.
2. From the CSI listing, specify the ID, preceded by the prefix UY, UW, or UZ, of the latest PTF applied to your PSF program. Use the PTF number as a keyword *only* if you suspect that the PTF has caused the problem.

   The format of the keyword string might now be:

   ```
   5655M3201 WAIT APSDLOAD DIRECT 420
                           D/T4312
   ```

Using the keyword string as a search argument

You now have the information needed for an effective search of the problem listings in IBM Software Support Facility or EWS. If you do not have access to IBM Software Support Facility or EWS, consult your IBM Support Center; otherwise, use the keyword string as a search argument in IBM Software Support Facility or EWS. Each keyword describes one aspect of a program problem. The more precisely the keyword string describes the problem, the more selective the search is.

To specify the keyword string as a search argument:

1. Using the full keyword string you have developed, use a search tool, such as Info Access, to search IBM Software Support Facility or EWS.
2. From the list of matches, eliminate any APAR fixes or PTFs that have already been applied to your system.
3. Compare each remaining APAR or PTF closing description with the problem symptoms you have observed.
4. If you find a match and a fix, apply the fix described in the APAR record, and test the fix.
5. If you find a match but no fix, ask your IBM representative to notify you when a fix becomes available.
6. If you find no match, broaden the search by dropping keywords one at a time from the right side of the search argument; then, repeat the search.
7. If you still cannot find a match, consult your IBM Support Center.

Preparing APARs

Prepare an authorized program analysis report (APAR) only when you have followed the diagnostic procedures in this chapter and the keyword search has been unsuccessful.

To prepare an APAR:

1. Initiate an APAR:

   If, after you have consulted with your IBM Support Center for assistance, no fix for your problem is found, an IBM specialist will contact you to diagnose the problem in more detail. If the problem is a new one, the specialist will initiate an APAR. Be prepared to supply this information:
   - Customer number
   - Release level
   - Current service level (the PTF list and list of APAR fixes applied)
   - Keyword string or strings used to search IBM Software Support Facility or EWS
   - Processing unit number: serial number, type, and model
   - Printer type and model
2. Gather information for the APAR:

   You might be asked to supply any or all of this information to describe the environment of the PSF problem:
   - A description of the problem
   - The SMP/E PTF or SMP/E CSI listing
   - A small segment of the input statements and data that is sufficient to reproduce the problem
   - A small segment of the output that is sufficient to illustrate the problem

- Any traces or storage dumps that you have used to diagnose the problem
- The terminal operator log (or the control statement listing from the library)
- A full listing of the JCL used
- Any printed output of data related to the job or data set in error, such as data set error messages
- A copy of the link-edit map for load module APSPPIEP
- A copy of the host system log
- For a WAIT problem (if possible):
  - A description of the resource being waited for
  - The program module that is waiting
- For a LOOP problem, the location of the loop or at least a partial trace of the loop
- For a DOC problem, the location of the error in the publication and a description of the problem it caused
- For a PERFM problem, a description of the actual performance and the expected performance, and the source of the performance specification

3. Submit the information:

   When submitting information for an APAR to IBM, carefully pack and clearly identify any storage media that contains source programs, job stream data, data sets, or libraries.

   Note: If you submit confidential information to IBM, mark the information confidential. IBM considers all information submitted to be non-confidential unless otherwise indicated.

   Any storage media submitted must have this information attached and visible:

   - The APAR number assigned by IBM
   - A list of the data sets on the storage media, such as the application source program, JCL, or data
   - A description of how the storage media was made, including:
     - The JCL required to get the information from the tape
     - The exact JCL listing or the list of commands used
     - Labeling information used for the volume and its data sets
     - The recording mode and density
     - The attributes used for each data set

   Each source submitted must have this information attached and visible:

   - The APAR number assigned by IBM
   - The contents of the storage media, such as the source program, job control statements, or data

   Each dump, and any other printed information, must show the APAR number.

Chapter 3. Using PSF operator interface commands

The PSF operator interface can be used to:

- Initialize the operator interface
- Start traces dynamically
- Stop traces.
- Stop printer functional subsystem applications (FSAs)
- Display printer information
- Display TCP/IP status

This chapter describes the operator interface commands that can be used with PSF. The MVS™ MODIFY command can be used as a PSF operator interface, in deferred-printing mode only.

Operator interface commands can be entered at any time while PSF is running. However, if a command is directed to a specific FSA, that FSA must be up and running at the time when the command is issued or the command is rejected.

Initializing the operator interface

The PSF operator interface must be initialized before any PSF operator interface commands are processed.

Be aware: Before the PSF operator interface is initialized, enter only parameters on the MODIFY command that do not require a printer name (*fsa_name*), such as TRACEON or TRACEOFF; otherwise, the command fails. After the PSF operator interface is initialized, you can enter any MODIFY parameter.

To initialize the operator interface:

1. Use the Printer Inventory or the PSF startup procedure to indicate whether the operator interface is initialized automatically or whether you are prompted to issue a command to initialize the operator interface:
   - In the Printer Inventory, set the `Trace prompt` parameter to YES to prompt for operator interface initialization (see *PSF for z/OS: Customization* for more information).
   - In the PSF startup procedure, use the PARM parameter in the EXEC statement to indicate whether you are prompted. For example,

     ```
     //  EXEC PGM=APSPPIEP,PARM=(,,NOPROMPT)
     ```

     indicates that the PSF operator interface is intialized automatically, whereas

     ```
     //  EXEC PGM=APSPPIEP,PARM=(,,PROMPT)
     ```

     indicates that you must issue a command to initialize the operator interface. See “PARM parameters on the EXEC statement” on page 50 for more information about the PARM parameters.
2. Type the MODIFY (or F) command with the U parameter to initialize the PSF operator interface. The syntax of the command is:

   {MODIFY | F} *fss_name*,**U**

The parameters for initializing the PSF operator interface are:

fss_name
Specifies the name of the PSF functional subsystem (FSS) that has been initialized. This parameter is required.

U Specifies that the PSF operator interface is to be initialized.

Starting traces

A PSF operator interface command can affect one of these trace environments:
- An NST trace
- An FSA external trace for an active FSA
- FSA external traces for all FSAs that are not yet active
- An FSI trace
- An internal trace

To start a trace dynamically:

1. Type the MODIFY (or F) command with the TRACEON parameter. The syntax of the command is:

   {MODIFY | F} *fss_name*,**TRACEON**
   [,
   [*fsa_name***]**
   [,MODE={NOTIFY | FULL | SYNC | INTR | LIMIT | IPDS }]
   [,FORMAT={PSF | GTF}]
   [,COMP={ALL | (CCM | DEVM |
   DOCP | ERRM | EXIT | JCLM | LASI | LMC | LMM | MSGM |
   PPCC | PPQM | PPWTR | SRM | STRM | TCPIP) }]
   [,EID={FSI | PSF | ALL }]
   ]
2. Do one of these to affect a trace environment:
   - Specify MODE=NOTIFY without specifying a printer name (*fsa_name*) to affect the NST trace environment.
   - Specify the name of the printer FSA to affect the FSA external trace for a single FSA.
   - Do *not* specify a printer name to affect the FSA external traces for all FSAs.

For more information about these command parameters, see "Syntax of the PSF operator interface command" on page 54. For examples of using the PSF operator interface to start traces, see "Starting various traces" on page 59.

Stopping traces

To stop a trace, type the MODIFY (or F) command with the TRACEOFF parameter. The syntax of the command is:

{MODIFY | F} *fss_name*,**TRACEOFF**
[,
[*fsa_name***]**
[,MODE=NOTIFY]
]

For more information about the command parameters, see "Stopping a trace with the PSF operator interface" on page 69.

Stopping printer FSAs

If you cannot stop or cancel a printer by using a JES command, you can use the PSF operator interface to stop the printer FSA.

To stop a printer FSA, type the MODIFY (or F) command with the FORCE parameter. The syntax of the command is:

{MODIFY | F} *fss_name*,**FORCE**,*fsa_name*

For more information about the command parameters, see "Stopping a printer FSA" on page 43.

Displaying printer information in PSF

You can use the PSF operator interface to dynamically display printer information in the system log. The MVS MODIFY command is used to display the printer information in the system log; however, it can only be used in deferred-printing mode, PSF must be connected to the printer, and the printer must be in ready status. PSF is connected to the printer when APS933I has been issued and a disconnect message such as APS929I has not been issued.

To display printer information, type the MODIFY (or F) command with the DISPLAY and DATA=PRTINFO parameters. The syntax of the command is:

{MODIFY | F} *fss_name*,**DISPLAY**,*fsa_name*,**DATA=PRTINFO**

Note: AFP Download Plus does not support the DATA=PRTINFO parameter.

For more information about the command parameters, see "Displaying printer information" on page 32.

Displaying TCP/IP status in PSF

You can use the PSF operator interface to dynamically display the status of a TCP/IP connection on the console and system log.

To display TCP/IP status, type the MODIFY (or F) command with the DISPLAY and STATUS=TCPIP parameters. The syntax of the command is:

{MODIFY | F} *fss_name*,**DISPLAY,**[*fsa_name*]**,STATUS=TCPIP**

For more information about the command parameters, see "Displaying TCP/IP status" on page 36.

Note: To use the AFP Download Plus operator interface to display the status of a TCP/IP connection, see *PSF for z/OS: AFP Download Plus*.

Chapter 4. Using the PSF diagnostic tools

This chapter describes the diagnostic tools you can use to collect information about PSF software problems. These tools might help you identify the PSF module causing a problem. After you have identified the module causing the problem, you can include the module name in the keyword string you create for searching the database of known PSF problems, as explained in Chapter 2. If you cannot find a match for your problem in the database, the tools described in this chapter can provide useful information to your IBM specialist when further investigation of the problem is required.

This chapter describes these diagnostic tools that can be useful in diagnosing PSF problems:

- Diagnostic procedures
- Messages
- Restartable abends
- Dumps
- Traces
- Display functions
- Summary reports

This chapter also describes how to stop a printer FSA that does not respond to JES commands.

Diagnostic procedures

This section lists the problem situations corresponding to the first five keywords in "Specifying type-of-failure keywords" on page 6:

- Abend
- Loop or Wait
- Error message
- Incorrect output

The diagnostic tools you can use to gather information about the problem are indicated for each situation.

Abend

If you have correctly coded the JCL to request a dump, a storage dump is written to the applicable data set. For a description of the ways to request the various dumps, see "Dumps" on page 22.

Loop or Wait

If a loop or a wait is indicated, cancel the PSF-started task with a dump (see "Dumps" on page 22):

- If the dump indicates a loop, start the PSF internal wrap trace, start a GTF trace with the SYS and JOBNAME options, and request a dump by using the z/OS system DUMP command. Ensure that the SDATA operand of the DUMP command includes TRT.
- If the dump indicates a wait, you might want to start an FSA full external trace to get a complete history of the PSF activity. The full trace might help you determine the cause of the wait.

Error messages

The action to take in response to a message depends on the type of message. To correct an error condition, you might have to use an MVS SLIP trap or a conditional dump (see "Dumps" on page 22).

Error messages that are not valid

Three types of error messages that are not valid occur when:

- A message is issued when it should not have been.

  If you receive a PSF error message and follow the recovery actions described in *PSF for z/OS: Messages and Codes* without finding the source of the problem, use the DUMP keyword in the PRINTDEV statement to request that the system perform a conditional dump when the message occurs.
- PSF does not issue a message when it should.

  If you do not receive a PSF message when you think you should, run the job again and capture a PSF full FSA trace.
- A message contains data that is not valid or does not contain data that it should contain for the error encountered.

  Run the job again and capture a PSF full FSA trace.

Valid error messages

Do not confuse this case with one in which the message itself is in error. PSF messages point to the data stream object associated with the error. For an explanation of the error and for suggested actions to take, see *PSF for z/OS: Messages and Codes*.

Incorrect output

A conditional dump (see "Conditional dump" on page 22) or a PSF internal or external trace (see "Traces" on page 28) can help find the source of the program problem.

Messages

Whenever PSF ends abnormally, it issues an error message (either APS050I or APS055I) containing PSF abend reason codes. These codes are explained in *PSF for z/OS: Messages and Codes*.

If the system ends abnormally, the z/OS operating system issues messages containing system abend codes. These codes are explained in the messages publication for your operating system.

Restartable abends

PSF processing can refresh and restart an FSA. Restart is available for abend codes in Table 5.

Table 5. Restartable abend codes

Abend Category	Restartable Abend Codes
02XX abends	X'239' X'260' X'2BA' X'2BE' X'2E5' X'2EB' X'2EE' X'2F7' X'2F8'

Table 5. Restartable abend codes (continued)

Abend Category	Restartable Abend Codes
04XX and 05XX abends	X'435' X'490' X'4B0' X'4B1' X'4B2' X'4B4' X'4B5' X'4B6' X'4F0' X'4F5' X'502' X'51E' X'520' X'521' X'523' X'551' X'556' X'557'
06XX abends	X'602' X'652'
07XX abends	X'752' X'7A8'
08XX abends	X'850' X'851' X'860' X'880' X'881' X'891' X'8A0' X'8A1' X'8A2' X'8A3' X'8A4' X'8A5' X'8A6' X'8A7' X'8A8' X'8A9' X'8AA' X'8AB' X'8AC' X'8AD' X'8C0'
09XX abends	X'926' X'931' X'933' X'936' X'937' X'9B1' X'9B2' X'9B3' X'9B4' X'9B8' X'9BB' X'9BC' X'9C1' X'9C9' X'9CA' X'9C9' X'9F0' X'9F2'
0FXX abends	X'F00' X'F02' X'F03' X'F05' X'F06' X'F07' X'F09' X'F0A' X'F0B' X'F0C' X'F0D' X'F0E' X'F0F' X'F10' X'F11' X'F12' X'F13' X'F14' X'F15' X'F16' X'F17'

This is the processing for abends that can be restarted:

- For a restartable abend, PSF passes control to ESTAE, where the abend code and a time stamp are logged in a table. The table retains a certain number of abends to determine whether an abend loop is occurring.
- An abend loop causes the FSA to stop abnormally, and the restart processing ends.
- If an abend occurs during the restart processing, PSF proceeds with the normal abend processing for the original abend.
- During restart processing, you cannot use the PSF operator interface to send commands to the printer that is being restarted. This message indicates that restart processing has begun:

  ```
  APS038I RESTART PROCESSING IS BEGINNING FOR THE ABEND REPORTED ABOVE.
  ```

  You can resume sending PSF commands to the printer when you receive this message:

  ```
  APS057I ABEND RESTART PROCESSING HAS COMPLETED.
  ```

In these conditions, PSF does not attempt to restart:

- B1-security environment
- Direct-printing mode
- Abends that, if restarted, fail again or loop

To produce a dump during restart processing, specify either:

- An abend code on the PRINTDEV DUMP parameter. Figure 2 shows the format of the parameter.

```
DUMP=(ABDnnnn)

where nnnn is the abend code.
```

Figure 2. Specifying an abend code on the PRINTDEV DUMP parameter

- The `Dump: Code` parameter in the Printer Inventory. Table 6 on page 24 shows how to use this parameter.

Dumps

PSF typically produces a dump for an abend. However, PSF does not produce a dump for some abend reason codes. If you need a dump, you can obtain it by specifying the DUMP parameter in the PRINTDEV statement or by specifying the `Dump: Code` parameter in the Printer Inventory (see Table 6 on page 24).

Dumps containing information useful in diagnosing PSF problems can be generated when a dump parameter is specified, PSF abends, or a SLIP trap is set. Three types of dumps are used to diagnosis PSF problems:

Conditional dump
: A conditional dump is produced when a dump parameter is specified in the Printer Inventory or on the PRINTDEV statement of the PSF startup procedure, or in the JCL for direct-printing mode. This dump gives you an abend dump of PSF and PPCC activity when a specified PSF message is issued or a PSF reason code is generated.

Standard MVS abend dump
: A standard MVS abend dump is produced when PSF abends. PSF issues a message containing an abend reason code.

SVC dump
: An SVC dump is produced for system-related errors when the system operator sets a SLIP trap or types the DUMP command.

The following sections explain the three dumps and how to read a dump.

Conditional dump

When most PSF modules return control to a calling module, they set a return code and a reason code. You can request that a conditional dump occur when a PSF reason code is met or a specific PSF message is issued. For a list of PSF reason codes, see Appendix C, "PSF reason codes."

To request a conditional dump of PSF control blocks, specify a dump parameter on one of these:
- Infoprint Server Printer Inventory
- PRINTDEV statement of the PSF startup procedure in deferred-printing mode
- PRINTDEV statement of the print-job JCL in direct-printing mode

When a conditional dump occurs, the PSF task abends. If a PSF message identifier is specified to cause the conditional dump, an abend code of X'024 C20' is reported. If a PSF reason code is specified to cause the conditional dump, an abend code of X'024 D20' is reported.

In deferred-printing mode, the dump goes directly to SYS1.DUMPxx and is analyzed by using IPCS. For information about routing the dump output in direct-printing mode, see “MVS abend dumps (direct-printing mode)” on page 27.

Dump specified in the Printer Inventory

You can use the Infoprint Server Printer Inventory instead of the PSF startup procedure to specify a dump. Using the Printer Inventory is more efficient because it avoids the need to restart all the printers in a startup procedure when changing parameters. Only the printer for which parameters are changed needs to be restarted.

Keep in mind: Parameters available in the Printer Inventory, including dump parameters, are ignored in the PSF startup procedure when the Printer Inventory is used. Therefore, if you use the Printer Inventory, you must specify the parameters in the Printer Inventory instead of the startup procedure.

You can use the Printer Inventory component of Infoprint Server without licensing the Infoprint Server feature of z/OS. For more information, see *z/OS Infoprint Server Printer Inventory for PSF*.

To use the Printer Inventory instead of a PSF startup procedure for dump parameters, you must:

1. Specify the Printer Inventory name on the INV parameter in the PARM field of the EXEC statement for the startup procedure:

   ```
   //  EXEC PGM=APSPPIEP,PARM=('INV=piname')
   ```

   where *piname* is the four-character name of the Printer Inventory that is specified in the Infoprint Server configuration file. For example, `// EXEC PGM=APSPPIEP,PARM=('INV=AOPI')` specifies the default name of the Printer Inventory.
2. Specify dump parameters in the Printer Inventory by using the Printer Inventory Definition Utility (PIDU) or the Printer Inventory ISPF panels.

   Table 6 on page 24 shows how dump parameters are specified in the PIDU program or on the ISPF panels. When you are defining parameters on the ISPF panels, see the online help for information about each parameter.

For more information about the Printer Inventory, see *PSF for z/OS: Customization*.

Table 6. Specifying dump parameters in the Printer Inventory

Dump Parameter Name		
ISPF Panel	**PIDU**	**Description**

Dump: Code	dump-code	Identifies a reason code that causes a conditional dump of the PSF address space when the reason code occurs. The reason code can be:
		• A 7-character hexadecimal abend reason code for an abend that PSF does not typically provide a dump, such as a restartable abend; the first three characters of an abend reason code are always ABD. For example:
		`ABD011C`
		See *PSF for z/OS: Messages and Codes* for a list of abend reason codes.
		• An 8-character hexadecimal PSF reason code; you can enter the hexadecimal characters only or the hexadecimal characters with a prefix of **0x**. For example:
		`09600c00`
		`0x09600c00`
		See Appendix C, "PSF reason codes," on page 101 for a list of PSF reason codes.
		• An integer from 0 to 2147483647. For example:
		`157289480`
		Notes:
		1. If both a reason code and a message ID are specified, a dump occurs at the first occurrence of either one.
		2. For an explanation of restartable abends, see "Restartable abends" on page 20.

Dump: Message ID	dump-message-id	Identifies a PSF message that causes a conditional dump of the PSF address space when the message occurs. The dump occurs after the message is issued for the number of times specified by the Dump: Count parameter, or on the first occurrence of the message if the Dump: Count parameter is not specified. Syntax: **APS***nnnnt* *nnnn* 3- to 4-digit message number *t* One of these type codes: **A** Message requiring operator action **I** Information message Examples: **APS896I**, **APS620A** **Notes:** 1. PSF ignores some messages. See Table 7 on page 25 for a list of message IDs that PSF ignores even if they are specified. 2. If both a reason code and a message ID are specified, a dump occurs at the first occurrence of either one.

Table 6. Specifying dump parameters in the Printer Inventory (continued)

Dump Parameter Name		
ISPF Panel	**PIDU**	**Description**
Dump: Count	message-count-before-dump	Specifies the number of times the message specified by the Dump: Message ID parameter is issued before PSF produces a conditional dump. Values: 1 to 99

Dump specified on the PRINTDEV statement

The information in the conditional dump follows standard dump format. Figure 3 contains the syntax of the DUMP parameter in the PRINTDEV statement.

```
DUMP=([reasoncode|ABDnnnn] [,msgid,count])
```

Figure 3. Syntax of the DUMP Parameter in the PRINTDEV statement

The DUMP parameters are:

reasoncode
: Specifies an 8-character PSF reason code. For a list of PSF reason codes, see Appendix C, "PSF reason codes."

ABD*nnnn*
: Specifies a 7-character hexadecimal abend reason code for an abend that PSF does not typically provide a dump, such as a restartable abend. The first three characters are always ABD. For a list of abend reason codes, see *PSF for z/OS: Messages and Codes*.

msgid
: Specifies a PSF message identifier.

  Note: PSF ignores the DUMP parameter for some message IDs, because PSF is already in the middle of an abend when this second request for an abend is encountered. Table 7 lists the message IDs that PSF ignores even if they are specified. Use the DUMP parameter only as directed by support personnel.

Table 7. Message IDs that PSF ignores

APS000I	APS001I	APS002A	APS003A	APS004I	APS005I
APS006I	APS022I	APS023I	APS025I	APS038I	APS042I
APS043I	APS044I	APS045I	APS047I	APS049I	APS050I
APS051I	APS053I	APS054I	APS055I	APS060I	APS062I
APS063I	APS064I	APS065I	APS066I	APS067I	APS068I
APS069I	APS070I	APS071I	APS072I	APS075I	APS076I
APS077I	APS078I	APS084I	APS096I	APS097I	APS099I
APS580I	APS581I	APS582I	APS583I	APS584I	APS585I
APS586I	APS587I	APS588I	APS589I	APS590I	APS591I
APS592I	APS593I	APS594I	APS595I	APS596I	APS597I
APS598I	APS599I	APS605I	APS606I	APS608I	APS610I
APS611I	APS612I	APS613I	APS620A	APS621I	APS622I

Table 7. Message IDs that PSF ignores (continued)

APS623I	APS624I	APS625I	APS626I	APS627I	APS628I
APS629I	APS630I	APS635I	APS636I	APS637I	APS638I
APS639I	APS640I	APS645I	APS646I	APS647I	APS648I
APS649I	APS650I	APS651I	APS652I	APS653I	APS654I
APS655I	APS656I	APS661I	APS664I	APS667I	APS668I
APS669I	APS670I	APS671I	APS672I	APS683I	APS684I
APS685I	APS686I	APS687I	APS690I	APS692I	APS693I
APS694I	APS695I	APS696I	APS6979I	APS698I	APS699I
APS922I	APS928I	APS934I	APS955I	APS957I	APS990I
APS991I	APS995I	APS996I	APS998I	APS1001I	APS1002I
APS1003I	APS1005I	APS1006I	APS1007I	APS1008I	APS1700I
APS1701I	APS1702I	APS1703I	APS1704I	APS1705I	APS1706I
APS1707I	APS1708I	APS1709I	APS1710I	APS1711I	APS4500I
APS4501I	APS4502I	APS6508I	APS7000I	APS8500I	APS8501I
APS8560I	APS8562I	APS8563I	APS8564I	APS8566I	

For more information about PSF messages, see *PSF for z/OS: Messages and Codes*.

count
: Specifies a decimal number ranging from 1 to 99. PSF produces a dump immediately before the message indicated by *msgid* is issued for the *n*th time (where *n* is the number specified by *count*). For example, specify **4** for a count of 4, or specify **15** for a count of 15 messages. Specify a count only when you also specify *msgid*.

The time at which PSF produces a dump depends on what is specified on the DUMP parameter:

If the variable is:	A formatted dump is printed:
Reason code	When PSF encounters the reason code value when exiting from a module.
Abend reason code	When PSF issues an abend with an abend reason code.
Message identifier	When PSF issues a message for the *n*th time (where *n* is the message count). If you do not specify a message count, the dump occurs on the first occurrence of the message.
Message count	When PSF issues the message identified by the message identifier for the *n*th time, where *n* is the message count.

When both a message ID and a reason code are specified on the DUMP parameter, a dump occurs at the first occurrence of either situation. For example, Figure 4 on page 27 specifies that a dump is produced if either of these occur:

- PSF issues reason code 04052200.
- PSF issues message APS558I for the third time.

```
DUMP=(04052200,APS558I,3)
```

Figure 4. Specifying both a message ID and a reason code on the DUMP parameter

Figure 5 specifies that a dump is to occur when module APSDDS exits with reason code 04052200 (a data set cannot be printed because of an I/O error).

```
DUMP=(04052200)
```

Figure 5. Specifying that a dump occurs when module APSDDS exits with RC 04052200

Figure 6 specifies that a dump is to occur after message APS558I is issued for the third time (a page is too complex to be processed).

```
DUMP=(,APS558I,3)
```

Figure 6. Specifying that a dump occurs after message APS558I is issued a third time

Figure 7 specifies that a dump is to occur when PSF issues abend reason code 011C.

```
DUMP=(ABD011C)
```

Figure 7. Specifying that a dump occurs when PSF issues abend reason code 011C

MVS abend dumps (direct-printing mode)

To obtain a dump in direct-printing mode for a PSF abend, you must include a SYSUDUMP, SYSABEND, or SYSMDUMP DD statement in your print-job JCL. These statements describe the format in which the output is to be printed:

SYSUDUMP
Provides a dump of control information and the main storage as it relates to the load module. This information is formatted by the abend dumping service and is ready for printing.

SYSABEND
Provides a dump of the control information and the main storage as it relates to the load module. Additional data, if any, depends on what is defined on the z/OS system. This information is formatted by the abend dumping service and is ready for printing.

SYSMDUMP
Provides a dump of the control information and the main storage as it relates to the load module. Additional data, if any, depends on what is defined on the z/OS system. This information is not formatted by the abend dumping service. The interactive problem control system (IPCS) program can be used to view and print dumps.

SVC dumps (deferred-printing mode)

An SVC dump is recorded on SYS1.DUMPxx and can be caused by PSF abending or by the system operator issuing the DUMP command.

Reading a dump

For a description of how to read a dump, see *z/OS Problem Management*. For help in using a dump to solve a PSF problem, see *z/OS MVS Diagnosis: Tools and Service Aids*.

The IPCS program is used to view dumps at the display terminal and print them. See the IPCS publications for your operating system, *z/OS MVS IPCS User's Guide* and *z/OS MVS IPCS Commands*.

Traces

Several PSF-supplied traces and system traces can be helpful in diagnosing PSF software problems. The service representative in the IBM Support Center might ask you to run a trace to aid in diagnosing a problem. After you run the trace, you send it to the service representative who will then interpret it. The traces you can use are:

PSF internal wrap traces
The internal traces contain hexadecimal entries for most module entries and exits. Data for these traces is maintained in internal storage and wraps when the trace storage area is full. See "PSF internal wrap traces" on page 29 for more information.

PSF external traces
External trace records contain unformatted entries for PSF and PPCC activity. You must use the formatter utility to format these entries. PSF provides external traces of several different types, which are described in "PSF external traces" on page 30.

Note: To diagnose problems occurring at the attachment or SNA level, run a VTAM® buffer trace. For more information about VTAM buffer traces, see the applicable ACF/VTAM diagnosis guide.

Generalized trace facility traces
The trace produced by the z/OS generalized trace facility (GTF) contains z/OS system-level information as well as information pertinent to PSF. Data that might be useful in PSF diagnosis includes:
- I/O interrupts
- Start I/O operations
- SVC interrupts
- FSI interface
- Program interrupts
- External interrupts
- System recovery routine operations, including STAE/ESTAE operations

GTF traces run independently of PSF. If a GTF trace is started, you can also direct PSF trace output to the GTF trace data set (see "Specifying trace parameters with the PSF operator interface" on page 53). For more information on GTF, see the Service Aids publication that applies to the operating system you are running. To reduce the effect of external tracing on PSF processing, PSF writes unformatted external trace records to the output DD. To format these external trace records, two utilities are supplied: the PSF Trace Formatter and the GTF Formatting Appendage. Both utilities format external trace records after PSF processing is complete.

Note: You do not have to format traces to submit them to IBM. However, if your IBM service representative is going to view the trace at your installation, you will need to run the formatting routine.

z/OS (or system) traces

The z/OS trace produces a smaller set of information than the GTF trace. The z/OS trace provides the following information that might be useful in PSF diagnosis:

- I/O interrupts
- Start I/O operations
- SVC interrupts
- Program interrupts
- External interrupts
- Recovery events

For more information on the z/OS trace, see the diagnostic techniques publication (using dumps and traces) for your operating system.

ACF/VTAM traces

Several traces produced by ACF/VTAM can record data flow to and from an SNA-attached printer. For information about these traces, see the applicable ACF/VTAM diagnosis guide.

Note: You also have another option with the 3820 printer, because it has a trace capability that can record communication activity. For more information about printer traces, see the reference publication for your printer.

The following sections describe:

- PSF internal wrap traces
- PSF external traces
- Impacts of tracing

For information about starting, stopping, formatting, and printing traces, see Chapter 5, “Working with PSF Traces,” on page 45.

PSF internal wrap traces

A PSF internal trace is a wrap trace that contains general flow information. Only a small set of the control block information is saved. Because this is a wrap trace, it reflects only the most recent history of PSF processing.

If an internal trace is done in conjunction with a functional subsystem application (FSA) component external trace, the same PSF components are traced with both. For more information about specifying PSF component tracing, see “FSA component traces” on page 31.

The PSF internal wrap traces are maintained in PSF internal storage and cannot be directed to an external data set. To see the output of an internal trace, perform a memory dump of PSF internal storage. For more information on when and how dumping is done, see “Dumps” on page 22.

Separate wrap traces are maintained for:

- The FSS, which is used only for deferred-printing mode. This trace has a fixed length of 1 KB, which equals 1024 bytes.
- Each FSA. This trace has a variable length, from 4 KB to 3996 KB.

- The PPCC activity for each FSA if the printer is SNA-attached. This trace has a fixed length of 16 KB.

The FSS internal trace is always active when PSF is active. If the FSA internal trace is started for an SNA-attached printer, the PPCC trace is also started.

The procedures for running an internal trace are described in "Starting traces" on page 45.

PSF external traces

The PSF external traces are the notify subtask (NST) trace, the functional subsystem application (FSA) external trace, and the functional subsystem interface (FSI) trace. PSF external traces are directed to a data set specified by the individual user. For more information about specifying the data set for trace output, see "Directing external traces" on page 47. The procedures for running NST, FSA, and FSI traces are described in "Starting traces" on page 45.

Notify subtask traces

The notify subtask (NST) trace contains information related to the releasing and checkpointing of data sets by PSF. It does not contain information related to getting data set records or to the data set records themselves. A Printer Inventory notify subtask (PINST) trace is an NST trace that contains information specific to the Printer Inventory.

The data gathered in an NST trace for an FSA is recorded only if an FSA internal or external trace of the page printing writer (PPWTR) component is also active for that FSA. The NST trace can be directed either to the GTF data set or to a data set owned by PSF. PSF-owned trace data sets are specified in the JCL of the PSF startup procedure.

FSA external traces

An FSA external trace contains information related to the internal processing of PSF or to the interface between PSF and JES. It can include information generated by individual PSF subcomponents and related to the accessing, processing, and transmitting of print jobs. It can also trace input data records and output printer commands.

One FSA external trace can be active for each FSA controlled by PSF. An external trace for a particular FSA contains information only for that FSA. Multiple FSAs can be traced simultaneously. With a PSF trace, the trace data for each FSA must be directed to a separate data set. With GTF, however, multiple FSA external traces can be directed to a single GTF data set.

The information in an FSA external trace is user-controllable and can be subdivided into these categories:

FSA full trace
A full trace is the largest and most complete FSA external trace. All PSF subcomponents and all input records and output printer commands are traced.

FSA limit trace
A limit trace is the second largest FSA external trace. It is a shortened version of the FSA full external trace. All PSF subcomponents and all input records and output printer commands are traced; however, the data on input records, output printer commands, and TCP/IP buffers for object containers and IOCA image resources has been shortened to 32 bytes per

record. This trace is best used when the job you are trying to print contains large object containers and IOCA image resources.

FSA IPDS trace
An Intelligent Printer Data Stream (IPDS) trace contains only the output printer commands (the IPDS structured fields). It is used when microcode support requires a trace.

FSA component traces
A component trace provides a subset of the information provided by a full, limit, or IPDS trace. By use of the MVS MODIFY command, the operator can specify which PSF components are to generate trace entries. If all components are specified, the trace output is the same as that of the full, limit, or IPDS trace specified. For more information, see "Specifying trace parameters with the PSF operator interface" on page 53.

A component trace is useful if you know what pieces of trace information in your trace data set are necessary. Specifying one or more components helps reduce the volume of extraneous data in the trace. If you are not sure which components should be traced, however, use the FSA full, limit, or IPDS trace.

The components selected for a component external trace are also the only components traced by an internal FSA wrap trace.

FSA synchronization (SYNC) trace
A SYNC trace generates information relevant only to page repositioning and contains entries only when page repositioning occurs. A SYNC trace is completed faster than a full trace but contains less information.

FSI traces
The FSI trace contains information relevant to the interface between PSF and JES. The data itself is not traced, only the JES interface control information. If you want only the FSI traced, direct the output to the GTF data set.

Understanding the impacts of tracing
Consider these when using traces:

Processor Use
An FSA full external trace affects processor performance. You should not run a full external trace during a time of peak processor use. All other traces affect processor performance, too, but less significantly.

Printer Throughput
When tracing is active, printer throughput is directly affected by the volume of trace data being run. You should not run an FSA full external trace while other print jobs are running. All other external traces affect throughput, too, but less significantly.

DASD Requirements
An external trace is typically directed to a DASD data set. An FSA full external trace can become so large, however, that DASD space is affected. Consider directing a full external trace to some other device, such as a tape drive.

An error might occur after multiple data sets are processed. If you know which data set caused the error, you can start the trace dynamically, to reduce the volume of trace data. However, you should start the trace

before the print job that is causing the error. For more information about starting traces dynamically, see “Specifying trace parameters with the PSF operator interface” on page 53.

If a full trace is directed to DASD, allocate 6 cylinders for the first page processed while tracing is active, plus 1 cylinder for each additional page of data processed (IBM 3390 disk storage or equivalent).

Formatting a trace requires additional storage. Allocate 9 cylinders for the first page and 2 cylinders for each succeeding page.

If the print job contains large object container or IOCA image resources, a full trace is most likely too large to store. In a full trace, each resource is entirely traced each time it is sent to the printer. For these types of print jobs, it is recommended that you use the FSA limit trace, which does not trace all of the data for object container and IOCA image resources.

Timing

Activating a trace causes changes in the timing relationships between the processor and printer, with the result that problems might seem to disappear while tracing is active. The more data traced, the more skewed the timings.

When problems disappear while tracing is active, try traces that affect timing less but still evoke trace data relevant to the problem. The different types of traces, listed in order of increasing effect on timing, are:

- Internal wrap trace
- FSA SYNC trace
- NST trace
- FSI trace
- FSA component trace

  Note: A trace of only one component might be more useful than an FSI, NST, or FSA SYNC trace, depending on what component is traced.
- FSA component trace (multiple components)
- FSA IPDS trace
- FSA limit trace
- FSA full trace

Display functions

Instead of taking a PSF trace or dump, PSF display functions can be useful in these diagnostic situations:

- You need to verify the functional characteristics that are available from the Sense Type and Model (STM) IPDS command and the Execute Order Homestate (XOH) Obtain Printer Characteristics (OPC) IPDS command.
- You need to know the status of AFP Download Plus.
- You need to know the status of the TCP/IP connection.

This section describes the display functions used to obtain information about a printer and the status of AFP Download Plus or the TCP/IP connection.

Displaying printer information

If you need to obtain the functional characteristics of a printer, you can do so without creating a PSF trace or memory dump. By using the display function in PSF, you can display the information in the system log or write it to a data set so

you can view it or format and print it. The display function takes the printer information available with the IPDS STM and the XOH-OPC command responses and displays it to you.

These methods are used for displaying printer information:

- Activate the display printer information function in the PSF startup procedure. A DD statement in the PSF startup procedure defines the data set to which the printer information is sent. PSF always saves printer information for each printer defined in the startup procedure.
- Use the PSF operator interface to specify the display printer information parameter. This interface can dynamically display printer information in the system log. You can use the MVS MODIFY command to display the printer information in the system log; however, it can only be used in deferred-printing mode.

Requesting printer information with the PSF startup procedure

You use a DD statement in the PSF startup procedure to specify the data set where the printer characteristics information is written for each printer defined in the startup procedure. PSF creates a member in the data set for each printer. The member name in the data set is the printer FSA name, such as PRT612. Before you specify the data set in the DD statement, you must allocate a partitioned data set (PDS). After information is saved to the data set, you can view and print the printer information report.

Allocating the partitioned data set: You must allocate the PDS as "PDSE" to reduce problems with insufficient directory blocks and storage space and to allow multiple FSAs to open the data set without a system abend. IBM recommends that the PDS have the attributes specified in Table 8.

Table 8. Recommended PDS Attributes

Attribute	Value	Type	Description
DCB=DSORG=	PO	Required	PDS data set organization
DSNTYPE=	LIBRARY	Required	Data set defined as PDSE
DCB=RECFM=	VB	Required	Variable blocked records
DCB=LRECL=	512	Required	Maximum bytes in record
DISP=	SHR	Required	Data set can be used by multiple print files
SPACE=	(CYL,(*nn*,1,10))	Required	DASD cylinders needed to process data **Note:** Space requirements are dependent on the capabilities of the printer and the number of printers for which you want information. A primary allocation of two cylinders of DASD space is recommended as a starting point. More space is required if you have more than 15–20 printers for which you want to run reports.

Specifying the DD statement: Figure 8 on page 34 shows the format of the DD statement you use for saving printer information to a data set. The DD name for the PRTINFO data set must always be PRTINFO. The data set name can be anything you want; however, IBM suggests that you use the name of the startup procedure and the PRTINFO qualifier to accurately identify the information that the data set contains. You should also use DISP=SHR to let multiple PSF FSAs simultaneously write printer information to the data set.

```
//PRTINFO    DD   DSNAME=fssname.prtinfo,DISP=SHR
```

Figure 8. Saving Printer Information to a Data Set

Figure 9 shows the DD statement used to display printer information for a printer when the FSS name is APSWPROT.

```
//PRTINFO    DD DSNAME=APSWPROT.PRTINFO,DISP=SHR
```

Figure 9. Saving Printer Information to a Data Set (Sample)

Viewing and printing the report: After the printer information is saved to the data set, you can view the softcopy report (see "Softcopy report" on page 138 for an example of the source data). You can also format the softcopy report and print it as a hardcopy report.

To generate a hardcopy printer information report, use these IBM-supplied page and form definitions to format the softcopy report:

Page definition P1DPI01

Form definition F1DPI01

The page definition uses PPFA record formatting to define the resulting printer information report. It also uses proportional spaced and monospaced, sans-serif fonts from AFP Font Collection Version 2. Because the report contains unprintable characters returned by the printer for some fields, IBM recommends that you specify DATACK=BLOCK in your print request to avoid messages about incorrect characters.

Figure 10 shows an example of a job stream that formats the softcopy printer information report for printing as a hardcopy report.

```
//JOB1      JOB    ...
//STEP1     EXEC   PGM=IEBGENER
//SYSPRINT  DD     SYSOUT=*
//SYSIN     DD     DUMMY
//OUTRL     OUTPUT PAGEDEF=DPI01,FORMDEF=DPI01,DATACK=BLOCK
//SYSUT2    DD     SYSOUT=*, OUTPUT=*.OUTRL
//SYSUT1    DD     DSN=APSWPROT.PRTINFO(PRT612),DISP=SHR
```

Figure 10. Example of the Job Stream for Formatting the Printer Information Report

For an example of a hardcopy printer information report, see "Hardcopy report" on page 123.

Requesting printer information with the MODIFY command

A system programmer or operator who needs to obtain the functional characteristics of a printer can do so by specifying the display function with the PSF operator interface. The display function takes the printer information available with the IPDS STM command and the XOH-OPC command responses and dynamically displays it in the system log.

The MVS MODIFY command is used to display the printer information in the system log; however, it can only be used in deferred-printing mode, PSF must be

connected to the printer, and the printer must be in ready status. PSF is connected to the printer when APS933I has been issued and a disconnect message such as APS929I has not been issued.

Figure 11 shows the format of the MODIFY command used for displaying printer information.

```
{MODIFY | F} fss_name,DISPLAY,fsa_name,DATA=PRTINFO
```

Figure 11. MODIFY Command Format for Displaying Printer Information

To display printer information, the PSF operator enters the MODIFY (or F) command with the DISPLAY and DATA=PRTINFO parameters.

Note: The AFP Download Plus feature of PSF does not support the DATA=PRTINFO parameter.

The parameters used with the MODIFY command to display printer information are:

fss_name
Specifies the name of the FSS for which information is displayed. This parameter is required and must match the FSS parameter for the JES2 FSS statement or the FSSNAME parameter for the JES3 FSSDEF statement.

DISPLAY
Specifies that information is displayed in the system log. This parameter is required.

fsa_name
Specifies the name of the printer for which information is displayed. This parameter is required.

DATA=PRTINFO
Specifies that information from the STM and OPC is displayed in the system log.

Figure 12 shows the MODIFY command used to display printer information when the FSS name is APSWPROT and the printer name is PRT614.

```
MODIFY APSWPROT,DISPLAY,PRT614,DATA=PRTINFO
```

Figure 12. Displaying Printer Information (Sample)

For an example of printer information displayed in the system log, see "Softcopy report" on page 138.

Displaying AFP Download Plus status

A system programmer or operator who needs to know the status of AFP Download Plus can do so without taking a PSF trace. You can specify the MVS MODIFY command with the PSF operator interface or specify an AFPPARMS control statement parameter to display AFP Download Plus status on the console and system log. You can only use the commands in deferred-printing mode because AFP Download Plus transmits data through TCP/IP connections.

Use one of these methods to display AFP Download Plus status:

- Specify the MVS MODIFY command with the PSF operator interface. Figure 13 shows the required parameters of the MODIFY command used for displaying AFP Download Plus status.

```
{MODIFY | F}  fss_name,DISPLAY,[fsa_name],STATUS=AFPDP
```

Figure 13. MODIFY command format for displaying AFP Download Plus status (required parameters)

- Specify an AFPPARMS control statement parameter. The `display-afpdp-status` AFPPARMS control statement parameter is used for displaying AFP Download Plus status. The values are:

  yes
  AFP Download Plus processing status is activated and stays activated for the life of the FSA or until the DISPLAY,STATUS=AFPDP operator interface MODIFY command is issued. Processing status is reported at the end of the spool data set for both the spool data set transformation to MO:DCA-P and the transformed document transmission.

  no AFP Download Plus processing status is not activated. This is the default.

For a description of the parameters used to display AFP Download Plus status, see *PSF for z/OS: AFP Download Plus*.

Displaying TCP/IP status

A system programmer or operator who needs to know the status of a TCP/IP connection can do so without taking a PSF trace. By using the display function in PSF, you can display the TCP/IP status on the console and system log. The display function is specified with the PSF operator interface. This interface can dynamically display information on the console and system log. You can use the MVS MODIFY command to display the printer information on the console and system log; however, it can only be used in deferred-printing mode.

Figure 14 shows the format of the MODIFY command used for displaying TCP/IP status.

```
{MODIFY | F} fss_name,DISPLAY,[fsa_name],STATUS=TCPIP
```

Figure 14. MODIFY command format for displaying TCP/IP status

To display TCP/IP status, the PSF operator types the MODIFY (or F) command with the DISPLAY parameter. The parameters used with the MODIFY command to display TCP/IP status are:

fss_name
Specifies the name of the FSS for which the TCP/IP status is displayed. This parameter is required and must match the FSS parameter for the JES2 FSS statement or the FSSNAME parameter for the JES3 FSSDEF statement.

DISPLAY
Specifies that information is displayed on a display console and the system log. This parameter is required.

fsa_name
Specifies the name of the printer for which the TCP/IP status is displayed. This parameter is optional. If no printer name is specified, TCP/IP status for all active TCP/IP printers is displayed.

Note: *fsa_name* is a positional parameter; therefore, if you specify the STATUS=TCPIP parameter but do not specify an *fsa_name*, you must type a comma in place of the *fsa_name*.

STATUS=TCPIP
Specifies that status for the TCP/IP connection is displayed on a display console and the system log.

Figure 15 shows the MODIFY command used to display TCP/IP status when the FSS name is APSWPROT and the printer name is PRT614.

```
MODIFY APSWPROT,DISPLAY,PRT614,STATUS=TCPIP
```

Figure 15. Displaying TCP/IP status (sample)

Figure 16 shows the MODIFY command used to display TCP/IP status for all active TCP/IP printers when the FSS name is APSWPROT.

```
MODIFY APSWPROT,DISPLAY,,STATUS=TCPIP
```

Figure 16. Displaying TCP/IP status for all active TCP/IP printers (sample)

Figure 17 shows a sample of the TCP/IP status output displayed on the console when the MVS MODIFY command is entered with the DISPLAY and STATUS=TCPIP parameters.

```
00-          f apswprot,display,prt619,status=tcpip
  - STC00280  APS639I  APSWPROT APSWPROT ***  COMMAND(DISPLAY)
  - (CONT.) ACCEPTED.
  - STC00280  APS699I  TCPIP    DISPLAY  STATUS 955
  -                                                    PENDING
  - PRINTER........... TCP/IP STATUS.....................  COMMANDS.....
  - PRT619  READY      TCP/IP IS ACTIVE
  -                    PRINTER ATTACHED
```

Figure 17. Status output displayed on the console (sample). This output is for PSF. Output varies slightly for AFP Download Plus and Download for z/OS.

Figure 18 shows a sample of the TCP/IP status output displayed on the system log with the APS699I message when the MVS MODIFY command is entered with the DISPLAY and STATUS=TCPIP parameters.

```
  F WTRES600,DISPLAY,PRT619,STATUS=TCPIP
  APS639I  WTRES600 WTRES600 ***  COMMAND (DISPLAY) 948
  (CONT.) ACCEPTED.
  APS699I  TCP/IP   DISPLAY  STATUS 949
                                                     PENDING
  PRINTER........... TCP/IP STATUS.....................  COMMANDS.....
  PRT619  READY      TCP/IP IS ACTIVE
                     PRINTER ATTACHED
```

Figure 18. Status output displayed on the system log (sample). This output is for PSF. Output varies slightly for AFP Download Plus and Download for z/OS.

The TCP/IP status output displayed on the console and system log consists of a primary TCP/IP status and might consist of one or two sub-statuses and a pending command. The primary TCP/IP statuses, sub-statuses, and pending

commands that might be displayed on the console and system log for PSF are described in Table 9.For the statuses, sub-statuses, and pending commands that might be displayed for AFP Download Plus or Download for z/OS, see *PSF for z/OS: AFP Download Plus* or *PSF for z/OS: Download for z/OS*.

Table 9. TCP/IP status, sub-status, and pending command descriptions

TCP/IP Status Type	Description
Primary Status	
INITIALIZING TCP/IP	PSF is in the process of initializing the TCP/IP interface. Issue the MODIFY command again and if the same TCP/IP status is displayed, there is most likely a problem with the interface. Additional messages have already been or will be issued describing the problem in more detail. See "Note" on page 40.
TCP/IP IS ACTIVE	PSF has initialized the TCP/IP interface and is ready to start a job or is actively processing a job. This is the normal status for the TCP/IP interface.
TCP/IP IS INACTIVE	The TCP/IP interface between PSF and TCP/IP is inactive because either: • The interface has not started yet (INITAPI). This can occur when MGMTMODE=OUTAVAIL and there is no work for PSF; therefore, PSF is not connected to the printer. • The interface has stopped (TERMAPI) and has not restarted yet (INITAPI). This can occur when MGMTMODE=OUTAVAIL, the DISCONNECT interval timer has expired, and there is no more work for PSF; therefore, PSF is not connected to the printer.
TERMINATING TCP/IP	PSF is in the process of stopping the TCP/IP interface. Issue the MODIFY command again and if the same TCP/IP status is displayed, there is most likely a problem with the interface. Additional messages have already been or will be issued describing the problem in more detail. See "Note" on page 40.
Sub-Status	
TCP/IP INTERFACE CONNECTED	When PSF is initializing the TCP/IP interface, this sub-status indicates that has successfully completed. When PSF is stopping the TCP/IP interface, this sub-status indicates that CLOSE has successfully completed but TERMAPI has not. Issue the MODIFY command again and if the same TCP/IP status is displayed, there is most likely a problem with the interface. See "Note" on page 40.
NOT READY	This sub-status indicates that the printer is in the NOT READY state.
PRINTER ATTACHED	When TCP/IP is active, this sub-status indicates that PSF has successfully attached the printer (ASSIGNED). This is the normal sub-status for the TCP/IP interface.
CONNECTED	When PSF is initializing the TCP/IP interface, this sub-status indicates that CONNECT has successfully completed. When PSF is stopping the TCP/IP interface, this sub-status indicates that PSF has successfully closed the session (SESSION CLOSED). Issue the MODIFY command again and if the same TCP/IP status is displayed, there is most likely a problem with the interface. See "Note" on page 40.

Table 9. TCP/IP status, sub-status, and pending command descriptions (continued)

TCP/IP Status Type	Description
PRINTER IN SESSION	When PSF is initializing the TCP/IP interface, this sub-status indicates that the session has successfully started (SESSION OPENED). When PSF is stopping the TCP/IP interface, this sub-status indicates that PSF has successfully unattached the printer (UNASSIGNED). Issue the MODIFY command again and if the same TCP/IP status is displayed, there is most likely a problem with the interface. See "Note" on page 40.
READY	This sub-status indicates that the printer is printing or is waiting for a job.
Pending Command	
CLOSE	Issue the MODIFY command again and if the CLOSE command is still pending, there is most likely a problem with the interface. See "Note" on page 40.
CONNECT	Whenever this command is pending, PSF is unable to connect with the printer. An APS935I message either has already been issued or will be issued with more details, including the TCP/IP error number (errno) received. See "Note" on page 40.
FREEADDRINFO	Issue the MODIFY command again and if the FREEADDRINFO command is still pending, there is most likely a problem with the interface.
GETADDRINFO	Issue the MODIFY command again and if the GETADDRINFO command is still pending, there is most likely a problem with the interface.
INITAPI	Issue the MODIFY command again and if the INITAPI command is still pending, there is most likely a problem with the interface. See "Note" on page 40.
IOCTL	Issue the MODIFY command again and if the IOCTL command is still pending, there is most likely a problem with the interface. See "Note" on page 40.
PTON	Issue the MODIFY command again and if the PTON command is still pending, there is most likely a problem with the interface.
RECV	Issue the MODIFY command again and if the RECV command is still pending, there is most likely a problem with the interface. See "Note" on page 40.
SELECT BOTH	Select was issued looking for either a Read or Write operation with Read taking priority. Whenever this command is pending, PSF is waiting for a response from the printer and the printer is not responding.
SELECT READ	Select was issued for a Read operation only. Whenever this command is pending, PSF is waiting for a response from the printer, which is not responding.
SELECT WRITE	Select was issued for a Write operation only. Issue the MODIFY command again and if the SELECT WRITE command is still pending, there is most likely a problem with the interface. See "Note" on page 40.
SEND	Issue the MODIFY command again and if the SEND command is still pending, there is most likely a problem with the interface. See "Note" on page 40.

Table 9. TCP/IP status, sub-status, and pending command descriptions (continued)

TCP/IP Status Type	Description
SETSOCKOPT	Issue the MODIFY command again and if the SETSOCKOPT command is still pending, there is most likely a problem with the interface. See "Note."
SHUTDOWN	Issue the MODIFY command again and if the SHUTDOWN command is still pending, there is most likely a problem with the interface. See "Note."
SOCKET	Issue the MODIFY command again and if the SOCKET command is still pending, there is most likely a problem with the interface. See "Note."
TERMAPI	Issue the MODIFY command again and if the TERMAPI command is still pending, there is most likely a problem with the interface. See "Note."
Note: If the problem is only occurring on one TCP/IP-attached destination, it is most likely a printer problem. If the problem is occurring on all or multiple TCP/IP-attached printers, it is most likely a problem with TCP/IP and you should contact your TCP/IP administrator.	

When the TCP/IP status is displayed on the console and system log, it might be displayed in combination with a sub-status or a pending command. Each sub-status might have another sub-status, pending command, or both that is displayed with it. Table 10 on page 41 shows the possible combinations of TCP/IP statuses, sub-statuses, and pending commands that can be displayed on the console and system log for PSF. For the possible combinations that can be displayed for AFP Download Plus, see *PSF for z/OS: AFP Download Plus*.

Table 10. TCP/IP status combinations displayed on the console

TCP/IP Status	Sub-Status	Pending Command
TCP/IP IS INACTIVE	None	None
INITIALIZING TCP/IP One sub-status or pending command might be displayed with this status.		INITAPI
	TCP/IP INTERFACE CONNECTED	One of these might be displayed with the sub-status: • CONNECT • FREEADDRINFO • GETADDRINFO • PTON • SOCKET
	PRINTER CONNECTED	One of these might be displayed with the sub-status: • IOCTL • RECV • SELECT READ • SELECT WRITE • SEND • SETSOCKOPT
	PRINTER IN SESSION	One of these might be displayed with the sub-status: • RECV • SELECT READ • SELECT WRITE • SEND
TCP/IP IS ACTIVE The sub-status is always displayed with this status.	PRINTER ATTACHED One of these is displayed: • NOT READY • READY	One of these might be displayed with the sub-status: • RECV • SELECT BOTH • SELECT READ • SELECT WRITE • SEND

Table 10. TCP/IP status combinations displayed on the console (continued)

TCP/IP Status	Sub-Status	Pending Command
TERMINATING TCP/IP One sub-status is always displayed with this status.	PRINTER ATTACHED	One of these might be displayed with the sub-status: • CLOSE • RECV • SELECT READ • SELECT WRITE • SEND • SHUTDOWN
	PRINTER IN SESSION	One of these might be displayed with the sub-status: • CLOSE • RECV • SELECT READ • SELECT WRITE • SEND • SHUTDOWN
	PRINTER CONNECTED	One of these might be displayed with the sub-status: • CLOSE • SHUTDOWN
	TCP/IP INTERFACE CONNECTED	One of these might be displayed with the sub-status: • FREEADDRINFO • TERMAPI

Summary reports

An AFP Statistics (AFPSTATS) report is available in PSF to produce summary data about the resources used to print a document. The data in the report identifies resources used, describes how a resource is specified to PSF, and indicates the resource library (also called the repository) from which the resource is obtained.

The AFPSTATS report summarizes these resource types:
- Character sets
- Coded fonts
- Code pages
- Form definitions
- Object containers
- Overlays
- Page definitions
- Page segments
- TrueType and OpenType fonts
- Printer-resident fonts with a 16-digit global resource identifier (GRID)

The AFPSTATS report provides print file processing details that let you:
- Determine in which resource libraries PSF found each resource
- Determine whether PSF attempted to reload a resource and whether the reload completed, failed, or was ignored

- Determine whether PSF attempted to substitute one resource for another and whether the substitution completed or was ignored
- Determine whether one font was mapped to another
- Determine whether an inline resource was not used
- Diagnose some resource selection problems
- Obtain statistical data about how a print file is printed, such as the total number of pages, the number of times a specific resource was referenced, and the number of significant events
- Diagnose some print file printing performance problems

To generate an AFPSTATS report for a print file, the system programmer must first define an AFPSTATS repository, which is a partitioned data set where AFPSTATS reports are written. You define the repository with the AFPSTATS DD statement in the PSF startup procedure and then allocate the data set. After the AFPSTATS repository is defined and allocated, an AFPSTATS report can be requested for a print file by:

- Specifying the **AFPSTATS** keyword on the OUTPUT JCL statement. See *PSF for z/OS: User's Guide*.
- Using the XTP7ASAP flag in Exit 7.

The print file owner can use the OUTPUT JCL statement to request an AFPSTATS report for any PSF print file he or she owns; however, if XTP7ASAP is changed by the installation exit, it overrides the OUTPUT statement.

For information about defining an AFPSTATS repository and using Exit 7 to request an AFPSTATS report, see *PSF for z/OS: Customization*.

When an AFPSTATS report is written to the AFPSTATS repository, you can view it as a softcopy report or format it as a hardcopy report and print it.

Note: When the AFPSTATS report is active, PSF is collecting data and writing it to the AFPSTATS repository. These extra activities during PSF processing could cause degraded performance. Whenever you experience a problem with performance, first ensure that all extra activity, such as PSF traces and reports, are disabled before confirming the performance problem.

For more information about the AFPSTATS report, including the format of a softcopy or hardcopy AFPSTATS report, see *PSF for z/OS: User's Guide*.

Stopping a printer FSA

If you cannot stop or cancel a printer by using a JES command, you can use the PSF operator interface to stop the printer FSA. Figure 19 shows the syntax of the MODIFY command for stopping a printer FSA.

{MODIFY | F} *fss_name*,**FORCE** ,*fsa_name*

Figure 19. MODIFY command format for stopping a printer FSA

To stop a printer FSA, the operator types the MODIFY (or F) command with the FORCE parameter. The following list describes the parameters used with the MODIFY command to stop a printer FSA. All of the parameters are required.

fss_name
Specifies the name of the FSS that manages the printer FSA to be stopped. This

parameter must match the FSS parameter for the JES2 FSS statement or the FSSNAME parameter for the JES3 FSSDEF statement.

FORCE
Specifies that the printer FSA specified by *fsa_name* be stopped.

fsa_name
Specifies the printer to be stopped. For JES2, *fsa_name* can use either the PRINTR*nn* or PRT*nnnn* format. For JES3, *fsa_name* can be 1 to 8 characters, with the first character being alphabetic.

Note: When you issue the FORCE command, the FSA stops with abend code 024-E50. PSF issues message APS627I when it processes the FORCE parameter. If the FSA is tracing to an external trace data set when the FORCE parameter is issued, a C03 system abend might result for the trace data set when the FSS address space is stopped.

If the FORCE command is unsuccessful on JES3 systems, use the JES3 command shown in Figure 20 to stop the printer FSA.

```
*FAIL,PRTXX
```

Figure 20. JES3 command to stop the printer FSA

Chapter 5. Working with PSF Traces

This chapter describes how to:
- Start various PSF traces
- Stop a trace
- Format and print trace data
- Determine trace entry layouts

Starting traces

This section provides this information:

- An overview of what you need to do before you start a trace
- Ways to specify trace parameters in:
  - Infoprint Server Printer Inventory
  - PSF startup procedure
  - PSF operator interface
  - Direct-printing mode JCL
- Examples of how to start traces

Overview

This section describes the three steps you follow to start a trace:
1. "Determining the kind of trace you want"
2. "Selecting a method to start a trace" on page 46
3. "Directing external traces" on page 47

Determining the kind of trace you want

The type of trace you request depends on the problem you are diagnosing or the information you are collecting. Use these guidelines to determine which type of trace to request:

- If the problem is related to page repositioning during the printing of a data set, request an FSA full trace or an FSA limit trace if the job you are running contains large object container or IOCA image resources.
- If the problem is related to incorrect handling of the JES spool, request an NST trace and an FSA full trace. If the job you are running contains large object container or IOCA image resources, then request an FSA limit trace instead of an FSA full trace.
- If the problem is related to the common message log function, request a PINST trace and an FSA full trace.
- If the problem is related to the interface between PSF and JES, request an FSI trace.
- If the problem is related to a PSF abend, request an internal trace and, if possible, an FSA full trace. If the job you are running contains large object container or IOCA image resources, then request an FSA limit trace instead of an FSA full trace.
- If the problem is related to printer errors or to incorrect processing of a data set, request an FSA full trace. If the job you are running contains large object container or IOCA image resources, then request an FSA limit trace instead of an FSA full trace.
- If the problem cannot be re-created with an FSA full trace or an FSA limit trace, try directing the trace to the GTF data set. If the error still cannot be re-created,

request an internal trace. For information about specifying the size of the FSA internal trace table, see "Specifying trace parameters in the Printer Inventory" on page 47 or "PARM parameters on the EXEC statement" on page 50.

The method of starting a trace depends on the type of trace you want.

Selecting a method to start a trace

In deferred-printing mode, you can activate a trace and specify the trace control options you want in one of three places:

- The Infoprint Server Printer Inventory:
  - Printer Inventory Definition Utility (PIDU)
  - ISPF panels
- The PSF startup procedure:
  - TRACE parameter on the PRINTDEV statement
  - PARM parameters on the EXEC statement
  - DD statements for trace data sets
- The MVS MODIFY command, which serves as a PSF operator interface

Note: If you have installed the Download for z/OS feature or the AFP Download Plus feature, you can use the same dump and trace facilities as you use with PSF and specify trace parameters the same way. However, with Download for z/OS, you can only specify trace parameters in the startup procedure and on the MODIFY operator command. If you suspect the problem is in the Download for z/OS feature or the AFP Download Plus 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 FSI.

For more information about how to use the PSF trace facility with the Download for z/OS feature, see *PSF for z/OS: Download for z/OS*. For more information about how to use the PSF trace facility with the AFP Download Plus feature, see *PSF for z/OS: AFP Download Plus*.

In direct-printing mode, you can specify the parameters that activate and control a trace only in the print job JCL in either of two places:

- The TRACE parameter on the PRINTDEV statement
- The DD statements for trace data sets

The parameters that activate tracing in the Printer Inventory or the PSF startup procedure take effect when PSF is initialized. By using the PSF operator interface, you can control traces dynamically while PSF is running.

The methods of starting the various traces are summarized in Table 11. For samples of trace invocation, see "Starting various traces" on page 59.

Table 11. Methods of starting PSF traces

Trace	Deferred-Printing Mode			Direct-Printing Mode
	Printer Inventory (see page 47)	**PSF Startup Procedure (see page 49)**	**PSF Operator Interface (see page 53)**	**Print-Job JCL (see page 59)**
NST	x	x	x	
PINST	x			
FSA full	x	x	x	x

Table 11. Methods of starting PSF traces (continued)

Trace	Deferred-Printing Mode			Direct-Printing Mode
	Printer Inventory (see page 47)	**PSF Startup Procedure (see page 49)**	**PSF Operator Interface (see page 53)**	**Print-Job JCL (see page 59)**
FSA SYNC	x	x	x	
FSA component			x	
FSA limit	x	x	x	
FSA IPDS	x	x	x	
FSI			x	
Internal	x	x	x	x

Directing external traces

You can direct the output of FSA external traces and NST traces either to the GTF data set (only in deferred-printing mode) or to a PSF-owned data set. If you start an external trace as a part of PSF initialization, the trace output is always directed to a PSF-owned data set. Traces started by the PSF operator interface can be directed either to the GTF data set or to a PSF-owned data set.

When PSF is running, you can redirect the external trace output to the GTF data set or start a trace and direct its output either to the GTF data set or to a PSF-owned data set.

Only the PSF operator interface can be used to redirect trace output. A single PSF operator interface command can start a trace and direct its output. For more information about directing trace output with the PSF operator interface, see "Specifying trace parameters with the PSF operator interface" on page 53.

When you direct the output of FSA external traces and NST traces to PSF-owned data sets, use separate data sets. If you direct two traces to the same PSF-owned data set, you can get unpredictable results or even lose trace data. For example, the name of a PINST data set must be different than both the data set name for the FSA external trace and the NST trace data set name. PSF simultaneously directs the output of all FSA external traces and NST traces to a single GTF data set.

For information about defining PSF-owned data sets for trace output, see "DD statements for PSF external trace output" on page 52.

Before you direct external trace output to the GTF data set, you must start GTF. The number of FSAs that can be traced with GTF is limited to 16. For information on running GTF, see *z/OS MVS Diagnosis: Tools and Service Aids*.

Note: When you start a GTF trace, use the USR trace option for GTF; otherwise, GTF rejects all PSF entries, which are not included in the trace data set. Also, use the JOBNAMEP option for GTF, to restrict the extraneous data in the GTF trace.

Specifying trace parameters in the Printer Inventory

You can use the Infoprint Server Printer Inventory to specify trace parameters. Using the Printer Inventory is more efficient than using the PSF startup procedure

because it avoids the need to restart all the printers in a startup procedure when changing parameters. Only the printer for which parameters are changed needs to be restarted.

Keep in mind: Parameters available in the Printer Inventory, including trace parameters, are ignored in the PSF startup procedure when the Printer Inventory is used. Therefore, if you use the Printer Inventory, you must specify the parameters in the Printer Inventory instead of the startup procedure.

You can use the Printer Inventory component of Infoprint Server without licensing the Infoprint Server feature of z/OS. For more information, see *z/OS Infoprint Server Printer Inventory for PSF*.

To use the Printer Inventory instead of a PSF startup procedure for trace parameters, you must specify the Printer Inventory name on the INV parameter in the PARM field of the EXEC statement for the startup procedure:

```
//  EXEC PGM=APSPPIEP,PARM=('INV=piname')
```

where *piname* is the four-character name of the Printer Inventory that is specified in the Infoprint Server configuration file. For example, `// EXEC PGM=APSPPIEP,PARM=('INV=AOPI')` specifies the default name of the Printer Inventory. The INV parameter replaces the trace options you specify when you are not using the Printer Inventory (see Figure 22 on page 50).

When using the Printer Inventory, the trace data set must exist and be cataloged before PSF is started. For an FSA trace, the trace data set must exist and be cataloged before the PSF FSA is started. For an NST trace and a Printer Inventory notify subtask (PINST) trace, the trace data set must exist and be cataloged before the first PSF FSA in the FSS is started.

The trace data set must be allocated with these attributes:

- The record length must be 80.
- The block size must be a multiple of 80. For better performance, a block size of 27920 is recommended.
- The record format must be F, U, or FB. FB is recommended for best performance.
- The organization must be sequential (no directory allocated).

The size required for the trace data set depends on the type of trace being generated and how long tracing is to last. For FSA full traces (the largest kind), a general rule is a data set of six cylinders for the first page, plus one cylinder for each additional page of data printed (IBM 3390 disk storage or equivalent). For complex pages containing many fonts, overlays, page segments, object containers, and IOCA images, more storage might be required.

When PSF is started and a trace is requested, any data in the trace data set from an earlier operation of PSF is replaced.

You can specify trace parameters in the Printer Inventory Definition Utility (PIDU) or on the Printer Inventory ISPF panels. Table 12 on page 49 shows how trace parameters are specified in the PIDU program or on the ISPF panels for an FSS and an FSA. When you are defining parameters on the ISPF panels, see the online help for information about each parameter.

For more information about the Printer Inventory, see *PSF for z/OS: Customization*.

Table 12. Specifying trace parameters in the Printer Inventory

Type	Trace Parameter Name		Description
	ISPF Panel	**PIDU**	
FSS	NST trace dsname	nst-trace-dsname	The name of the data set that PSF directs an NST trace to. This name must be different than the data set name PSF directs an FSA external trace to.
	PINST trace dsname	pinst-trace-dsname	The name of the data set that PSF directs a Printer Inventory notify subtask (PINST) trace to. This name must be different than both the data set name PSF directs an FSA external trace to and the NST trace data set name.
	Trace prompt **Values:** / = Yes Blank = No	trace-prompt **Values:** yes no	A value that indicates whether an operator response is required each time the FSS starts to initialize the PSF operator interface. The default is NO.
	Trace table size	trace-table-size	A number that indicates how many 4 KB pages of storage are allocated for the FSA internal trace table. When defined for the FSS, this allocation applies to all FSAs. Values: 1 to 999. The default is 32.
FSA	FSA trace dsname	fsa-trace-dsname	The name of the data set that PSF directs an FSA trace to when the trace mode is SYNC, FULL, LIMIT, or IPDS.
	Trace mode **Values:** 1 = None 2 = Internal 3 = Sync 4 = Full 5 = Limit 6 = IPDS	trace-mode **Values:** none internal sync full limit ipds	A value that indicates the type of PSF tracing that is started during FSA initialization: **NONE** No PSF tracing is started. **INTERNAL** An internal trace is started (default). **SYNC** An FSA SYNC external trace is started along with an internal trace. **FULL** An FSA full external trace is started along with an internal trace. **LIMIT** A shortened FSA external trace is started along with an internal trace. **IPDS** An FSA IPDS trace is started along with an internal trace. **Note:** You must specify the FSA trace dsname parameter when the trace mode is SYNC, FULL, LIMIT, or IPDS. Otherwise, you might receive an error message and the trace is not started.
	Trace table size	trace-table-size	A number that indicates how many 4 KB pages of storage are allocated for the FSA internal trace table. This allocation occurs only if the trace mode is INTERNAL, SYNC, FULL, LIMIT, or IPDS. Values: 1 to 999. The default is 32.

Specifying trace parameters in the PSF startup procedure

The PRINTDEV and EXEC statements in the PSF startup procedure contain parameters to start tracing or to specify trace options. DD statements in the PSF startup procedure define the data sets to which the output of an external trace is to

be sent. The syntax of each statement is described in this section. For examples of how to use these parameters to start the various traces, see "Starting various traces" on page 59.

Note: If you can re-create the problem, start an FSA full external trace at PSF initialization, which is described under "Starting an FSA full external trace at PSF initialization" on page 61. If the problem is intermittent, and you cannot re-create it, use the GTF trace data set, which is described under "Using the GTF trace data set" on page 63.

Editing the PSF startup procedure

To change the PSF startup procedure after a PSF FSA has started, perform these steps:

1. Stop each of the FSAs in the FSS.
2. Cancel the PSF address space.
3. Change the statements in the startup procedure.
4. Restart the printers.

TRACE parameter on the PRINTDEV statement

The PRINTDEV statement contains parameters that specify PSF processing defaults. Among these parameters is the TRACE parameter, as shown in Figure 21.

```
//fsa_name PRINTDEV
:
          TRACE={YES | NO}
```

Figure 21. Example of the TRACE parameter in the PRINTDEV statement

fsa_name
Specifies the name of the printer to which this PRINTDEV statement applies.

YES
Specifies that any requested PSF tracing for this FSA is to begin during FSA initialization. If you specify no other trace parameters in the PSF startup procedure, only PSF internal tracing is activated for this FSA. YES is the default.

NO Specifies that no PSF tracing is to be started during PSF initialization. You can use the PSF operator interface to start traces dynamically after PSF is initialized.

Specifying TRACE=YES on the PRINTDEV statement is the only specification required to start the FSA and PPCC internal traces.

For more information about the PRINTDEV statement, see *PSF for z/OS: Customization*.

PARM parameters on the EXEC statement

To specify trace options, you can include PARM parameters on the EXEC statement of the PSF startup procedure, such as:

```
//  EXEC PGM=APSPPIEP,PARM=(NSTddname,trace_type,prompt,trace_size,tcpip_name,UNICODE)
```

Figure 22. PARM parameters on the EXEC statement of the startup procedure

Note: The UNICODE parameter is no longer used. If you specify the value, it is ignored.

You must specify the options with the PARM parameter in the correct position. If you do not want to specify a value for a given parameter, type a comma in its place. For example, if you want to specify PSF prompting, type:

```
//  EXEC PGM=APSPPIEP,PARM=(,,PROMPT)
```

Figure 23. Example of specifying PSF prompting in the EXEC statement

The PARM parameters for trace options are:

NSTddname
Specifies the name of a DD statement defining the output data set in which to record the NST trace output. For information about specifying the DD statement, see "DD statements for PSF external trace output" on page 52. This name must conform to the standard JCL DD naming conventions.

This parameter specifies that the NST trace is to start during PSF initialization if you have specified TRACE=YES on the PRINTDEV statement and have defined the NST trace data set in a DD statement. If you want the NST trace to be started dynamically, do not specify the *NSTddname* parameter.

trace_type
Specifies the FSA trace to start:

FULL Specifies an FSA full external trace.

SYNC Specifies an FSA SYNC external trace.

INTR Specifies an FSA internal trace and, if the printer is SNA-attached, a PPCC internal trace. INTR is the default value.

LIMIT
Specifies a shortened FSA external trace.

IPDS Specifies an FSA IPDS external trace.

prompt Specifies whether an operator response is required to initialize the PSF operator interface:

PROMPT
Specifies that each time the FSS is initialized, the operator is to receive a message, APS620A, that prompts the operator to issue a response, which notifies PSF to initialize the PSF operator interface. The response can be any PSF operator interface command; it is directed to all FSAs or to the notify subtask.

Thus the operator can type commands, such as those to start FSI or FSA component traces, before PSF starts processing data sets. Prompting occurs even if the startup procedure does not include tracing specifications.

NOPROMPT
Specifies that the PSF operator interface is to be initialized automatically. No operator response is required. NOPROMPT is the default value.

trace_size
Specifies the number of 4 KB pages of storage to allocate for each internal FSA trace table. Valid values are from 1 to 999. The default is 32 (128 KB). This allocation occurs only if PSF internal tracing is active.

Note: When the number of pages specified is more than 32, and the specified region is greater than 32 MB, increase the PSF REGION size. To determine how large an increase is needed, use the equation in Figure 24, where *number of FSAs active* is the maximum number of FSAs active while the FSS is running.

```
REGION increase = (number of FSAs active) x 4 KB x (trace_size - 32)
```

Figure 24. Determining the region size

tcpip_name
Specifies the name of the TCP/IP address space. If this parameter is not coded, PSF uses the default name of TCPIP.

UNICODE
Specifies that PSF is enabled to use the system conversion services that z/OS provides. This parameter is ignored because PSF 4.5 or later is always Unicode-enabled.

DD statements for PSF external trace output

As is explained in "Directing external traces" on page 47, you can direct the output of a PSF external trace either to the GTF trace data set (in deferred-printing mode) or to a PSF-owned data set. To define the PSF-owned data sets, use the DD statements described in this section ; if you direct trace output to the GTF trace data set, PSF ignores these statements. When you use PSF-owned data sets, you must direct the output of each PSF external trace to a different data set.

The name of the DD statement depends on the type of trace output being directed to the data set:

- For an NST trace data set, the DD name must match the DD name specified in the first parameter of the PARM keyword on the EXEC statement.
- For an FSA trace data set, the DD name must match the *fsa_name* specified in the PRINTDEV statement for the FSA to be traced.

Figure 25 shows how to specify an NST trace together with a full trace.

```
//EXEC   PGM=APSPPIEP, PARM=(NSTTRACE,FULL)
:
//NSTTRACE  DD   DSNAME=XXXX,DISP=XXX
//*
//PRTZ      DD   DSNAME=XXXX,DISP=XXX
:

//PRTZ   CNTL
//       PRINTDEV
//       TRACE=YES
```

Figure 25. Specifying an NST trace with a full trace

If no valid data set name is specified, no PSF external trace data is recorded unless the operator directs the data to the GTF data set. For information on directing trace output to the GTF data set, see "Specifying trace parameters with the PSF operator interface" on page 53.

The parameters on the DD statement must follow these guidelines:

- The record length must be 80, which is the default.

- The block size must be a multiple of 80. If the block size is not specified, or if it is not a multiple of 80, it defaults to 1040. For better performance, the recommended block size is 27920.
- The record format must be F, U, or FB. The default is FB, which is recommended for best performance.
- The organization must be sequential (PS).

DASD data sets can be either preallocated or allocated by PSF, as in the following figuresFigure 26 and Figure 27. Preallocated data sets can be reused with no user action, but data sets allocated by PSF must be deleted or renamed before each PSF startup.

The required size of the data set depends on the type of trace being generated and how long tracing is to last. For FSA full traces (the largest kind), a general rule is a data set of 6 cylinders for the first page, plus 1 cylinder for each additional page of data printed (IBM 3390 disk storage or equivalent). For complex pages containing many fonts, overlays, page segments, object containers, and IOCA images, more storage might be required.

The examples in Figure 26 and Figure 27 show how to code a DD statement to direct the output of a PSF external trace to a DASD data set.

Figure 26 assumes that the data set has been preallocated and cataloged. The data set is reused on each successive PSF startup.

```
//ddname    DD   DSNAME=SYS1.PSF.TRACE,DISP=OLD
```

Figure 26. Writing trace results to a DASD data set

Note: Both **DISP=MOD** and **DISP=SHR** are acceptable.

Figure 27 shows how to send the result of a trace to an unallocated data set.

```
//ddname   DD DSNAME=SYS1.PSF.TRACE,UNIT=3390,VOL=SER=SYS000,
//            DISP=(NEW,KEEP,CATLG),SPACE=(CYL,(5,10),RLSE),
//            DCB=BLKSIZE=27920
```

Figure 27. Writing trace results to an unallocated data set

This DD statement causes a data set to be allocated with a record format of FB, a record length of 80, a block size of 27920, a primary space allocation of 5 cylinders, and a secondary space allocation of 10 cylinders.

Specifying trace parameters with the PSF operator interface

You can use the MVS MODIFY command as a PSF operator interface only in deferred-printing mode. This interface can start and stop traces dynamically. You can start the FSI and FSA component traces through the PSF operator interface.

When to issue PSF operator interface commands

A PSF operator interface command can affect one of these trace environments:

- An NST trace
- An FSA external trace for an active FSA
- FSA external traces for all FSAs that are not yet active
- An FSI trace

- An internal trace

To affect the NST trace environment, specify MODE=NOTIFY on the PSF operator interface command. (Do not specify a printer name when specifying MODE=NOTIFY.) To affect the FSA external traces for a single FSA, specify the name of the printer FSA on the PSF operator interface command. To affect the FSA external traces for all FSAs, do *not* include a printer name in the PSF operator interface command. For more information on these command parameters, see "Syntax of the PSF operator interface command."

Operator interface commands can be entered at any time while PSF is running. If a command is directed to a specific FSA, however, that FSA must be up and running at the time when the command is issued, or the command will be rejected.

You can type multiple operator interface commands during PSF processing. Remember that each successive command overrides all the options of preceding commands affecting the same trace. Even if you want to change only one characteristic of a trace, you still have to specify values for any of the other options for which you do not want the default value to be used.

When operator interface commands are processed

The time at which a PSF operator interface command is processed depends on the trace environment. The concept underlying the processing of operator interface commands is *FSA initialization*. FSA initialization is complete when PSF has processed the PRINTDEV statement in the PSF startup procedure.

The exact time of FSA initialization is hard to determine. These guidelines can help:

- When message APS620A is issued (as a result of the PROMPT parameter of the PARM keyword in the PSF startup procedure), no FSA has been initialized.
- When PSF issues the setup message for a channel-attached printer, the FSA for that printer has been initialized.
- For any printer, when the START command for that FSA is entered, FSA initialization occurs immediately after any of these types of commands:

  Commands affecting the NST trace
  Operator interface commands affecting the NST trace are typically queued internally by PSF. The commands are processed, and the options are changed as indicated, only on data set boundaries (any FSA) or on FSA initialization (any FSA), whichever occurs first.

  Commands affecting the tracing of a specific FSA
  Commands affecting the tracing of a specific FSA cannot be entered unless the FSA has been initialized. Commands are processed only when the FSA is idle or on data set boundaries. If the FSA is not idle, the command is queued and is processed on the next data set boundary.

  Commands affecting the tracing of all FSAs
  A command affecting the tracing of all FSAs is processed during the initialization of each FSA. The command affects only FSAs that have not yet been initialized—typically, only those that are not currently started. Therefore, the command does not affect an FSA that is already active, unless the FSA has to be reinitialized.

Syntax of the PSF operator interface command

Figure 28 on page 55 shows the format of the MODIFY command. For examples of using the PSF operator interface to start traces, see "Starting various traces" on page 59

page 59.

```
{MODIFY | F} fss_name,TRACEON
[,
[ fsa_name]
[,MODE={NOTIFY | FULL | SYNC | INTR | LIMIT | IPDS }]
[,FORMAT={PSF | GTF}]
[,COMP={ALL | (CCM | DEVM |
DOCP | ERRM | EXIT |  JCLM | LASI | LMC | LMM | MSGM |
PPCC | PPQM | PPWTR | SRM | STRM | TCPIP) }]
[,EID={FSI | PSF | ALL }]
]
```

Figure 28. PSF operator interface command format for starting traces

Note: The comma is always required if you specify keywords after TRACEON.

To start a trace, the PSF operator types the MODIFY (or F) command with the TRACEON parameter. The parameters used with the MODIFY command to start a trace are:

fss_name
Specifies the name of the FSS for which tracing should be started. This parameter is required and must match the FSS parameter for the JES2 FSS statement or the FSSNAME parameter for the JES3 FSSDEF statement.

TRACEON
Specifies that tracing should be started for one or more FSAs or for the notify subtask. This parameter is required.

fsa_name
Specifies the name of the printer for which tracing should be started. This parameter is optional and cannot be specified for NST traces (MODE=NOTIFY). For information about starting an NST trace for a specific FSA, see "Starting an NST trace dynamically" on page 61. If *fsa_name* is not specified, the command affects all the FSAs that are managed by the FSS and that are started after the command is entered. Notice that *fsa_name* is a positional parameter, which means that you must place it exactly as shown in Figure 28.

Note: *fsa_name* is a positional parameter. If you specify the MODE parameter but do not specify an *fsa_name*, you must type a comma in place of the *fsa_name*.

Figure 29 shows how to start a trace when no *fsa_name* is specified.

```
MODIFY fss_name,TRACEON,,MODE=INTR
```

Figure 29. Starting a trace without specifying a printer name

The *fsa_name* specified must match one of these:
- For JES2, the PRT*nnnn* statement
- For JES3, the JNAME parameter of the DEVICE statement

For more information about the JES2 PRT*nnnn* statement and the JES3 JNAME parameter, see *PSF for z/OS: Customization*.

The presence or absence of a *fsa_name* affects the time at which the MODIFY command is processed. For more information, see "When operator interface commands are processed" on page 54.

The six optional parameters of the MODIFY command are:

[MODE={NOTIFY | FULL | SYNC | INTR | LIMIT | IPDS }]

The **MODE** parameter specifies the trace type:

NOTIFY
Specifies that an NST external trace is to be started. The NST trace data for an FSA is recorded only if an FSA internal or external trace of the page printing writer (PPWTR) component is also active for that FSA.

Figure 30 shows how to specify an NST external trace.

```
MODIFY fss_name,TRACEON,,MODE=NOTIFY,FORMAT=GTF
```

Figure 30. Specifying an NST external trace

FULL
Specifies that an FSA full external trace is to be started. An internal FSA trace is also started, along with an internal PPCC trace for SNA-attached printers. If the FORMAT parameter is specified, the default for the MODE parameter is FULL.

Figure 31 shows how to specify a full external trace.

```
MODIFY fss_name,TRACEON,,MODE=FULL
```

Figure 31. Specifying a full external trace

SYNC
Specifies that an FSA SYNC external trace is to be started. An internal FSA trace is also started, along with an internal PPCC trace for SNA-attached printers.

INTR
Specifies that only internal tracing is to be done. An internal FSA trace is to be started, along with an internal PPCC trace for SNA-attached printers. If the FORMAT parameter is not specified, the default for the MODE parameter is INTR. If MODE=INTR is specified for a particular printer FSA, any active external tracing of that FSA stops when internal tracing starts. If MODE=INTR is specified on an operator command affecting all FSAs that were not initialized at the time the command was entered, any requests for external tracing of those FSAs in the PSF startup procedure are ignored.

Figure 32 on page 56 shows how to specify an internal trace.

```
MODIFY fss_name,TRACEON,PRI1,MODE=INTR
```

Figure 32. Specifying an internal trace

LIMIT
Specifies that a shortened FSA external trace is to be started. An internal FSA trace is also started, along with an internal PPCC trace for SNA-attached printers.

Figure 33 on page 57 shows how to specify a limit external trace.

```
MODIFY fss_name,TRACEON,,MODE=LIMIT
```

Figure 33. Specifying a limit external trace

IPDS
Specifies that an FSA external trace of only the output printer commands is to be started. An internal FSA trace is also started, along with an internal PPCC trace for SNA-attached printers.

Figure 34 on page 57 shows how to specify an IPDS external trace.

```
MODIFY fss_name,TRACEON,,MODE=IPDS
```

Figure 34. Specifying an IPDS external trace

[FORMAT={PSF | GTF}]
The FORMAT parameter specifies where external trace output is to be directed:

PSF
Specifies that the trace output is to be sent to a PSF-owned data set as defined in DD statements in the PSF startup procedure. This is the default. See "DD statements for PSF external trace output" on page 52.

GTF
Specifies that the trace output is to be sent to the GTF trace data set. If GTF is specified, the GTF program must be up and running before you type the PSF operator interface command. GTF must be specified for FSI traces and for NST traces that are started dynamically.

For more information on GTF, see *z/OS MVS System Commands*.

[COMP={ ALL | (CCM | DEVM | DOCP | ERRM | EXIT | JCLM | LASI | LMC | LMM | MSGM | PPCC | PPQM | PPWTR | SRM | STRM | TCPIP) }]
Specifies the PSF components to be traced. You should specify COMP only for an FSA full, limit, or IPDS external trace or for FSA and PPCC internal traces (MODE=FULL, MODE=LIMIT, MODE=IPDS, or MODE=INTR). You can specify multiple components, but you must delimit them with commas. You can specify them in any order.

ALL
Specifies that all the following individual subcomponents are to be traced. ALL is the default. You cannot specify ALL with any individual subcomponents.

CCM
Common conversion machine

DEVM
Device manager

DOCP
Document processor

ERRM
I/O error manager

EXIT
PSF installation exits

JCLM
JCL modules

LASI
Library access system interface

LMC
Line-mode conversion

LMM
Line-mode migration

MSGM
Message modules

PPCC
Page Printer Communication Component (for SNA-attached printers)

PPQM
Pending page queue manager

PPWTR
Page printing writer

Note: If NST trace data is to be recorded, tracing of the PPWTR component must be active.

SRM
Resource Manager

STRM
Storage Manager

TCPIP
TCP/IP component

[EID={FSI | PSF | ALL}]
Specifies the Event IDs (EIDs) to be written to the GTF trace data set. If you do not specify FORMAT=GTF in conjunction with EID=PSF or EID=FSI, PSF uses the default value, EID=ALL. If you specify FORMAT=PSF, the value of the EID parameter is ignored. EID is valid only when FORMAT=GTF is specified. If EID is not specified, it defaults to ALL.

You can use the EID parameter in conjunction with the COMP parameter to limit the amount of data contained in the trace output. If you use EID=FSI, you should specify COMP=PPWTR or COMP=ALL.

FSI
Specifies that EIDs for events occurring on the FSI interface to PSF are to be written to the trace data set.

PSF
Specifies that all PSF EIDs are to be written to the trace data set, with the exception of EIDs for events occurring on the FSI interface to PSF.

ALL
Specifies that all supported EIDs are to be written to the trace data set.

To select PSF trace data when formatting the GTF trace data set, specify USR=(FDn) on the AMDPRDMP EDIT control card, where *n* is 4 for FSI trace information, and *n* is 0 for PSF information. If you want both FSI and PSF trace data, specify USR=(FD0, FD4) on the EDIT control card.

Specifying trace parameters in direct-printing mode JCL

When PSF is in direct-printing mode, only FSA full external tracing and FSA full internal tracing are permitted. The trace output can be directed only to a PSF-owned data set. The trace data set should be specified by the DD statement in the JCL for the print job to be traced (see Figure 35).

```
//ddname   DD DSNAME=SYS1.PSF.TRACE,UNIT=3390,VOL=SER=SYS000,
//            DISP=(NEW,KEEP,CATLG),SPACE=(CYL,(5,10),RLSE)
```

Figure 35. Trace data set specified in the DD statement

The DD statement in Figure 35 causes a data set to be allocated with a record format of FB, a record length of 80, a block size of 1040, a primary space allocation of 5 cylinders, and a secondary space allocation of 10 cylinders. The *ddname* must match the name on the PRINTDEV statement.

Also in direct-printing mode, the PARM parameters on the EXEC statement are ignored; the values for those parameters are assumed to be (,FULL,NOPROMPT,32). For information on the meaning of these PARM parameters, see "PARM parameters on the EXEC statement" on page 50.

Note: You cannot use the Printer Inventory or the PSF operator interface to specify trace parameters in direct-printing mode.

Editing the print job JCL

To change the print job JCL when PSF is using a printer in direct-printing mode, use this procedure:

1. Finish printing the current job.
2. Cancel the application program address space.
3. Change the statements in the JCL.
4. Restart the application program.

Starting various traces

The examples in this section show how to start these traces at PSF initialization and dynamically with the PSF operator interface:

- "Starting a PSF internal trace at PSF initialization"
- "Starting a PSF internal trace dynamically" on page 60
- "Starting an NST trace at PSF initialization" on page 60
- "Starting an NST trace dynamically" on page 61
- "Starting an FSA full external trace at PSF initialization" on page 61
- "Starting an FSA full external trace dynamically" on page 62
- "Starting NST and FSA full external traces dynamically" on page 65
- "Starting an FSA limit external trace at PSF initialization" on page 65
- "Starting an FSA limit external trace dynamically" on page 66
- "Starting an FSA IPDS external trace at PSF initialization" on page 67
- "Starting an FSA IPDS external trace dynamically" on page 67

Starting a PSF internal trace at PSF initialization

To start the PSF internal traces at PSF initialization and specify that 1 MB of storage is to be used for each FSA trace table, perform these steps:

1. Do one of these:
   - Specify a trace mode of INTERNAL, SYNC, or FULL in the Printer Inventory (see Table 12 on page 49).
   - Specify TRACE=YES either on the PRINTDEV statement in the PSF startup procedure or, if you are using PSF in direct-printing mode, in the print job JCL. TRACE=YES is the default on the PRINTDEV statement, so you can omit the TRACE parameter.
2. For deferred-printing mode only, specify the size of the internal trace table in the Printer Inventory (see Table 12 on page 49) or with the PARM parameter on the EXEC statement in the PSF startup procedure:

   ```
   PARM=(,,,256)
   ```

Internal tracing begins when the printer FSA is initialized.

Starting a PSF internal trace dynamically

To start the PSF internal traces dynamically by using the default size of the trace table, perform these steps:

1. Do one of these:
   - Specify a trace mode of NONE in the Printer Inventory (see Table 12 on page 49).
   - Specify TRACE=NO on the PRINTDEV statement in the PSF startup procedure.
2. Start the printer FSA with the START command.
3. Start GTF by using the procedures described in *z/OS MVS System Commands*.
4. Type a PSF operator interface command. Figure 36 shows the command for a printer name of PRT1 and an FSS name of FSS5.

```
MODIFY FSS5,TRACEON,PRT1
```

Figure 36. PSF operator interface command

Internal tracing begins when the FSA is idle or at the next data set boundary.

Starting an NST trace at PSF initialization

To start an NST trace at PSF initialization and direct its output to a data set called PSF.NSTDS, do one of these:

- In the Printer Inventory:
  1. Specify a trace mode of INTERNAL, SYNC, or FULL.
  2. Specify an NST trace data set name of PSF.NSTDS.

  See Table 12 on page 49 for a description of the trace mode and NST trace data set name parameters.
- In the PSF startup procedure:
  1. Specify TRACE=YES on the PRINTDEV statement for the FSAs that will be traced by the notify subtask. TRACE=YES is the default.
  2. Identify the *ddname* of the DD statement defining the trace output data set by using a PARM parameter on the EXEC statement. Figure 37 on page 61 shows the PARM parameter with a *ddname* of NSTDD.

```
PARM=(NSTDD)
```

Figure 37. The PARM parameter on the EXEC statement

3. Include a DD statement defining the NST trace output data set (see Figure 38).

```
//NSTDD    DD   DSNAME=PSF.NSTDS,DISP=OLD
```

Figure 38. The DD statement defining the NST trace output data set

NST tracing begins when the printer FSA is initialized.

Starting an NST trace dynamically

To start an NST trace dynamically and direct its output to the GTF data set, perform these steps:

1. Ensure that GTF tracing is started.
2. Ensure that the NST trace data set name parameter is not specified in the Printer Inventory (see Table 12 on page 49) or in the PARM parameter on the EXEC statement in the PSF startup procedure (see Figure 37). Any DD statements defining data sets to receive NST trace data are ignored.
3. Start the printer FSA with the START command.
4. Type a PSF operator interface command. Figure 39 shows the command for an FSS name of FSS5.

```
MODIFY FSS5,TRACEON,,MODE=NOTIFY,FORMAT=GTF
```

Figure 39. PSF operator interface command

5. Type one of these PSF operator interface commands:
   - To trace all components, type a command similar to the one in Figure 40.

```
MODIFY FSS5,TRACEON,PRT1,COMP=ALL
```

Figure 40. PSF operator interface command to trace all components

   - To restrict the amount of trace data to the minimum, type a command similar to the one in Figure 41.

```
MODIFY FSS5,TRACEON,PRT1,COMP=PPWTR
```

Figure 41. PSF operator interface command for minimal data

NST tracing begins at the next data set boundary. In this example, if an FSA external trace is active when the command in step 4 is entered, the active FSA external trace stops, and the NST trace begins. To start both the NST and FSA external traces simultaneously, see "Starting NST and FSA full external traces dynamically" on page 65.

Starting an FSA full external trace at PSF initialization

To start an FSA full external trace at PSF initialization and direct its output to a data set called PSF.FSATRC, do one of these:

- In the Printer Inventory:
  1. Specify a trace mode of FULL.
  2. Specify an FSA trace data set name of PSF.FSATRC. Allocate at least 25 cylinders for the trace data set.

  See Table 12 on page 49 for a description of the trace mode and FSA trace data set name parameters.
- In the PSF startup procedure or in the print-job JCL for direct-printing mode:
  1. Specify TRACE=YES on the PRINTDEV statement. TRACE=YES is the default.
  2. Specify PARM=(,FULL) on the EXEC statement.

     Note: If PSF is in direct-printing mode, do not include the PARM parameter.
  3. Include a DD statement for a new DSN containing the PSF full trace (see Figure 42). Allocate at least 25 cylinders for the trace data set.

```
//PRT2      DD    DSNAME=PSF.FSATRC,DISP=OLD
:
//PRT2      CNTL                    PRINTER 2 DEFINITION
//PRT2      PRINTDEV
//          TRACE=YES
:
//PRT2      ENDCNTL
```

Figure 42. Starting an FSA full external trace at PSF initialization

FSA full external tracing begins when the printer FSA is initialized.

Starting an FSA full external trace dynamically

You can start an FSA full external trace and direct its output to either a PSF-owned trace data set or to a GTF trace data set.

Using a PSF-owned trace data set: To start an FSA full external trace dynamically and direct its output to a data set called PSF.FSATRC, perform these steps:

1. Do one of these:
   - In the Printer Inventory:
     a. Specify a trace mode of INTERNAL.
     b. Specify an FSA trace data set name of PSF.FSATRC.

     See Table 12 on page 49 for a description of the trace mode and FSA trace data set name parameters.
   - In the PSF startup procedure:
     a. Specify either TRACE=NO or TRACE=YES on the PRINTDEV statement. IBM recommends specifying TRACE=YES so that an internal trace is started at PSF initialization. TRACE=YES is the default if you omit the TRACE parameter.
     b. Specify PARM=(,INTR) on the EXEC statement. INTR specifies that only an internal trace will start at PSF initialization. INTR is the default if you omit the PARM parameter.
     c. Include a DD statement in the PSF startup procedure to define the data set to receive the trace output. Figure 43 on page 63 shows the statement for a printer name of PRT2.

```
//PRT2      DD   DSNAME=PSF.FSATRC.DISP=OLD
:
//PRT2      CNTL                   PRINTER 2 DEFINITION
//PRT2      PRINTDEV
//          TRACE=YES
:
//PRT2      ENDCNTL
```

Figure 43. Specifying the data set to receive the trace output

2. Start the printer FSA with the START command.
3. Type a PSF operator interface command. Figure 44 shows the command for an FSS name of FSS5 and a printer name of PRT2.

```
MODIFY FSS5,TRACEON,PRT2,MODE=FULL
```

Figure 44. A PSF operator interface command for an FSS name of FSS5 and a printer name of PRT2

FSA full external tracing begins when the FSA is idle, or at the next data set boundary.

Note: To start an FSA SYNC trace instead of an FSA full trace, specify MODE=SYNC instead of MODE=FULL in the command in Figure 44.

Using the GTF trace data set: The following example starts PSF full tracing and also includes FSI events for PRT3 in FSS1, where FSS1 is the functional subsystem name. The output is directed to the GTF trace data set. To print the output in an ESA environment, use IPCS. To view the data, use IPCS with the COMMANDS option, GTF USR(FD0,FD4).

To start an FSA full external trace dynamically and direct its output to the GTF trace data set, perform these steps:

1. Set GTF to accept PSF input:

   START GTF
   S GTF.identifier,devname,volserial,(time=yes)

   where:

   identifier=
   User name for this GTF session

   devname=
   Device number or type of the output device that is to contain the trace data set

   volserial=
   Serial number of magnetic tape or DASD volume to contain the trace data set

   time=yes
   GTF is to time-stamp every record

   GTF responds
   xx AHL100A SPECIFY TRACE OPTIONS

   Enter r xx,trace=usrp,jobnamep

GTF responds
xx AHL101A SPECIFY TRACE EVENT KEYWORDS--
USR=,JOBNAME=

Enter r xx,usr=(fd0,fd4),jobname=(FSS1)

Note: Jobname= is the PSF Startup Procedure Name.

GTF responds
xx AHL102A CONTINUE TRACE DEFINITIONS or REPLY END

Enter r xx,end

GTF responds
AHL103I Trace Options Selected --USR=(FD0,FD4),Jobname=(FSS1)

GTF responds
xx AHL125A RESPECIFY Trace Options or Enter U

Enter r xx,u

GTF responds
AHL031A GTF Initialization Complete

2. Start the PSF trace and direct the output to GTF:
   a. Make sure the trace mode is INTERNAL in the Printer Inventory or the PSF startup procedure specifies PARM=(,INTR) on the EXEC statement. This is to ensure that only an internal trace is started at PSF initialization. INTR is the default if you omit this PARM parameter.
   b. Start the printer with the appropriate START command.
   c. Type a PSF operator interface command. Figure 45 shows the command for an FSS name of FSS1 and a printer name of PRT3.

```
MODIFY FSS1,TRACEON,PRT3,FORMAT=GTF,MODE=FULL
```

Figure 45. A PSF operator interface command specifying full tracing

   d. PSF FULL tracing for PRT3 in FSS1 begins at the next data set boundary, and is directed to the GTF trace data set.
   e. Run the failing job.
   f. Type a command similar to the one in Figure 46 to stop PSF tracing.

```
MODIFY FSS1,TRACEOFF,PRT3
```

Figure 46. Specifying the command to stop PSF tracing

   g. Type **P GTF** to stop GTF.

   Note: When you are attempting to start a PSF trace and write the output to the GTF trace data set, PSF might issue the message in Figure 47.

```
MSGAPS610I  RC04  GTF RETURN CODE RC04
```

Figure 47. PSF-issued message when writing output to the GTF data set

   This message means that GTF was not started with the correct USR event IDs. If you use the command in Figure 48 on page 65 to start PSF tracing, you must

specify **USR=(FD0,FD4)**.

```
MODIFY fss_name,TRACEON,PRTxxx,FORMAT=GTF
```

Figure 48. Specifying the correct GTF USR event ID

If you do not want both types of event, start GTF with the appropriate event ID. If you want FD0, add **EID=PSF** to the MODIFY command. If you want only the FD4 entries, add **EID=FSI** to the MODIFY command.

When starting a PSF NST trace, specify **USR=(FD0,FD4)** to direct its output to the GTF trace data set.

Starting NST and FSA full external traces dynamically

To start the NST and FSA full external traces dynamically and direct the outputs of both traces to the GTF data set, perform these steps:

1. Do one of these:
   - In the Printer Inventory, specify a trace mode of INTERNAL. See Table 12 on page 49 for a description of the trace mode parameter.
   - In the PSF startup procedure:
     a. Specify either TRACE=NO or TRACE=YES on the PRINTDEV statement. IBM recommends specifying TRACE=YES so that an internal trace is started at PSF initialization. TRACE=YES is the default if you omit the TRACE parameter.
     b. Specify PARM=(,INTR) on the EXEC statement. INTR specifies that only an internal trace will start at PSF initialization. INTR is the default if you omit this PARM parameter.
2. Ensure that the NST trace data set name parameter is not specified in the Printer Inventory (see Table 12 on page 49) or in the PARM parameter on the EXEC statement in the PSF startup procedure (see Figure 37 on page 61). Any DD statements defining data sets to receive NST trace data are ignored.
3. Start the printer FSA with the START command.
4. Start GTF by using the procedures described in *z/OS MVS System Commands*.
5. Enter the PSF operator interface commands. Figure 49 shows the commands for a printer name of PRT5 and an FSS name of FSS5.

```
MODIFY FSS5,TRACEON,,MODE=NOTIFY,FORMAT=GTF
MODIFY FSS5,TRACEON,PRT5,MODE=FULL,FORMAT=GTF
```

Figure 49. Commands for printer PRT5 and an FSS name of FSS5

NST and FSA full external tracing begins at the next data set boundary.

Starting an FSA limit external trace at PSF initialization

To start an FSA limit external trace at PSF initialization and direct its output to a data set called PSF.FSATRC, do one of these:

- In the Printer Inventory:
  1. Specify a trace mode of LIMIT.
  2. Specify an FSA trace data set name of PSF.FSATRC. Allocate at least 25 cylinders for the trace data set.

  See Table 12 on page 49 for a description of the trace mode and FSA trace data set name parameters.

- In the PSF startup procedure:
  1. Specify TRACE=YES on the PRINTDEV statement. TRACE=YES is the default.
  2. Specify PARM=(,LIMIT) on the EXEC statement.
  3. Include a DD statement for a new DSN containing the PSF limit trace (see Figure 50). Allocate at least 25 cylinders for the trace data set.

```
//PRT2      DD    DSNAME=PSF.FSATRC,DISP=OLD
:
//PRT2      CNTL                    PRINTER 2 DEFINITION
//PRT2      PRINTDEV
//          TRACE=YES
:
//PRT2      ENDCNTL
```

Figure 50. Starting an FSA limit external trace at PSF initialization

FSA limit external tracing begins when the printer FSA is initialized.

Starting an FSA limit external trace dynamically

You can start an FSA limit external trace and direct its output to either a PSF-owned trace data set or to a GTF trace data set.

Using a PSF-owned trace data set: To start an FSA limit external trace dynamically and direct its output to a data set called PSF.FSATRC, perform these steps:

1. Do one of these:
   - In the Printer Inventory:
     a. Specify a trace mode of INTERNAL.
     b. Specify an FSA trace data set name of PSF.FSATRC.

     See Table 12 on page 49 for a description of the trace mode and FSA trace data set name parameters.
   - In the PSF startup procedure:
     a. Specify either TRACE=NO or TRACE=YES on the PRINTDEV statement. IBM recommends specifying TRACE=YES so that an internal trace is started at PSF initialization. TRACE=YES is the default if you omit the TRACE parameter.
     b. Specify PARM=(,INTR) on the EXEC statement. INTR specifies that only an internal trace will start at PSF initialization. INTR is the default if you omit the PARM parameter.
     c. Include a DD statement in the PSF startup procedure to define the data set to receive the trace output. Figure 51 shows the statement for a printer name of PRT2.

```
//PRT2      DD   DSNAME=PSF.FSATRC.DISP=OLD
:
//PRT2      CNTL                   PRINTER 2 DEFINITION
//PRT2      PRINTDEV
//          TRACE=YES
:
//PRT2      ENDCNTL
```

Figure 51. Specifying the PSF-owned data set to receive the trace output

2. Start the printer FSA with the START command.
3. Type a PSF operator interface command. Figure 52 shows the command for an FSS name of FSS5 and a printer name of PRT2.

```
MODIFY FSS5,TRACEON,PRT2,MODE=LIMIT
```

Figure 52. A PSF operator interface command for an FSS name of FSS5 and a printer name of PRT2

FSA limit external tracing begins when the FSA is idle, or at the next data set boundary.

Using the GTF trace data set: The procedure to start an FSA limit external trace dynamically and direct its output to the GTF trace data set is exactly the same as for an FSA full external trace. See the procedure in "Using the GTF trace data set" on page 63.

Note: Instead of using MODE=FULL in Figure 45 on page 64, use MODE=LIMIT.

Starting an FSA IPDS external trace at PSF initialization

To start an FSA IPDS external trace at PSF initialization and direct its output to a data set called PSF.FSATRC, do one of these:

- In the Printer Inventory:
  1. Specify a trace mode of IPDS.
  2. Specify an FSA trace data set name of PSF.FSATRC. Allocate at least 25 cylinders for the trace data set.

  See Table 12 on page 49 for a description of the trace mode and FSA trace data set name parameters.
- In the PSF startup procedure:
  1. Specify TRACE=YES on the PRINTDEV statement. TRACE=YES is the default.
  2. Specify PARM=(,IPDS) on the EXEC statement.
  3. Include a DD statement for a new DSN containing the PSF IPDS trace (see Figure 53). Allocate at least 25 cylinders for the trace data set.

```
//PRT2      DD    DSNAME=PSF.FSATRC,DISP=OLD
:
:
//PRT2      CNTL                    PRINTER 2 DEFINITION
//PRT2      PRINTDEV
//          TRACE=YES
:
:
//PRT2      ENDCNTL
```

Figure 53. Starting an FSA IPDS external trace at PSF initialization

FSA IPDS external tracing begins when the printer FSA is initialized.

Starting an FSA IPDS external trace dynamically

You can start an FSA IPDS external trace and direct its output to either a PSF-owned trace data set or to a GTF trace data set.

Using a PSF-owned trace data set: To start an FSA IPDS external trace dynamically and direct its output to a data set called PSF.FSATRC, perform these steps:

1. Do one of these:
   - In the Printer Inventory:
     a. Specify a trace mode of INTERNAL.
     b. Specify an FSA trace data set name of PSF.FSATRC. Allocate at least 25 cylinders for the trace data set.

     See Table 12 on page 49 for a description of the trace mode and FSA trace data set name parameters.
   - In the PSF startup procedure:
     a. Specify either TRACE=NO or TRACE=YES on the PRINTDEV statement. IBM recommends specifying TRACE=YES so that an internal trace is started at PSF initialization. TRACE=YES is the default if you omit the TRACE parameter.
     b. Specify PARM=(,INTR) on the EXEC statement. INTR specifies that only an internal trace will start at PSF initialization. INTR is the default if you omit the PARM parameter.
     c. Include a DD statement in the PSF startup procedure to define the data set to receive the trace output. Figure 54 shows the statement for a printer name of PRT2.

```
//PRT2      DD   DSNAME=PSF.FSATRC.DISP=OLD
:
//PRT2      CNTL                   PRINTER 2 DEFINITION
//PRT2      PRINTDEV
//          TRACE=YES
:
//PRT2      ENDCNTL
```

Figure 54. Specifying the PSF-owned data set to receive the trace output

2. Start the printer FSA with the START command.
3. Type a PSF operator interface command. Figure 55 shows the command for an FSS name of FSS5 and a printer name of PRT2.

```
MODIFY FSS5,TRACEON,PRT2,MODE=IPDS
```

Figure 55. A PSF operator interface command for an FSS name of FSS5 and a printer name of PRT2

FSA IPDS external tracing begins when the FSA is idle, or at the next data set boundary.

Using the GTF trace data set: The procedure to start an FSA IPDS external trace dynamically and direct its output to the GTF trace data set is exactly the same as for an FSA full external trace. See the procedure in "Using the GTF trace data set" on page 63.

Note: Instead of using MODE=FULL in Figure 45 on page 64, use MODE=IPDS.

Stopping a trace

You can stop a trace by using the PSF operator interface or by stopping the printer FSA and editing the PSF startup procedure to remove trace specifications. Both methods are described in the following sections.

Stopping a trace with the PSF operator interface

The syntax of the PSF operator interface command used to stop traces is shown in Figure 56.

```
{MODIFY | F} fss_name,TRACEOFF
[,  [ fsa_name
]  [,MODE=NOTIFY] ]
```

Figure 56. The PSF operator interface command for stopping traces

Note: The comma is required if you specify any keywords after the TRACEOFF keyword.

To stop a trace, the PSF operator types the MODIFY (or F) command with the TRACEOFF parameter. The parameters you can use with the MODIFY command to stop a trace are:

fss_name
Specifies the name of the FSS for which tracing should be stopped. This parameter must match the FSS parameter for the JES2 FSS statement or the FSSNAME parameter for the JES3 FSSDEF statement. If you do not also specify a printer FSA with the *fsa_name* parameter, tracing will not start for any printers after this command is entered. This parameter is required.

TRACEOFF
Specifies that tracing should be stopped for one or more FSAs or for the notify subtask. This parameter is required.

fsa_name
Specifies the name of a specific printer for which tracing should be stopped. This parameter is optional and cannot be specified for NST traces. If *fsa_name* is not specified for FSA external traces, the tracing of any active FSAs managed by the FSS will not be affected. When an FSA is initialized, however, trace specifications in the startup procedure for any of the FSAs managed by the FSS are ignored.

Note: *fsa_name* is a positional parameter. If you specify the MODE parameter but do not specify a *fsa_name*, you must type a comma in place of the *fsa_name*.

Figure 57 shows how to stop a trace when no *fsa_name* is specified.

```
MODIFY,fss_name,TRACEOFF,,MODE=NOTIFY
```

Figure 57. Stopping a trace when no printer is specified

Figure 58 shows how to stop a trace when a *fsa_name* is specified.

```
MODIFY,fss_name,TRACEOFF,PRI1
```

Figure 58. Stopping a trace when a printer is specified

The *fsa_name* specified must match either of these:
- For JES2, the PRT*nnnn* statement
- For JES3, the JNAME parameter of the DEVICE statement

For more information about the JES2 PRT*nnnn* statement and the JES3 JNAME parameter, see *PSF for z/OS: Customization*.

MODE=NOTIFY
Specifies that only the NST tracing is to be stopped. Any active FSA traces remain active. MODE=NOTIFY cannot be specified if an *fsa_name* is specified.

For more information about when tracing will be stopped, see "When operator interface commands are processed" on page 54.

Stopping traces without the PSF operator interface

To stop tracing an FSA in deferred-printing mode, you can stop the printer. If tracing was started at initialization, and you do not want it to start again, edit the PSF startup procedure to remove the trace specifications. For information about how to edit the startup procedure, see "Specifying trace parameters in the PSF startup procedure" on page 49.

To stop tracing a job in direct-printing mode, either stop the job or stop the printer. If you do not want tracing started for the next job printed in direct-printing mode, ensure that the PRINTDEV statement in the JCL for that job does not specify tracing. For information about how to change the JCL, see "Specifying trace parameters in direct-printing mode JCL" on page 59.

Formatting and printing trace data

PSF no longer formats trace data while PSF is running; therefore, data must be formatted when PSF has stopped. Figure 59 on page 71 shows a sample JCL to start the PSF trace post formatter.

```
//APSWTRCF JOB 'ACCOUNT #','NAME',MSGLEVEL=(1,1)
//*************************************************************
//* PSF TRACE FORMATTER INVOCATION JCL
//*************************************************************
//STEP01   EXEC PGM=APSTRFMT,REGION=100K
//*                          /* REGION = (3 * BLKSIZE) + 20K
//*                          /* BLKSIZE = TRACEIN BLOCKSIZE
//SYSUDUMP DD SYSOUT=*
//*TRACEIN  DD PATH='tracein'    <- SET TO PSF GENERATED zFS
//*                                FILE NAME.
//TRACEIN  DD UNIT=unit,        <- UNIT MIGHT BE TAPE OR DASD.
//            DSN=tracein,      <- SET TO PSF GENERATED TRACE
//*                                DATA SET NAME.
//            DISP=SHR,
//            VOL=SER=volser    <- SERIAL NUMBER OF
//*                                VOLUME.
//TRACEOUT DD UNIT=unit,        <- UNIT MIGHT BE TAPE OR DASD.
//            DSN=traceout,     <- SET TO DATA SET NAME WHERE
//*                              FORMATTED RECORDS ARE
//*                              PLACED.
//            DISP=disp,        <- DISPOSITION OF TRACE OUT.
//            VOL=SER=volser    <- SERIAL NUMBER OF VOLUME.
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
       TYPE=SHORT
/*
//
```

Figure 59. JCL to start a PSF trace formatter

The TRACEIN DD card identifies the trace data generated by PSF. Therefore, the attributes of that data set should be reflected in the DD card.

The TRACEOUT DD card identifies the data set into which the formatted trace job is stored. The parameters specified on the DD statement are device-dependent. The data control block (DCB) parameters you should specify are:

Record length:
This must be 117, which is the default.

Block size:
This must be a multiple of 117. If it is not specified or it is not a multiple of 117, it defaults to 1287.

Record format:
This must be FBA, U, or FB. The default is FBA.

Organization:
Sequential (PS).

You can specify three TYPE options on the SYSIN DD card:

SHORT
Excludes some PSF data, specifically PPCC trace entries. For some entries, only the first 32 bytes of data are traced. In a truncated entry, a '<' is placed in the space between the address and the start of the data in the trace output data set. This is the default.

TITLES
Only headers are printed for the trace entry being formatted.

LONG
All data is included in the trace output data set.

Printing GTF data

Print GTF trace data sets by using the Interactive Problem Control System (IPCS). For information about using IPCS, see the *z/OS MVS IPCS User's Guide*.

Determining trace entry layouts

The trace mapping structures for PSF internal and external traces are defined in these control blocks:

APSGITM Internal trace mapping structure

APSGXTM External trace mapping structure

An IBM Support Center representative can determine the layouts (or descriptions) of internal trace entries in APSGITM or external trace entries in APSGXTM. The prologs of APSGITM and APSGXTM describe how to find the trace entry layouts.

Appendix A. Message-to-module cross-reference

This appendix lists all the message identification numbers issued by PSF and the modules that produce each message. Use this appendix when building a keyword string with the MSGx keyword.

Note: An asterisk (*) after a module name indicates that the module produces the message when you have the Download for z/OS feature installed. Two asterisks (**) indicate that the module produces the message when you have the AFP Download Plus feature installed.

Table 13. Message-to-module cross-reference

Message	Modules
APS000I	APSADPSS
APS001I	APSADPSS
APS002A	APSAOPEN
APS003A	APSAOPEN
APS004I	APSADPSS
APS005I	APSAOPEN
APS006I	APSAOPEN
APS018I	APSPPDCM
APS020I	APSPPDCM
APS021I	APSHPDSP** APSPPDSP
APS022I	APSHPOSE** APSKAFPD* APSPPIEP
APS023I	APSHPFSA** APSKFSA* APSPPFSA
APS024I	APSHPFAC** APSHPODR** APSKFAC* APSKODR* APSPPFAC APSPPODR
APS025I	APSHPFSP** APSKFSP* APSPPFSP
APS026I	APSHPDVP** APSPPDCM APSPPDVP
APS030I	APSHPDVP** APSPPDVP
APS031I	APSHPDSP** APSKDSP* APSPPDSP
APS032I	APSHPDSP** APSKDSP* APSPPDSP
APS033I	APSHPDSP** APSKDSP* APSPPDSP
APS034I	APSHPDSP** APSKDSP* APSPPDSP
APS035I	APSHPDSP** APSKDSP* APSPPDSP
APS036I	APSHPDSP** APSPPDSP
APS037I	APSHPDSP** APSPPDSP
APS038I	APSHPEFS** APSKEFSA* APSPEFSA
APS039I	APSPPDCM
APS040I	APSPIPER
APS041I	APSHPFAC** APSHPODR** APSKFAC* APSKODR* APSPPFAC APSPPODR
APS042I	APSHPFAC** APSHPFSP** APSHPODR** APSKFAC* APSKFSP* APSKODR* APSPPATR APSPPFAC APSPPFSP APSPPODR

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS043I	APSHPFAC** APSHPFSP** APSHPODR** APSKFAC* APSKFSP* APSKODR* APSPPFAC APSPPFSP APSPPODR
APS044I	APSPPATR
APS045I	APSPPFSA
APS047I	APSHPFSM** APSHPSMF** APSKSMF* APSPFSMF APSPPSMF
APS049I	APSHPFSM** APSHPSMF** APSKSMF* APSPFSMF APSPPSMF
APS050I	APSHPEFS** APSKEFSA* APSPEFSA APSPEFSS APSPENST
APS051I	APSPENST
APS052I	APSPPGDS
APS053I	APSHPEFS** APSKEFSA* APSPEFSA
APS054I	APSPPATR
APS055I	APSHPEFS** APSKEFSA* APSPEFSA APSPEFSS APSPENST
APS056I	APSPPGDS
APS057I	APSHPDVP** APSKDVP* APSPPDVP
APS058I	APSPPDVP
APS060I	APSPPFSA
APS061I	APSHPDVP** APSPPDVP
APS062I	APSHPNFY** APSKNTFY* APSPNTFY
APS063I	APSPNTFY

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS064I	APSPNTFY
APS065I	APSPNTFY
APS066I	APSPNTFY
APS067I	APSPNTFY
APS068I	APSHPNFY** APSKNTFY* APSPNTFY
APS069I	APSHPNFY** APSKNTFY* APSPNTFY
APS070I	APSHPNFY** APSKNTFY* APSPNTFY
APS071I	APSHPNFY** APSKNTFY* APSPNTFY
APS072I	APSHPNFY** APSKNTFY* APSPNTFY
APS073I	APSHPDVP** APSPPDVP
APS074I	APSPPDVP
APS075I	APSPSMDS
APS076I	APSPSMDS
APS077I	APSPSMDS
APS078I	APSPSMDS
APS079I	APSPPDVP
APS080I	APSPPDVP
APS081I	APSPPDVP
APS082I	APSHPDSP** APSKDSP* APSPPDSP
APS083I	APSPPDVP
APS084I	APSHPOSE** APSPPIEP
APS085I	APSPPIEP
APS086I	APSPPIEP
APS087I	APSPPIEP
APS088I	APSPPIEP
APS089I	APSPPIEP
APS095I	APSUEXTI*
APS096I	APSGCINT APSPPNST

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS097I	APSPPNST APSUEXTI
APS098I	APSUEXTI
APS099I	APSPPNST APSUEXTI
APS100I	APSDMSGF
APS101I	APSDDS
APS102I	APSLRBS APSLRIDS APSLRLIB APSLRUSS
APS103I	APSDCPL APSDFNL APSDLOAD
APS104I	APRSTMAZ
APS105I	APSDECH
APS106I	APRSTMAZ
APS107I	APSDECH
APS108I	APSDECH
APS109I	APSDECH
APS110I	APRBNGAZ APRCF2AZ APRCS2AZ APREN2AZ APRENCAZ APRENVAZ APRFD2AZ APRFDPAZ APRINMAZ APROCAAZ APROENAZ APROSTAZ APRPTPAZ APRTLEAZ APSHDWPF
APS111I	APRCS2AZ
APS112I	APSDGET
APS113I	APRSTMAZ
APS114I	APRSTMAZ
APS115I	APSDGET
APS116I	APRSTMAZ
APS117I	APRBNGAZ APRCS2AZ APRPDPAZ APRSTMAZ
APS118I	APRSTMAZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS120I	APRCF2AZ APRCP2AZ APRCS2AZ APREN2AZ APRENVAZ APRF2AZ APRFDPAZ APRINMAZ
APS121I	APRDOCEX
APS122I	APRCS2AZ
APS123I	APRBPGEX
APS125I	APSDFNL
APS126I	APRCS2AZ
APS127I	APRCS2AZ
APS128I	APRBPGEX APSDDGB
APS129I	APRCS2AZ
APS130I	APSDDS
APS131I	APSDDS
APS132I	APSDDS
APS135I	APRENVAZ APRINMAZ
APS138I	APRENVAZ APRFD2AZ APRINMAZ
APS139I	APRFDPAZ
APS140I	APRFD2AZ APRINMAZ
APS141I	APRFDPAZ
APS143I	APRINMAZ
APS145I	APRFD2AZ
APS146I	APRFD2AZ
APS147I	APRFD2AZ
APS151I	APSDMSGF
APS152I	APRFDPAZ
APS153I	APRMSGEX
APS154I	APRFD2AZ
APS155I	APRLCCAZ
APS156I	APRFDPAZ
APS157I	APRINVAZ
APS158I	APRBLPAZ APRINVAZ
APS159I	APRSTMAZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS162I	APRINVAZ
APS163I	APRIMGAZ
APS165I	APRCS2AZ
APS166I	APREN2AZ
APS167I	APREN2AZ
APS169I	APRIOBEX
APS170I	APRFD2AZ
APS171I	APREN2AZ
APS172I	APRFD2AZ
APS178I	APRFDPAZ
APS179I	APRFD2AZ
APS181I	APRFDPAZ
APS186I	APRCP2AZ
APS188I	APRIBPAZ
APS190I	APRFD2AZ
APS191I	APRFD2AZ
APS192I	APRCS2AZ
APS193I	APRCS2AZ
APS194I	APSDFNL
APS195I	APSDFNL
APS196I	APSDFNL
APS197I	APRCS2AZ
APS199I	APSDLOAD
APS206I	APSDDS
APS207I	APRCS2AZ
APS209I	APRIBPAZ
APS210I	APREN2AZ APRENCAZ APRENVAZ APRINMAZ APROCAAZ APROENAZ APROSTAZ APRPTPAZ APRXLTAZ
APS212I	APRCS2AZ APREN2AZ APRENVAZ APRIMGAZ APRINMAZ APROENAZ APROSTAZ
APS214I	APRFDPAZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS215I	APRINMAZ
APS217I	APRENCAZ
APS218I	APRIBPAZ
APS219I	APRIBPAZ
APS220I	APSDDS
APS221I	APRINMAZ
APS222I	APRCS2AZ
APS223I	APRIBPAZ
APS225I	APSHPDVP APSPPDVP
APS226I	APSDDS
APS227I	APRLCCAZ
APS228I	APRBPGEX
APS229I	APSDSECD
APS230I	APSDSECD
APS231I	APSDSECD
APS232I	APSDSECD
APS233I	APSDSECD
APS234I	APSDSECD
APS235I	APSDSECD
APS236I	APSDSECD
APS237I	APSDSECD
APS239I	APSDLOAD
APS240I	APSDSECD
APS241I	APSDDGB APSPPDVP
APS242I	APRLCCAZ
APS244I	APREN2AZ APRENVAZ
APS245I	APRIMGAZ
APS246I	APRBPGEX APSDSECD
APS247I	APSDSECD
APS248I	APRBPGEX
APS249I	APRCS2AZ
APS250I	APREAGAZ APRFDPAZ APRPDPAZ
APS251I	APRFDPAZ
APS252I	APRLCCAZ
APS253I	APRFD2AZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS254I	APRFD2AZ
APS255I	APRIBPAZ
APS256I	APRIBPAZ
APS258I	APRSTMAZ
APS259I	APREN2AZ APRENVAZ APRINMAZ APROENAZ APROSTAZ
APS260I	APRIMGAZ APROCAAZ APROENCAZ APROSTAZ
APS261I	APREN2AZ APRENVAZ
APS262I	APREN2AZ
APS263I	APRINMAZ APRLDTAZ APROSTAZ
APS264I	APRENVAZ APROENAZ
APS265I	APRLCCAZ
APS267I	APREAGAZ
APS268I	APREN2AZ
APS269I	APREN2AZ APRENVAZ APRINMAZ APROENAZ APROSTAZ
APS270I	APRPDPAZ
APS271I	APRINMAZ
APS272I	APRINMAZ
APS273I	APRFD2AZ
APS274I	APRFDPAZ
APS275I	APRPPGAZ
APS276I	APROCAAZ
APS278I	APREN2AZ APRIDOAZ APROENAZ APROSTAZ
APS279I	APRCS2AZ
APS280I	APRCS2AZ
APS281I	APRCS2AZ
APS282I	APRPRPAZ
APS283I	APRIBPAZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS284I	APRIBPAZ
APS285I	APRFD2AZ
APS286I	APRFD2AZ
APS287I	APREAGAZ
APS288I	APRBPPAZ
APS289I	APREN2AZ
APS290I	APREAGAZ
APS291I	APRFD2AZ APRFDPAZ
APS292I	APRINMAZ
APS293I	APRFDPAZ
APS294I	APRINMAZ
APS295I	APRINMAZ
APS296I	APRINMAZ
APS297I	APRFDPAZ
APS298I	APRIBPAZ
APS299I	APRIMGAZ
APS300I	APRPDPAZ
APS301I	APRPDPAZ
APS307I	APRPDPAZ
APS308I	APSDMSGF
APS309I	APRPDPAZ
APS310I	APRPDPAZ
APS312I	APRPDPAZ
APS314I	APRPDPAZ
APS315I	APRPDPAZ
APS316I	APRPDPAZ
APS317I	APRPDPAZ
APS319I	APRPDPAZ
APS320I	APRPDPAZ
APS321I	APRPDPAZ
APS322I	APRPDPAZ
APS323I	APRPDPAZ
APS324I	APRPDPAZ
APS326I	APRCMPAZ
APS327I	APRPECAZ
APS328I	APRFDPAZ
APS329I	APRPDPAZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS330I	APRPLNAZ APRRFLAZ APRXDPAZ
APS331I	APRINMAZ
APS334I	APRPDPAZ
APS335I	APRCMPAZ
APS337I	APRPDPAZ
APS339I	APRPDPAZ
APS340I	APRCNTAZ
APS342I	APRCNTAZ
APS343I	APRPLNAZ APRRFLAZ APRXDPAZ
APS344I	APRPDPAZ
APS345I	APSDMSGF
APS346I	APRFPLAZ APRPLNAZ
APS350I	APRPDPAZ
APS352I	APRLDTAZ
APS353I	APRCMPAZ
APS355I	APRLDTAZ
APS359I	APRFDPAZ
APS360I	APRLCCAZ
APS361I	APRIBPAZ
APS362I	APRBRSEX
APS363I	APRBPGEX
APS364I	APRFDPAZ
APS365I	APRIBPAZ
APS366I	APRPLNAZ APRRFLAZ APRXDPAZ
APS367I	APRLDTAZ
APS368I	APRPTPAZ
APS369I	APREN2AZ APRENVAZ APROSTAZ
APS370I	APRCP2AZ APRCS2AZ
APS371I	APRCP2AZ APRCS2AZ
APS372I	APRCS2AZ
APS373I	APRCS2AZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS374I	APRCS2AZ
APS375I	APRCS2AZ
APS376I	APRCS2AZ
APS377I	APRCS2AZ
APS378I	APRCP2AZ
APS380I	APRMSGDZ
APS381I	APREN2AZ APRENCAZ APROCAAZ APROSTAZ
APS383I	APREAGAZ
APS384I	APRFD2AZ APRFDPAZ
APS385I	APRFD2AZ
APS386I	APREN2AZ APROSTAZ
APS387I	APREN2AZ APROSTAZ APRIOBEX
APS388I	APRIMGAZ APROSTAZ
APS389I	APREN2AZ
APS390I	APREN2AZ APRFD2AZ APRINMAZ APROSTAZ
APS391I	APRCS2AZ
APS392I	APRFD2AZ
APS393I	APRIBPAZ
APS394I	APRMSGEX
APS395I	APRIBPAZ
APS396I	APRFD2AZ
APS397I	APRFDPAZ
APS398I	APRFD2AZ
APS399I	APRMSGEX
APS400I	APSESNTB
APS401I	APSESNTB
APS402I	APSESNTB
APS403I	APSESNTB
APS404I	APSESNTB
APS405I	APSESNTB
APS406I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS407I	APSESNTB
APS408I	APSESNTB
APS409I	APSESNTB
APS410I	APSESNTB
APS411I	APSESNTB
APS412I	APSESNTB
APS413I	APSESNTB
APS414I	APSESNTB
APS415I	APSESNTB
APS416I	APSESNTB
APS417I	APSESNTB
APS418I	APSESNTB
APS419I	APSESNTB
APS420I	APSESNTB
APS421I	APSESNTB
APS422I	APSESNTB
APS423I	APSESNTB
APS424I	APSESNTB
APS425I	APSESNTB
APS426I	APSESNTB
APS427I	APSESNTB
APS428I	APSESNTB
APS429I	APSESNTB
APS430I	APSESNTB
APS431I	APSESNTB
APS432I	APSESNTB
APS433I	APSESNTB
APS434I	APSESNTB
APS435I	APSESNTB
APS436I	APSESNTB
APS437I	APSESNTB
APS438I	APSESNTB
APS439I	APSESNTB
APS440I	APSESNTB
APS441I	APSESNTB
APS442I	APSESNTB
APS443I	APSESNTB
APS444I	APSESNTB
APS445I	APSEATCD

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS446I	APSESNTB
APS447I	APSESNTB
APS448I	APSESNTB
APS449I	APSESNTB
APS450I	APSESNTB
APS451I	APSESNTB
APS452I	APSESNTB
APS453I	APSESNTB
APS454I	APSESNTB
APS455I	APSESNTB
APS456I	APSESNTB
APS457I	APSESNTB
APS458I	APSESNTB
APS459I	APSESNTB
APS460I	APSESNTB
APS461I	APSESNTB
APS462I	APSESNTB
APS463I	APSESNTB
APS464I	APSESNTB
APS465I	APSESNTB
APS466I	APSESNTB
APS467I	APSESNTB
APS468I	APSESNTB
APS469I	APSESNTB
APS470I	APSESNTB
APS471I	APSESNTB
APS473I	APSESNTB
APS474I	APSESNTB
APS475I	APSESNTB
APS476I	APSESNTB
APS477I	APSESNTB
APS478I	APSESNTB
APS479I	APSEATCD
APS480I	APSEMSG
APS481I	APSESNTB
APS482I	APSESNTB
APS483I	APSESNTB
APS484I	APSESNTB
APS485I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS486I	APSESNTB
APS487I	APSESNTB
APS488I	APSESNTB
APS489I	APSESNTB
APS490I	APSEMSG
APS491I	APSESNTB
APS492I	APSESNTB
APS493I	APSESNTB
APS494I	APSESNTB
APS495I	APSESNTB
APS496I	APSESNTB
APS497I	APSESNTB
APS498I	APSESNTB
APS499I	APSESNTB
APS500I	APSLINIT APSLMSG APSLOPEN
APS501I	APSLDYNA
APS502I	APSLMSG APSLUSSO
APS503I	APSLDYNA
APS504I	APSLDYNA
APS505I	APS4MLD APSLDYNA APSLMSG APSLOPEN
APS506I	APSLOPEN
APS507I	APSLOPEN
APS508I	APSLUSSO
APS509I	APSLCUSS APSLUSSO
APS510I	APSLUSSO
APS511I	APSLUSSO
APS512I	APSLMSG
APS513I	APSLMSG
APS514I	APSLRPNM
APS515I	APSLMSG
APS516I	APSLINIT
APS517I	APSLINIT
APS518I	APSLOPEN APSLRBS

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS519I	APSLUSSO
APS520I	APSLRUSS
APS522I	APSLRBS
APS523I	APSLMSG
APS524I	APSLCUSS
APS525I	APSLUSSO
APS527I	APSLRBS
APS532I	APSLMSG APSLOPEN
APS534I	APSLUSSO
APS535I	APSLMSG APSLOPEN
APS537I	APSLCLOS APSLMSG APSLOPEN
APS538I	APSLOPEN APSLRBS
APS539I	APSLRBS
APS540I	APSHODDS
APS547I	APSLABND APSLOPEN
APS548I	APSLABND APSLCLOS APSLDYNA APSLMSG APSLOPEN APSLRBS APSLUSSO
APS551I	APSLRDEL2 APSRDEL
APS553I	APSRLOAD
APS554I	APSRLOAD
APS555I	APSRNAME
APS556I	APSRMFNT
APS557I	APSRQRY
APS560I	APSRMFNT
APS561I	APSRNAME
APS562I	APSRMFNT
APS563I	APSRMFNT APSRMOVL APSRMPSG APSRNAME
APS564I	APSRSRT
APS565I	APSRLOAD

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS566I	APSRLOAD
APS568I	APRGRNEX
APS569I	APRGRNEX
APS570I	APSRLRT
APS571I	APSRROCK
APS573I	APSRMOVL APSRNAME
APS574I	APRGRNEX
APS575I	APROAEEX
APS576I	APRGRNEX
APS577I	APSRQRY
APS579I	APRFTIEX
APS580I	APSGPPCT APSRMARK APSRPGRN
APS581I	APSGPPCT APSRCPDS APSRMARK APSRPGRN
APS582I	APSRCPDS APSRPGRN
APS583I	APSRCPDS APSRPGRN
APS584I	APSRCPDS APSRMARK
APS585I	APSRCPDS
APS586I	APSRCPDS APSRPGRN
APS587I	APSGPPCT APSRMARK
APS588I	APSGPPCT APSRMARK
APS589I	APSGPPCT APSRMARK
APS590I	APSGPPCT APSRMARK
APS591I	APSRCPDS
APS592I	APSRCPDS APSRMARK APSRPGRN
APS593I	APSRCPDS
APS594I	APSRCPDS
APS595I	APSRCPDS
APS596I	APSRCPDS

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS597I	APSRCPDS
APS598I	APSRMARK
APS599I	APSRMARK
APS600I	APSJCL
APS601I	APSJCL
APS602I	APSJCL
APS603I	APSJCL
APS604I	APSJCL
APS605I	APSGTRCE APSGTROC
APS606I	APSGSYND
APS607I	APSZDAFP**
APS608I	APSGTROC
APS609I	APSJCL
APS610I	APSGDUMP
APS611I	APSZTRCE
APS612I	APSZTRCE
APS613I	APSZFORC APSZPRSE APSZTRCE
APS614I	APSJCL APSKDVP*
APS615I	APSJCL
APS616I	APSJCL
APS617I	APSJCL
APS618I	APSJCL
APS619I	APSJCL
APS620A	APSZCMND APSZESTI APSZRSTR
APS621I	APSZINIT
APS622I	APSZINIT
APS623I	APSZRSTR
APS624I	APSZRSTR
APS625I	APSZINIT
APS626I	APSZRSTR
APS627I	APSZFORC
APS628I	APSZESTI
APS629I	APSZESTI
APS630I	APSZESTI
APS631I	APSEATCD

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS632I	APSEATCD
APS633I	APSEATCD
APS634I	APSEATCD
APS635I	APSZPRSE
APS636I	APSZPRSE
APS637I	APSZFORC
APS638I	APSZCMND
APS639I	APSZCMND
APS640I	APSZPRSE**
APS641I	APSEATCD
APS642I	APSEATCD
APS643I	APSEATCD
APS644I	APSEATCD
APS645I	APSZPRSE**
APS646I	APSZPRSE
APS647I	APSZTRCE
APS648I	APSZPRSE
APS649I	APSZCMND
APS650I	APSZPRSE
APS651I	APSZPRSE
APS652I	APSZPRSE**
APS653I	APSZPTCP**
APS654I	APSZPTCP**
APS655I	APSZPRSE**
APS656I	APSZDAFP**
APS661I	APSZPRSE
APS664I	APSZPRSE
APS667I	APSZPRSE
APS668I	APSZCMND
APS669I	APSZCMND
APS670I	APSZCMND
APS671I	APSZCMND
APS672I	APSZPRSE**
APS683I	APSZCMND
APS684I	APSZCMND APSZPRSE
APS685I	APSZPRSE
APS686I	APSZPRSE
APS687I	APSZPRSE

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS690I	APSZDTCP
APS691I	APSJCL
APS692I	APSZCMND APSZRSTR
APS693I	APSZCMND
APS694I	APSZECI APSZESTI APSZINIT APSZRSTR APSZTCI
APS695I	APSZESTI APSZINIT APSZRSTR
APS696I	APSZPRSE
APS697I	APSZPRSE
APS698I	APSZDTCP
APS699I	APSZWTO
APS700I	APSEMSG
APS701I	APSEMSG
APS702I	APSESNTB
APS703I	APSESNTB
APS704I	APSESNTB
APS705I	APSESNTB
APS706I	APSESNTB
APS707I	APSESNTB
APS708I	APSESNTB
APS709I	APSESNTB
APS710I	APSESNTB
APS711I	APSEATCD
APS712I	APSEATCD
APS713I	APSEATCD
APS714I	APSEATCD
APS715I	APSESNTB
APS716I	APSESNTB
APS717I	APSEMSG
APS718I	APSESNTB
APS719I	APSESNTB
APS720I	APSESNTB
APS721A	APSEATCD
APS722I	APSEATCD
APS723I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS724I	APSEATCD
APS725I	APSEATCD
APS726I	APSESNTB
APS727I	APSESNTB
APS728I	APSESNTB
APS729I	APSESNTB
APS730I	APSESNTB
APS731I	APSESNTB
APS732I	APSESNTB
APS733I	APSESNTB
APS734I	APSESNTB
APS735I	APSEATCD
APS736I	APSESNTB
APS737I	APSESNTB
APS738I	APSESNTB
APS739I	APSESNTB
APS740I	APSESNTB
APS741I	APSESNTB
APS742I	APSESNTB
APS743I	APSESNTB
APS746I	APSESNTB
APS747I	APSESNTB
APS748I	APSESNTB
APS749I	APSESNTB
APS750I	APSESNTB
APS751I	APSESNTB
APS753I	APSESNTB
APS754I	APSESNTB
APS755I	APSESNTB
APS756I	APSESNTB
APS757I	APSESNTB
APS758I	APSESNTB
APS759I	APSESNTB
APS760I	APSESNTB
APS761I	APSESNTB
APS762I	APSESNTB
APS763I	APSESNTB
APS764I	APSESNTB
APS765I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS766I	APSESNTB
APS767I	APSESNTB
APS768I	APSESNTB
APS769I	APSESNTB
APS770I	APSESNTB
APS771I	APSESNTB
APS772I	APSESNTB
APS773I	APSESNTB
APS774I	APSESNTB
APS775I	APSESNTB
APS776I	APSEATCD
APS777I	APSESNTB
APS778I	APSESNTB
APS779I	APSESNTB
APS780I	APSESNTB
APS781I	APSE3820
APS782I	APSE3820
APS783I	APSE3820
APS784I	APSE3820
APS785I	APSESNTB
APS786I	APSESNTB
APS787I	APSE3820
APS788I	APSESNTB
APS790I	APSESNTB
APS791I	APSESNTB
APS792I	APSESNTB
APS793I	APSESNTB
APS794I	APSEATCD
APS796I	APSEATCD
APS797I	APSEATCD
APS798I	APSESNTB
APS799I	APSEATCD
APS800I	APSEMSG
APS801I	APSESNTB
APS802I	APSEATCD
APS803I	APSERRM
APS804I	APSESNTB
APS805I	APSESNTB
APS806I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS807I	APSE3820
APS808I	APSESNTB
APS809I	APSESNTB
APS810I	APSESNTB
APS811I	APSESNTB
APS812I	APSESNTB
APS813I	APSESNTB
APS814I	APSESNTB
APS815I	APSESNTB
APS816I	APSESNTB
APS817A	APSERRM
APS818I	APSERRM
APS819I	APSESNTB
APS820I	APSESNTB
APS821I	APSE3820 APSEATCD
APS822I	APSEATCD
APS823I	APSEATCD
APS824I	APSESNTB
APS825I	APSEATCD
APS826I	APSESNTB
APS827I	APSESNTB
APS828I	APSEATCD
APS829I	APSEATCD
APS830I	APSEMSG
APS831I	APSERRM
APS832I	APSEMSG
APS833I	APSEMSG
APS834I	APSESNTB
APS835I	APSESNTB
APS836I	APSERRM
APS837I	APSEATCD
APS838I	APSESNTB
APS839I	APSESNTB
APS840I	APSESNTB
APS841I	APSESNTB
APS842I	APSEATCD
APS843I	APSEATCD
APS844I	APSEATCD

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS845I	APSEATCD
APS846I	APSERRM
APS847I	APSEATCD
APS848I	APSESNTB
APS849I	APSESNTB
APS850I	APSEATCD
APS851I	APSERRM APSESNTB
APS852I	APSERRM
APS853I	APSEATCD
APS854I	APSESNTB
APS855I	APSESNTB
APS856I	APSESNTB
APS857I	APSESNTB
APS858I	APSEMSG
APS859I	APSEMSG
APS860I	APSESNTB
APS861I	APSESNTB
APS862I	APSESNTB
APS863I	APSESNTB
APS864I	APSESNTB
APS865I	APSESNTB
APS866I	APSESNTB
APS867I	APSESNTB
APS868I	APSESNTB
APS869I	APSESNTB
APS870I	APSESNTB
APS871I	APSESNTB
APS872I	APSEATCD
APS873I	APSESNTB
APS874I	APSEATCD
APS875I	APSESNTB
APS876I	APSESNTB
APS877I	APSESNTB
APS878I	APSESNTB
APS879I	APSESNTB
APS880I	APSESNTB
APS881I	APSESNTB
APS882I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS883I	APSESNTB
APS884I	APSESNTB
APS885I	APSESNTB
APS886I	APSESNTB
APS887I	APSESNTB
APS888I	APSESNTB
APS889I	APSESNTB
APS890I	APSESNTB
APS891I	APSESNTB
APS892I	APSESNTB
APS893I	APSESNTB
APS894I	APSESNTB
APS895I	APSEMSG
APS896I	APSESNTB
APS897I	APSESNTB
APS898I	APSESNTB
APS899I	APSESNTB
APS920I	APSCIPRT APSCSNIO
APS921I	APSCINIT
APS922I	APSCESTA
APS923I	APSCCLR
APS924I	APSCCLR
APS925I	APSCSNA
APS926I	APSNORS
APS927I	APSCIPRT
APS928I	APSCESTA
APS929I	APSCCLR
APS930I	APSCOPCI
APS931I	APSCOPCI APSCSTMI
APS932I	APSE3820 APSEATCD APSCSNA APSCTCP
APS933I	APSCCDEV
APS934I	APSCESTA
APS935I	APSCTCP
APS936I	APSCCLR
APS937I	APSCCLR
APS938I	APSCCLR

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS939I	APSCCTME
APS940I	APSNORS
APS941I	APSNORS
APS942I	APSCOPCI
APS943I	APSCINIT
APS944I	APSGMBR
APS946I	APSHNLNK** APSNLINK
APS947I	APSCCLR
APS948I	APSNINIT
APS949I	APSHNLNK** APSNLINK
APS950I	APSUEXIT
APS951I	APSUEXTI
APS952I	APSUEXTI
APS953I	APSUEXTI
APS954I	APSUREXT
APS955I	APSPPNST APSUFSSI
APS956I	APSUEXTI
APS957I	APSPPNST APSUFSSI
APS958I	APSUEXTI
APS959I	APSUEXTI
APS960I	APSTCLOS APSTOPEN
APS961I	APSTOPEN
APS962I	APSTOPEN
APS963I	APSTOPEN
APS964I	APSTPREC
APS965I	APSTPREC
APS966I	APSTPREC
APS967I	APSTOPEN
APS970I	APS4MLMC APS8LMM
APS971I	APS4MLD
APS972I	APS4MLD
APS973I	APS4MBCB
APS974I	APS4MLMC
APS975I	APS4MLMC
APS976I	APS4MLD

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS977I	APS4MCLS APS4MLD
APS978I	APS4MLMC
APS979I	APS4MLMC
APS980I	APS4MLD
APS981I	APS8LMM
APS982I	APS8LMM
APS983I	APS4POSE
APS984I	APS4POSE
APS986I	APSKDVP*
APS987I	APSKDSP*
APS988I	APSKNTFY*
APS989I	APSKDSP* APSKDVP*
APS990I	APSKROUT*
APS991I	APSKROUT*
APS992I	APSKFSA*
APS993I	APSKNTFY*
APS994I	APSKNTFY*
APS995I	APSKAFPD* APSKDVP*
APS996I	APSKROUT*
APS997I	APSKDVP*
APS998I	APSKROUT*
APS999I	APSKDSP*
APS1001I	APSHPOSE** APSPPIEP
APS1002I	APSOFSA APSOFSS
APS1003I	APSOFSA APSOFSS
APS1005I	APSOFSA APSOFSS
APS1006I	APSOFSA APSOFSS
APS1007I	APSOFSA APSOFSS
APS1008I	APSOFSA APSOFSS
APS1009I	APSHPDVP** APSPPDVP
APS1010I	APSHPODR**

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS1011A	APSHPODR**
APS1012A	APSHPODR**
APS1018I	APSHPDVP**
APS1020I	APSPPIEP
APS1021I	APSOPIA
APS1022I	APSOCONF APSODOC APSOFSA APSOPJ
APS1023I	APSODOC APSOFSA APSOPJ
APS1024I	APSOCONF APSODOC APSOFSA APSOPJ
APS1025I	APSOCONF APSOPJ
APS1026I	APSOCONF APSODOC APSOFSA APSOPJ
APS1027I	APSOCONF
APS1028I	APSOFSS
APS1029I	APSGMSGC
APS1030I	APSGMSGC
APS1031I	APSOLOG APSPCPJO
APS1032I	APSPCPJO
APS1033I	APSPINST
APS1034I	APSPINST
APS1035I	APSPINST
APS1036I	APSPIINT APS1037I APSPIINT
APS1037I	APSPIINT
APS1500I	APSUREXT
APS1501I	APSUREXT
APS1700I	APSRFLU
APS1701I	APSRFLU
APS1702I	APSRFLU
APS1703I	APSRFLU
APS1704I	APSRFLU
APS1705I	APSRFLU

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS1706I	APSRFLU
APS1707I	APSRFLU
APS1708I	APSRFLU
APS1709I	APSRFLU
APS1710I	APSRFLU
APS1711I	APSRFLU
APS2000I	APROCAAZ
APS2001I	APRDOCEX
APS2002I	APRDOCEX
APS2003I	APRINMAZ APROSTAZ
APS2004I	APRFD2AZ
APS2005I	APRRFLAZ
APS2006I	APRLDTAZ
APS2007I	APRPECAZ
APS2008I	APRPDPAZ
APS2009I	APRPDPAZ
APS2010I	APRPDPAZ
APS2011I	APRPDPAZ
APS2012I	APRPDPAZ
APS2013I	APRPECAZ
APS2014I	APRRFLAZ APRXDPAZ
APS2015I	APRPECAZ
APS2016I	APRRFLAZ
APS2017I	APRPDPAZ
APS2018I	APRPDPAZ
APS2019I	APRRFLAZ APRXDPAZ
APS2020I	APREN2AZ APRENCAZ APRENVAZ APROCAAZ APROSTAZ
APS2021I	APREN2AZ APRENVAZ APROSTAZ
APS2022I	APRDORAZ APREN2AZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS2023I	APREN2AZ APRENCAZ APRENVAZ APROSTAZ APRPTPAZ
APS2024I	APRENVAZ
APS2025I	APREN2AZ APRENVAZ
APS2026I	APRENVAZ
APS2027I	APRENVAZ
APS2028I	APRENVAZ
APS2030I	APROSTAZ
APS2032I	APRDCSAZ
APS2035I	APRDOCEX
APS2038I	APRELPAZ
APS2039I	APRFD2AZ
APS2040I	APRFEJAZ
APS2041I	APRLDTAZ
APS2042I	APRPTPAZ
APS2044I	APRPECAZ
APS2045I	APRPTPAZ
APS2046I	APRPDPAZ
APS2047I	APRPDPAZ
APS2048I	APRXBFAZ
APS2049I	APRXBFAZ
APS2050I	APRXBFAZ
APS2051I	APRXBFAZ
APS2052I	APRXBFAZ
APS2053I	APRXBFAZ
APS2054I	APRXBFAZ
APS2055I	APRPTPAZ
APS2056I	APRECAZ
APS2057I	APRPTPAZ APRXDPAZ
APS2058I	APRIBPAZ
APS2059I	APRIBPAZ
APS2062I	APRIPSEX
APS2063I	APRBPGEX
APS2064I	APRBPGEX APSDDGB
APS2065I	APSDDGB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS2066I	APSDDGB
APS2067I	APSDDGB
APS2068I	APSDDGB
APS2069I	APSDDGB
APS2071I	APRENVAZ
APS2072I	APRENVAZ
APS2073I	APREN2AZ
APS2074I	APRENVAZ
APS2075I	APRFPLAZ APRPLNAZ
APS2077I	APRENCAZ
APS2078I	APRENCAZ
APS2079I	APRACTEZ APROCAAZ
APS2080I	APRXLTAZ
APS2081I	APRESGAZ
APS2082I	APREN2AZ
APS2083I	APRPDPAZ
APS2084I	APRPLNAZ APRRFLAZ
APS2085I	APRBPGEX
APS2086I	APRBPGEX
APS2087I	APRXLTAZ
APS2088I	APRENVAZ APREN3AZ APROSTAZ APRPTPAZ
APS2089I	APREN3AZ APROSTAZ APRPTPAZ
APS2090I	APRENVAZ APREN3AZ APROSTAZ APRPTPAZ
APS2091I	APRCFHAZ APREAGAZ APRELPAZ APRESGAZ APRHSCAZ APRIDOAZ APROCOAZ APRODDAZ APRPGOAZ
APS2092I	APRCFHAZ APROCREZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS2093I	APRENVAZ
APS2094I	APRCFHAZ APRESGAZ APRHSCAZ
APS2095I	APRCFHAZ APRESGAZ APRHSCAZ
APS2096I	APRENCAZ APRENVAZ
APS2097I	APRCFHAZ APREAGAZ APRIDOAZ APROCOAZ APRODDAZ
APS2098I	APRCFHAZ APRELPAZ APRODDAZ
APS2099I	APRCFHAZ APRODDAZ
APS2100I	APRCFHAZ APRODDAZ
APS2101I	APRCFHAZ APRPGOAZ
APS2103I	APRDORAZ APREN3AZ
APS2104I	APREAGAZ APRELPAZ APRESGAZ APRHSCAZ APRIDOAZ APRLDTAZ APROCOAZ APRODDAZ APROSTAZ APRPGOAZ APRWRGAZ
APS2106I	APRCS2AZ
APS2107I	APRCFHAZ APRPLNAZ
APS2108I	APRENVAZ
APS2109I	APRCFHAZ APRPLNAZ APRRFLAZ APRXDPAZ
APS2110I	APRCFHAZ APRESGAZ APRHSCAZ

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS2111I	APRCPLAZ APRCP2AZ APRCS2AZ
APS2112I	APRDOCEX
APS2113I	APRDOCEX
APS2114I	APRCP2AZ
APS2116I	APRPTPAZ
APS2119I	APRMSGEX
APS2120I	APRMSGEX
APS2121I	APRMSGEX
APS2122I	APRSTMAZ
APS2500I	APSESNTB
APS2501I	APSESNTB
APS2502I	APSESNTB
APS2503I	APSESNTB
APS2504I	APSESNTB
APS2505I	APSESNTB
APS2506I	APSESNTB
APS2507I	APSESNTB
APS2508I	APSESNTB
APS2509I	APSESNTB
APS2510I	APSESNTB
APS2511I	APSESNTB
APS2512I	APSESNTB
APS2513I	APSESNTB
APS2514I	APSESNTB
APS2515I	APSESNTB
APS2516I	APSESNTB
APS2517I	APSESNTB
APS2518I	APSESNTB
APS2519I	APSESNTB
APS2520I	APSESNTB
APS2521I	APSESNTB
APS2522I	APSESNTB
APS2523I	APSESNTB
APS2524I	APSESNTB
APS2525I	APSESNTB
APS2526I	APSESNTB
APS2527I	APSESNTB
APS2528I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS2529I	APSESNTB
APS2530I	APSESNTB
APS2531I	APSESNTB
APS2532I	APSESNTB
APS2533I	APSESNTB
APS2534I	APSESNTB
APS2535I	APSESNTB
APS2536I	APSESNTB
APS2537I	APSESNTB
APS2538I	APSESNTB
APS2539I	APSESNTB
APS2540I	APSESNTB
APS2541I	APSESNTB
APS2542I	APSESNTB
APS2543I	APSESNTB
APS2544I	APSESNTB
APS2545I	APSESNTB
APS2546I	APSESNTB
APS2547I	APSESNTB
APS2548I	APSESNTB
APS2549I	APSESNTB
APS2550I	APSESNTB
APS2551I	APSEMSG APSESNTB
APS2552I	APSESNTB
APS2553I	APSEMSG APSERRM
APS2554I	APSESNTB
APS2555I	APSESNTB
APS2556I	APSESNTB
APS2557I	APSEATCD
APS2558I	APSEATCD
APS2559I	APSEATCD
APS2560I	APSESNTB
APS2561I	APSESNTB
APS2562I	APSECUR
APS2563I	APSESNTB
APS2564I	APSESNTB
APS2565I	APSESNTB
APS2566I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS2567I	APSESNTB
APS2568I	APSESNTB
APS2569I	APSESNTB
APS2570I	APSESNTB
APS2571I	APSESNTB
APS2572I	APSESNTB
APS2573I	APSESNTB
APS2574I	APSESNTB
APS2575I	APSESNTB
APS2576I	APSESNTB
APS2577I	APSESNTB
APS2578I	APSESNTB
APS2579I	APSESNTB
APS2580I	APSESNTB
APS2581I	APSEATCD
APS2582I	APSESNTB
APS2583I	APSESNTB
APS2585I	APSESNTB
APS2586I	APSESNTB
APS2587I	APSESNTB
APS2588I	APSESNTB
APS2589I	APSEATCD
APS2590I	APSEATCD
APS2591I	APSEATCD
APS2592I	APSEATCD
APS2593I	APSEATCD
APS2594I	APSESNTB
APS2595I	APSEATCD
APS2596I	APSEATCD
APS2597I	APSEATCD
APS2598I	APSEATCD
APS2599I	APSESNTB
APS2600I	APSEATCD APSECUR APSEMSG
APS2601I	APSESNTB
APS2602I	APSESNTB
APS2603I	APSESNTB
APS2604I	APSERRM
APS2605I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS2606I	APSESNTB
APS2607A	APSEATCD
APS2608I	APSESNTB
APS2611I	APSESNTB
APS2612I	APSESNTB
APS2613I	APSESNTB
APS2614I	APSESNTB
APS2615I	APSESNTB
APS2616I	APSESNTB
APS2617I	APSESNTB
APS2618I	APSESNTB
APS2619I	APSESNTB
APS2620I	APSESNTB
APS2621I	APSESNTB
APS2622I	APSESNTB
APS2623I	APSESNTB
APS2624I	APSESNTB
APS2625I	APSESNTB
APS2626I	APSESNTB
APS2627I	APSESNTB
APS2628I	APSCCDEV APSCSNIO APSERRM
APS2629I	APSESNTB
APS2630I	APSESNTB
APS2633I	APSESNTB
APS2634I	APSESNTB
APS2635I	APSESNTB
APS2636I	APSESNTB
APS2637I	APSESNTB
APS2638I	APSESNTB
APS2639I	APSESNTB
APS2640I	APSESNTB
APS2641I	APSESNTB
APS2644I	APSESNTB
APS2645I	APSESNTB
APS2646I	APSESNTB
APS2647I	APSEATCD
APS2648I	APSESNTB
APS2649I	APSESNTB

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS2650I	APSESNTB
APS2661I	APSESNTB
APS2662I	APSESNTB
APS2663I	APSESNTB
APS2664I	APSESNTB
APS2665I	APSESNTB
APS2666I	APSESNTB
APS2667I	APSESNTB
APS2668I	APSESNTB
APS2669I	APSESNTB
APS2670I	APSESNTB
APS2671I	APSESNTB
APS2672I	APSESNTB
APS2673I	APSESNTB
APS2674I	APSESNTB
APS2675I	APSESNTB
APS2676I	APSESNTB
APS2677I	APSESNTB
APS2678I	APSESNTB
APS2679I	APSESNTB
APS2681I	APSESNTB
APS2682I	APSESNTB
APS3000I	APSLRJFC
APS3001I	APSLRJFC
APS3002I	APSLRJFC
APS3003I	APSHODDS
APS3004I	APSHODDS
APS3005I	APSLUSSO
APS3006I	APSLUSSO
APS3500I	APRFTIEX
APS3501I	APSRIDOR APSRMDOR
APS3502I	APSRMDOR
APS3503I	APSRIDOR APSRMDOR
APS3504I	APSRIDOR APSRMDOR
APS3505I	APSRIDOR
APS3506I	APSRLDOR
APS3507I	APSRLDOR

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS3508I	APSRMDOR
APS3509I	APSRMDOR APSRMOVL
APS3510I	APSRMDOR APSRMOVL
APS3513I	APSRTTCP
APS3514I	APRBRSEX APSRMDOF
APS3515I	APRBRSEX APRIOBEX APSRMDOR
APS3516I	APRBRSEX APRIOBEX APSRMDOR
APS3517I	APRBRSEX APSRMDOF
APS3518I	APRBRSEX APSRMDOF
APS3519I	APRBRSEX APRIOBEX APSRMDOR
APS3520I	APSRTTDF**
APS3521I	APRBRSEX APRIOBEX
APS3522I	APRBRSEX APRIOBEX
APS3523I	APRBRSEX APRIOBEX
APS3524I	APSRMFNT
APS4000I	APSGATRM APSRASFT APSRAUST
APS4001I	APSGACMP
APS4002I	APSGAOPN
APS4003I	APSGATRM
APS4004I	APSGATRM
APS4400I	APSGCET
APS4401I	APRMSGEX APRTRNEX APSDECH APSGASPR APSHROCR** APSLUSSO APSRTTDF APSRMDOF
APS4402I	APRTRNEX

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS4403I	APRTRNEX
APS4500I	APSGTROC
APS4501I	APSGTROC
APS4502I	APSGTROC
APS4506I	APSGTZFS
APS6500I	APSNRM
APS6501A	APSCSNA APSCTCP
APS6501I	APSCSNA APSCTCP
APS6502I	APSCOPCI
APS6503I	APSCCOMP
APS6504I	APSNRM
APS6505I	APSHNLNK** APSNLINK
APS6506I	APSCDPI APSCOPC1 APSCSTMA
APS6507I	APSCDPI
APS6508I	APSCSTMA
APS6509I	APSCDPI
APS6510I	APSCSNA
APS6511I	APSCCDEV APSNSEND
APS6512I	APSHCTCP**
APS6513I	APSHCTCP**
APS6514I	APSHCEST**
APS6515I	APSHNRM**
APS6516I	APSCDPI
APS7000I	APSUEXIT APSUFEXT APSUNEXT APSUREXT
APS7001I	APSUEXTI
APS7002I	APSUEXIT
APS7003I	APSUEXIT
APS7004I	APSUREXT
APS7005I	APSUFSSI
APS8000I	APSJCLO**
APS8001I	APSJCLO**
APS8002I	APSJCLO**
APS8003I	APSJCLO**

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS8004I	APSJCLO**
APS8005I	APSJCLO**
APS8006I	APSJCLO**
APS8007I	APSJCLO**
APS8008I	APSJCLO**
APS8009I	APSJCLO**
APS8010I	APSJCLO**
APS8012I	APSJCLO**
APS8013I	APSJCLO**
APS8014I	APSJCK**
APS8015I	APSJCK**
APS8016I	APSJCK**
APS8017I	APSHFCRT**
APS8018I	APSJCL
APS8019I	APSJCLF
APS8200I	APSHHFDB** APSHHHER** APSHHINI** APSHHRES** APSHHSND**
APS8201I	APSHHFDB** APSHHHER** APSHHINI** APSHHLDB** APSHHMDB** APSHHRES** APSHHSND**
APS8202I	APSHHERI** APSHHFDB** APSHHHER** APSHHINI** APSHHJOF** APSHHLDB** APSHHMDB** APSHHMDF** APSHHMFT** APSHHRES** APSHHRGF** APSHHSMD** APSHHSND**
APS8203I	APSHHFDB** APSHHHER** APSHHLDB** APSHHMDB** APSHHRES** APSHHSND**

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS8204I	APSHHFDB** APSHHRES** APSHHSND**
APS8205I	APSHHCKT** APSHHERI** APSHHFDB** APSHHRES** APSHHRGF** APSHHSND**
APS8206I	APSHHJOF** APSHHRGF**
APS8207I	APSHHMDF** APSHHRGF**
APS8208I	APSHHCKT** APSHHCMF** APSHHEOF** APSHHJOF** APSHHMDF** APSHHMFT** APSHHRGF** APSHHSMD**
APS8209I	APSHHMDF** APSHHRGF**
APS8210I	APSHHJOF** APSHHMDF** APSHHRGF**
APS8211I	APSHHJOF** APSHHMDF** APSHHMFT** APSHHRGF** APSHODDS**
APS8212I	APSHHJOF**
APS8215I	APSHHCKT** APSHHEOF** APSHHJOF** APSHHMFT**
APS8216I	APSHHCKT** APSHHCMP** APSHHDET** APSHHEOF** APSHHERR** APSHHJOF** APSHHMDS** APSHHMFT** APSHHQSC**
APS8217I	APSHHERI**
APS8218I	APSHHERI**
APS8219I	APSHHERI**
APS8220I	APSHHDET**
APS8221I	APSHHDET**

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS8222I	APSHHDET**
APS8223I	APSHHDET**
APS8225I	APSHHQSC**
APS8226I	APSHHERI**
APS8227I	APSHHQSC**
APS8228I	APSHHQSC**
APS8229I	APSHHQSC**
APS8230I	APSHHQSC**
APS8231I	APSHHQSC**
APS8232I	APSHHRSP**
APS8233I	APSHHERI**
APS8234I	APSHHERI**
APS8235I	APSHHCKT**
APS8236I	APSHHEOF**
APS8237I	APSHHRSP**
APS8238I	APSHHERR**
APS8239I	APSHHERR**
APS8240I	APSJCLO**
APS8241I	APSHHERI**
APS8242I	APSHHERI**
APS8243I	APSHHERI**
APS8244I	APSHHERI**
APS8245I	APSHHERI**
APS8246I	APSHHFDB** APSHHHER** APSHHLDB** APSHHMDB** APSHHRES** APSHHSND**
APS8247I	APSHHERI**
APS8248I	APSHHRSP**
APS8249I	APSHHDET**
APS8250I	APSHHDET** APSHHQSC**
APS8251I	APSHHQSC**
APS8252I	APSHHERI**
APS8253I	APSHHINI**
APS8254I	APSHHERI**
APS8255I	APSHHQSC**
APS8256I	APSHHDET** APSHHQSC**

Table 13. Message-to-module cross-reference (continued)

Message	Modules
APS8257I	APSHHCMF**
APS8258I	APSHHCMF**
APS8300I	APSKROUT*
APS8500I	APSRCPDS
APS8501I	APSRCPDS
APS8550I	APSHFCRT** APSHFJOF**
APS8551I	APSHFCRT** APSHFJOF** APSHMPMF**
APS8552I	APSHMPMF**
APS8553I	APSHMPMF**
APS8554I	APSHMPMF**
APS8555I	APSHMPMF**
APS8556I	APSOUFO**
APS8558I	APSHDWPF** APSHFJOF** APSHMPMF**
APS8559I	APSHGDDS** APSHPSES**
APS8560I	APSHPNFY**
APS8562I	APSHPNFY**
APS8563I	APSHPNFY**
APS8564I	APSHPNFY**
APS8565I	APSHMPMF** APSHPCRT**
APS8566I	APSHPNFY**
APS8600I	APSDDS**

Appendix B. Cross-reference of IPDS printer commands and structured fields

Table 14 lists some of the Intelligent Printer Data Stream (IPDS) printer commands that PSF builds, with corresponding Mixed Object Document Content Architecture (MO:DCA) structured fields (SF). For more information about IPDS commands, see *Intelligent Printer Data Stream Reference*. For more information about MO:DCA structured fields, see *Mixed Object Document Content Architecture Reference*.

Note: Sometimes the structured field provides the data for the IPDS command. In other cases, the structured field causes the IPDS command to be built.

Table 14. Cross-reference of IPDS commands to structured fields

IPDS Command	Hex ID	Structured Field	Command Function
Activate Resource (AR)	D62E	BCP BFN BMO BOC BPS CFI CPD FND MCF MDR	Causes a resident resource to become available.
Apply Finishing Operations (AFO)	D602	MFC	Specifies the kind of finishing to be done to a sheet.
Begin overlay (BO)	D6DF	BMO	Identifies data that follows as an overlay.
Begin page (BP)	D6AF	BPG	Identifies data that follows as a page.
Begin page segment (BPS)	D65F	BPS	Identifies data that follows as a page segment.
Data object resource equivalence	D66C	IOB PPO	Used to identify secondary resources to be used with a subsequent presentation data object.
Deactivate data object font component	D65B	none	Directs the printer to deactivate one or more previously activated data object font components.
Deactivate data object resource	D65C	none	Directs the printer to deactivate one or more previously activated data object resources.
Deactivate font	D64F	none	Causes a font to become inactive.
Deactivate overlay	D6EF	none	Causes an overlay to become inactive.
Deactivate page segment (DPS)	D66F	none	Causes a page segment to become inactive.
Define user area (DUA)	D6CE	SDLM[1]	Defines the user printable area (UPA) for print labeling.

1. Security definitions library member.

2. Structured field used during conversion from IM Image to IO Image.

Table 14. Cross-reference of IPDS commands to structured fields (continued)

IPDS Command	Hex ID	Structured Field	Command Function
End	D65D	EBC ECP EGR EIM EFN EOC	Stops an image, graphics object, bar code, object container, or downloaded font sequence.
End page (EP)	D6BF	EMO EPG EPS	Stops an overlay, a page, or a page segment.
Execute order any state (XOA)	D633	None	Allowable orders: X'0600' Mark form carrier strip (3800 only) X'0800' Mark form X'0A00' Alternate offset stacker X'0C00' Control edge marks X'F100' Display operator panel message (3800 only) X'F200' Discard buffered data X'F300' Request printer information (3800 only) X'F400' Request resource list X'F500' Discard unstacked pages X'F600' Exception handling control X'F800' Print quality control
Execute order home state (XOH)	D68F	BPF MDD MFC MMC	Allowable orders: X'0100' Print buffered data X'0300' Specify group operation X'0400' Define group boundary X'0500' Erase residual print data X'0700' Erase residual font data X'0B00' Set x adjustment range (3800 only) X'1300' Eject to front facing X'1500' Select input media source X'1600' Set media origin X'1700' Set medium size X'0D00' Stack received pages X'0E00' Select media modifications X'F300' Obtain printer characteristics X'F500' Page counters control
Include data object	D67C	IOB	Causes a previously activated data object resource to be presented in the current page or overlay.
Include overlay (IO)	D67D	IPO LND PMC RCD SDLM[1] XMD	Include a page overlay or a secure overlay, and specify its position.
Include page segment (IPS)	D67F	IPS LND RCD XMD	Causes a loaded page segment to be placed on a page.
Invoke CMR (ICMR)	D66B	MDR PPO	Downloads a color management resource (CMR) in home state.
Load code page (LCP)	D618	CPI	Describes the attributes of a code page.

Table 14. Cross-reference of IPDS commands to structured fields (continued)

IPDS Command	Hex ID	Structured Field	Command Function
Load code page control (LCPC)	D61A	CPC CPD	Contains code page data.
Load copy control (LCC)	D69F	MCC MMC MMO MSU	Contains the modifications for each copy of each form. Includes medium overlay printer IDs assigned by Resource Manager.
Load equivalence (LE)	D61D	none	Maps suppressions.
Load font (LF)	D62F	FNG FNN	Contains font raster data.
Load font character set control (LFCSC)	D619	FNC FND	Describes the attributes of an outline font character set.
Load font control (LFC)	D61F	FNC FND FNM FNO	Describes the attributes of a raster font.
Load font equivalence (LFE)	D63F	MCF	Determines which fonts can be used on a page. Includes font printer IDs assigned by Resource Manager.
Load font index (LFI)	D60F	FNI	Contains addresses within the LF printer command data for each character and information for individual characters.
Logical page descriptor (LPD)	D6CF	PGD PTD	Establishes page size, length units, and initial values of control sequences.
Logical page position (LPP)	D66D	PGP	Contains the location of a page on a form.
Manage IPDS Dialog (MID)	D601	none	Begins or ends an IPDS dialog within a session.
No operation (NOP)	D603	none	No operation.
Presentation fidelity control	D634	PFC	Specifies the fidelity requirements for certain presentation functions.
Rasterize presentation object	D67B	PPO	Requests that a previously activated presentation data object resource or overlay be rasterized and stored in a cache.
Sense type and model	D6E4	none	Reads the IPDS standard identification information and printer capabilities.
Set home state	D697	none	Resets the printer to home state (home state operations).
Set presentation environment	D608	PEC	Home state command which sets specific presentation attributes, such as rendering intent and device appearance.
Write bar code (WBC)	D681	BDA	Contains bar code data and its associated parameters.
Write bar code control (WBCC)	D680	BDD MBC MCF MDR OBD OBP	Puts the printer in bar code state and defines the bar code presentation space, the bar code object area, and bar code mapping.

Table 14. Cross-reference of IPDS commands to structured fields (continued)

IPDS Command	Hex ID	Structured Field	Command Function
Write graphics (WG)	D685	GAD	Contains graphics data and its associated parameters.
Write graphics control (WGC)	D684	GDD MCF MDR MGO OBD OBP	Puts the printer in graphics state and defines the graphics presentation space, the graphics object area, and graphics mapping.
Write image (WI)	D64D	IRD	Contains IM image raster data.
Write image 2 (WI2)	D64E	IPD IRD[2]	Contains IO image data and its associated parameters.
Write image control (WIC)	D63D	IID IOC ICP	Describes and places an IM image.
Write image control 2 (WIC2)	D63E	ICP[2] IDD IID[2] IOC[2] MIO OBD OBP	Puts the printer in IO image state and defines the image presentation space, the IO image object area, and image mapping.
Write object container (WOC)	D64C	OCD	Contains the object container resource data.
Write object container control (WOCC)	D63C	BOC CDD MCD OBD OBP	Describes an object container resource.
Write text (WT)	D62D	IPS LND PTX RCD XMD	Contains text and text control sequences. See Table 15 for a list of control sequences.

Table 15 presents control sequences in the write-text printer command.

Table 15. Control sequences in the write-text printer command

Hex Code (Unchained/ Chained)	Text Control Name	Length
72/73	Overstrike	5
74/75	Set text color	4–5
76/77	Underscore	3
78/79	Temporary baseline move	3, 4, 6
80/81	Set extended text color	14–16
C0/C1	Set inline margin	4
C2/C3	Set intercharacter adjustment	4
C4/C5	Set variable-space increment	4
C6/C7	Absolute move inline	4

Table 15. Control sequences in the write-text printer command (continued)

Hex Code (Unchained/ Chained)	Text Control Name	Length
C8/C9	Relative move Inline	4
D0/D1	Set baseline increment	4
D2/D3	Absolute move baseline	4
D4/D5	Relative move baseline	4
D8/D9	Begin line	2
DA/DB	Transparent data	2–255
E4/E5	Draw I-axis rule	7
E6/E7	Draw B-axis rule	7
EE/EF	Repeat string	4–255
F0/F1	Set coded font local	3
F2/F3	Begin suppression	3
F4/F5	End suppression	3
F6/F7	Set text orientation	6
F8/F9	No operation	2–255

Appendix C. PSF reason codes

When most PSF modules return control to a calling module, they set a reason code in register 0. System programmers can specify dumps for specific reason codes or for specific message IDs. Table 16 lists the specific reason codes that are set by PSF modules.

Table 16. PSF reason codes

Reason Code	Definition	Set By
X'00000000'	The subcomponent completed successfully.	Any subcomponent
X'01240400'	A preload repositioning request.	APSPPDVP
X'01240401'	A JES Cancel order interrupted AFP Download Plus.	APSHPDVP
X'01240402'	A JES Restart order interrupted AFP Download Plus transformation.	APSPPDVP
X'01240404'	An error has occurred during AFP Download Plus transformation. The data set is held.	APSHPDVP
X'02010000'	An unsupported printer was allocated.	APSCIPRT
X'02010004'	The printer software feature was not installed.	APSCIPRT
X'02060800'	An I/O error was detected. The last command that was added has run.	APSCCOMP APSRROCK
X'02060801'	An I/O error was detected. The last command that was added did not run.	APSCCOMP APSRROCK
X'02060802'	An I/O error was detected. PSF does not know whether the last command that was added has run.	APSCCOMP APSCSNA APSCSNIO APSRROCK APSERRM
X'02060803'	An I/O error was detected. The last command was related to a resource but failed to activate that resource.	APSRROCK
X'02061201'	PSF failed to allocate the buffer.	APSCADD APROUTEX
X'02061500'	SNA only: Contact with the printer was lost during I/O.	APSCSNIO
X'02150004'	A null ACK was received, following the read operation.	APSCSNIO
X'02160802'	Intervention and recovery reported on SNA; Now possible to try again..	APSCSNA
X'04030100'	A CPC structured field is missing.	APSDCPL
X'04030200'	A CPC structured field specifies a null value that is not valid for the default character name.	APSDCPL
X'04030300'	A CPC structured field specifies a length that is not valid for a CPI repeating group.	APSDCPL
X'04030400'	A CPI structured field is missing.	APSDCPL
X'04030500'	A CPI structured field data length is not valid.	APSDCPL
X'04030600'	A CPI structured field specifies a null value that is not valid for a character name.	APSDCPL
X'04030700'	An ECP structured field is missing.	APSDCPL
X'04030800'	The names in the ECP and BCP structured fields do not match.	APSDCPL

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'04050100'	The first structured field of the data set, after processing the BDS structured field, is not valid.	APSDDS
X'04050200'	The first structured field of job header data, after processing a BJH internal structured field, is not valid.	APSDDS
X'04050300'	The first structured field of user data, after processing an EJH internal structured field, is not valid.	APSDDS
X'04050400'	A preload repositioning request.	APSDDS
X'04050500'	Printing of the current document, messages, and separator page stops.	APSDDS
X'04050600'	A structured field that is not valid follows a BTM internal structured field.	APSDDS
X'04050700'	A record type that is not valid follows an EDH internal structured field.	APSDDS
X'04050800'	A structured field that is not valid follows a BDH internal structured field.	APSDDS
X'04051B00'	An offset stacker was requested but is unavailable.	APSDDS
X'04052100'	Printing of current document is stopped.	APSDDS
X'04052110'	Insufficient virtual storage was available for buffering a line mode migration PAGEDEF.	APSDDS
X'04080100'	The length in a self-defining parameter on a structured field is wrong.	APSHDWPF
X'040A0100'	An END internal structured field was received.	APSDGET APRINPEX
X'040A0200'	A record length is not valid because no data was present when a carriage control was expected.	APSDGET APRINPEX
X'040A0300'	A structured field record length was not valid because it was less than the standard introducer length.	APSDGET APRINPEX
X'040A0302'	Although an extension bit was set, a structured field record length was not valid because it was less than the length needed for an introducer extension length field.	APSDGET APRINPEX
X'040A0303'	Although an extension bit was set, the structured field record length was not valid because it was less than the length needed for an extended introducer.	APSDGET APRINPEX
X'040A0400'	The length specified in a structured field introducer is greater than the record length.	APSDGET APRINPEX
X'040A0500'	The structured field introducer flag is not valid.	APSDGET APRINPEX
X'040A0600'	The structured field padding length is not valid.	APSDGET APRINPEX
X'040A0700'	The structured field data length is not valid because it is not the required multiple.	APSDGET APRINPEX
X'040A0703'	The structured field data length is not valid because it is not one of the allowed values.	APSDGET APRINPEX
X'040A0800'	The structured field type is not valid.	APSDGET APRINPEX
X'04100100'	Insufficient main storage is available to build the RRB.	APSDLOAD
X'04100200'	The first record in a FORMDEF is not a BFM structured field.	APSDLOAD

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'04100300'	The first record in a PAGEDEF is not a BPM structured field.	APSDLOAD
X'04100400'	The first record in a medium overlay is not a BMO structured field.	APSDLOAD
X'04100500'	The first record in a page segment is not a BPS structured field.	APSDLOAD
X'04100600'	The first record in a coded font is not a BCF structured field.	APSDLOAD
X'04100700'	The first record in a code page is not a BCP structured field.	APSDLOAD
X'04100800'	The first record in a font character set is not a BFN structured field.	APSDLOAD
X'04100900'	A double-byte font was requested to be loaded into a printer that does not support double-byte fonts.	APSDLOAD
X'04100A00'	A double-byte font is specified for a printer that does not support double-byte fonts.	APSDLOAD
X'04100B00'	An error was detected while processing a secure resource.	APSDLOAD
X'0410FE01'	APSDFML returned a non-zero return code to APSDLOAD with a non-positive reason code.	APSDLOAD
X'0410FE02'	APSDPML returned a non-zero return code to APSDLOAD with a non-positive reason code.	APSDLOAD
X'04110400'	The interrupt message page ended. End-of-data was returned to CCM.	APSDMSGF
X'04110800'	The message data set ended. End-of-data was returned to CCM.	APSDMSGF
X'04160000'	General information reason code. Provides environmental messages for objects on stack and position of current record.	APSDDGB
X'04160100'	Group level finishing requested but printer does not support group level finishing.	APSDDGB
X'04160200'	Medium level finishing requested but the printer does not support medium level finishing.	APSDDGB
X'041A0100'	An expected FNC structured field was not found.	APSDFNL
X'041A0300'	The pattern technology identifier in the FNC structured field is not valid.	APSDFNL
X'041A0400'	Bytes 4–9 of the FNC structured field contain a value that is not valid.	APSDFNL
X'041A0500'	The FNC structured field has a length that is not valid for the FNO structured field repeating group.	APSDFNL
X'041A0600'	The FNC structured field has a length that is not valid for the FNI structured field repeating group.	APSDFNL
X'041A0700'	The compression algorithm identifier in the FNC structured field for a single-byte font is not valid.	APSDFNL
X'041A0900'	The compression algorithm identifier in the FNC structured field for a double-byte font is not valid.	APSDFNL
X'041A0A00'	The FNC structured field contains flags that are not valid for a double-byte font.	APSDFNL
X'041A0B00'	An expected FNO structured field was not found.	APSDFNL
X'041A0C00'	The FNO structured field data length is not valid.	APSDFNL
X'041A0D00'	An FNO structured field contains a baseline extent value that is not valid.	APSDFNL
X'041A0E00'	An expected FNI structured field was not found.	APSDFNL
X'041A0F00'	The FNI structured field data length is not valid.	APSDFNL

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'041A1000'	The default character name specified in the CPC structured field was not found in the FNI structured field.	APSDFNL
X'041A1100'	The default character entry in the FNI structured field contains a character increment that is not valid.	APSDFNL
X'041A1200'	The default character entry in the FNI structured field contains a character box size that is not valid.	APSDFNL
X'041A1300'	The default character entry in the FNI structured field contains a character pattern data address that is not valid.	APSDFNL
X'041A1400'	The name in CPI is not found in the FNI structured field.	APSDFNL
X'041A1500'	The FNI structured field entry for a code point contains a character increment that is not valid.	APSDFNL
X'041A1600'	The FNI structured field entry for a code point contains a character box size that is not valid.	APSDFNL
X'041A1700'	The FNI structured field entry for a code point contains a character pattern data address that is not valid.	APSDFNL
X'041A1800'	An expected FNG structured field was not found.	APSDFNL
X'041A1900'	An expected EFN structured field was not found.	APSDFNL
X'041A1A00'	The names in BFN and EFN structured fields do not match.	APSDFNL
X'041D0100'	The resource library member requested from a System Object Library was not found.	APSDSECD
X'041D0200'	A keyword in the security definitions library member is wrong.	APSDSECD
X'041D0300'	One of the paper sizes loaded in the printer does not have a match in the security definitions library member.	APSDSECD
X'041D0400'	A required keyword is missing from the security definitions library member.	APSDSECD
X'041D0500'	A paper name in the security definitions library member is wrong.	APSDSECD
X'041D0600'	A TOP argument in the security definitions library member is wrong.	APSDSECD
X'041D0700'	A TOP keyword is out of order in the security definitions library member.	APSDSECD
X'041D0800'	An overlay name contains more than 6 characters in the security definitions library member.	APSDSECD
X'041D0900'	Page labeling is in effect, but secure overlays are specified in the security definitions library member.	APSDSECD
X'041D0A00'	SECOVLY keyword is out of order in the security definitions library member.	APSDSECD
X'041D0B00'	UPADIM or UPAORG keyword is out of order in the security definitions library member.	APSDSECD
X'041D0C00'	The unit used in the security definitions library member is wrong.	APSDSECD
X'041D0D00'	Two decimals are in a value in the security definitions library member.	APSDSECD
X'041D0E00'	A nonnumeric character is in a value in the security definitions library member.	APSDSECD
X'041D0F00'	A value specified in the security definitions library member has more than 6 characters.	APSDSECD

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'041D1000'	A value specified in the security definitions library member has more than 3 digits before the decimal point or more than 2 digits after the decimal point.	APSDSECD
X'041D1100'	A required keyword is missing from the security definitions library member.	APSDSECD
X'041D1200'	First keyword is out of order in the security definitions library member.	APSDSECD
X'041D1300'	The security definitions library member is empty.	APSDSECD
X'041D1400'	An error occurred while reading a record from the security definitions library member.	APSDSECD
X'041D1500'	A PAPERNAM keyword in the security definitions library member has no argument.	APSDSECD
X'041D1600'	A value is not specified for a keyword (PAPERSIZ, UPAORG, or UPADIM) in the security definitions library member.	APSDSECD
X'041D1700'	After a security definitions library member was processed, the attempt to close it failed.	APSDSECD
X'041D1800'	A value specified in inches in the security definitions library member is greater than 22.75.	APSDSECD
X'041D1900'	A value specified in millimeters in the security definitions library member is greater than 577.97.	APSDSECD
X'041D2000'	The X or Y dimension of the user printable area is zero.	APSDSECD
X'07104000'	PSF cannot obtain GRN pointer storage for the resource.	APRGRNEX
X'07104200'	PSF cannot obtain GRN pointer storage for the font code page.	APRGRNEX
X'07104400'	PSF cannot obtain GRN pointer storage for the font character set.	APRGRNEX
X'07104800'	PSF cannot obtain GRN pointer storage for the page segment.	APRGRNEX
X'07104C00'	PSF cannot obtain GRN pointer storage for the overlay.	APRGRNEX
X'07106600'	PSF cannot obtain storage for the LRE and RRL commands for the font.	APRGRNEX
X'07106800'	PSF cannot obtain storage for the LRE and RRL commands for the page segment.	APRGRNEX
X'07110400'	Attempted to print with double-byte font character set extension, but the associated printer-resident font could not be activated.	APRGRNEX
X'07200400'	Could not activate DOR.	APSRLDOR
X'07240000'	No space is available for a resource control block (RCB)—reason code.	APSRNAME
X'07240400'	No space is available for an RCB—font.	APSRNAME
X'07240800'	No space is available for an RCB—page segment.	APSRNAME
X'07240C00'	No space is available for an RCB—medium overlay.	APSRNAME
X'07241800'	No space is available for an RCB—FORMDEF.	APSRNAME
X'07241C00'	No space is available for an RCB—PAGEDEF.	APSRNAME
X'07242000'	No space is available for an RCB—code page.	APSRNAME
X'07242400'	No space is available for an RCB—character set.	APSRNAME
X'07242800'	No space for code page root font array.	APSRNAME
X'07242C00'	No space for character set root font array.	APSRNAME

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'07243000'	No space is available for an RCB—object container.	APSRNAME
X'07401400'	Requested font rotation for symbol set is not supported by the printer.	APSRMFNT
X'07402400'	An MCF2 is specified without a code page–character set pair.	APSRMFNT
X'07403400'	Map request of double-byte font for symbol set is not supported by the printer.	APSRMFNT
X'07404404'	Map request is for unsupported data object resource.	APSRMDOR
X'07404408'	Substitution not valid for DOR.	APSRMDOR
X'0740440C'	IOCA specified as OC.	APSRMDOR
X'07404804'	Cannot convert name to EBCDIC.	APSRMDOF
X'07500C00'	The GETMAIN macro unsuccessfully attempted to obtain virtual storage for LRE/RRL for overlay.	APROAEEX
X'07500D00'	No space for RRB.	APSODOF
X'07600200'	The code page specified in the resident code page table cannot be found.	APSRSRT
X'07600400'	The character set specified in the resident character set table cannot be found.	APSRSRT
X'07601200'	Grid not found in grid-to-name mapping code page table.	APSRSRT
X'07601400'	Grid not found in grid-to-name mapping character set table.	APSRSRT
X'07602200'	No code page was found in the name-to-grid mapping code-page table.	APSRSRT
X'07602400'	Character set not found in name-to-grid mapping character-set table.	APSRSRT
X'07603400'	Character set mapped to an FGID of zero.	APSRSRT
X'07705400'	Code page and character set have conflicting technologies. One is for a raster font, the other for an outline font.	APRFTIEX
X'07800400'	Resource load or delete operation was not successful.	APSRROCK
X'07804804'	Include request is for unsupported DOR.	APSRIDOR
X'07804806'	Attempted Exit 7 resource substitution is not valid.	APSRIDOR
X'07902000'	No space is available for resource MLCB control block.	APSRQRY
X'07902200'	No space is available for MLCB—code page.	APSRQRY
X'07902400'	No space is available for MLCB—font character set.	APSRQRY
X'07902500'	No space is available for MLCB—coded font.	APSRQRY
X'07902600'	No space is available for MLCB—page segment.	APSRQRY
X'07902800'	No space is available for MLCB—overlay.	APSRQRY
X'07902A00'	No space is available for MLCB—PAGEDEF.	APSRQRY
X'07902C00'	No space is available for MLCB—FORMDEF.	APSRQRY
X'07902E00'	No space for MLCB—object container.	APSRQRY
X'07904000'	No space is available for RRB.	APSRQRY
X'07904200'	No space is available for RRB—code page.	APSRQRY
X'07904400'	No space is available for RRB—font character set.	APSRQRY
X'07904500'	No space is available for RRB—coded font.	APSRQRY

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'07904600'	No space is available for RRB—page segment.	APSRQRY
X'07904800'	No space is available for RRB—overlay.	APSRQRY
X'07904A00'	No space is available for RRB—PAGEDEF.	APSRQRY
X'07904C00'	No space is available for RRB—FORMDEF.	APSRQRY
X'07904E00'	No space for RRB—object container.	APSRQRY
X'07A15000'	Unable to activate font through GRID.	APSRLOAD
X'07A25000'	Unable to activate an outline coded font through HAIDS.	APSRLOAD
X'07C00400'	Call to selectively delete the specific resource types resulted in no resources being deleted from the printer, because all of the resources specified were required.	APSRDEL APSRDTRR APSRDTSD APSRSDL
X'07C00800'	Call to selectively or totally delete the specific resource type cannot be satisfied, because none of the resource type specified is available to delete.	APSRDEL
X'08070100'	First nondocument data set level resource structured field received during restart. This reason code was stored in the RRB along with a return code of 4.	APRINPEX
X'08070101'	PSF is not enabled, and the print data set is not a softcopy publication.	APRINPEX
X'08070104'	Resource processing stopped before the end was reached.	APRINPEX
X'08080100'	Values that are not valid exist in one or more fields in the Begin Resource (BRS or BR) structured field.	APRBRSEX
X'08080101'	Error in inline resource processing.	APRBRSEX
X'08080102'	Environmental messages for OID.	APRIOBEX
X'08090100'	FORMDEF not specified.	APRDOCEX
X'08090104'	Printer does not support color fidelity—job is held.	APRDOCEX
X'08090105'	Printer does not support color fidelity—processing continues.	APRDOCEX
X'08090106'	Printer does not support Toner Saver Triplet.	APRDOCEX
X'080B0100'	No secure overlays.	APRBPGEX
X'080B0200'	UPA dimensions are not valid.	APRBPGEX
X'080B0300'	Multiple copies from different input bins; bin attributes do not match.	APRBPGEX
X'080B0500'	Printer does not support group level Medium Finishing Control (MFC) structured fields. Data set processing is stopped.	APRBPGEX
X'080B0600'	Printer does not support sheet level MFC structured fields. Data set processing is stopped.	APRBPGEX
X'080B0700'	The X'8E' triplet is unsupported and finishing fidelity is set to Do Not Stop.	APRBPGEX
X'080B0800'	The X'8E' triplet is unsupported and finishing fidelity is set to Stop.	APRBPGEX
X'080B0900'	The X'85' triplet is unsupported and finishing fidelity is set to Do Not Stop.	APRBPGEX
X'080B1000'	The X'85' triplet is unsupported and finishing fidelity is set to Stop.	APRBPGEX
X'080B1100'	A finishing operation is not supported and finishing fidelity is set to Stop.	APRBPGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'080B1200'	Print job finishing is requested on a data set other than the header. Finishing fidelity is set to DO NOT STOP.	APRBPGEX
X'080B1300'	Print job finishing is requested on a data set other than the header. Finishing fidelity is set to STOP.	APRBPGEX
X'080E0100'	Required main storage space for CFI structured field is not available.	APRCFIEX
X'08110100'	Not enough storage is available to build an RRB.	APRIPSEX
X'08120100'	Reached PIMSG count limit, stopped processing data set.	APREPGEX APRMSGEX APSDDS
X'08120101'	Current page ended.	APREPGEX
X'08140001'	Object stack is about to overflow.	APRMSGEX
X'08140002'	Bin substitution not allowed when mandatory page labeling.	APRMSGEX
X'08140100'	Required structured field is missing.	APRMSGEX
X'08140101'	EOF found before end of processing a resource.	APRMSGEX
X'08140102'	SF forms are in a sequence that is not valid.	APRMSGEX
X'08140103'	Bxx name does not match Exx name.	APRMSGEX
X'08140104'	Length in self-defining parameter on structured field is wrong.	APRMSGEX
X'08140105'	SF length is less than introducer length.	APRMSGEX
X'08140106'	Structured field length is greater than record length in RDW.	APRMSGEX
X'08140107'	Font size is not valid in MCF.	APRMSGEX
X'08140108'	Padding length is incorrect.	APRMSGEX
X'08140109'	Length in introducer is not correct for current structured field type.	APRMSGEX
X'08140110'	Incorrect value for structured field.	APRMSGEX
X'08140111'	Incorrect value for structured field.	APRMSGEX
X'08140112'	Image block is missing.	APRMSGEX
X'08140113'	Null name not acceptable for current structured field.	APRMSGEX
X'08140114'	Scale factor value in IOC structured field is not acceptable.	APRMSGEX
X'08140115'	MCF structured field entry ID is not valid.	APRMSGEX
X'08140116'	MCF structured field entry ID incomplete.	APRMSGEX
X'08140117'	MCF structured field entry ID does not contain a font character set reference.	APRMSGEX
X'08140118'	MCF structured field font local ID value not acceptable.	APRMSGEX
X'08140119'	Unit Base value in structured field is not supported.	APRMSGEX
X'08140120'	The Begin Segment introducer is missing from the first GAD structured field.	APRMSGEX
X'08140121'	X-direction and Y-direction L-units per unit base values do not match.	APRMSGEX
X'08140122'	The CCM detected a subset order or version parameter that is not valid in a GDD structured field.	APRMSGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140125'	The CCM detected a mapping option value that is not valid or is unsupported in a Map Object structured field (MIO, MGO, MBO, MCD) or in an IOB structured field with a bad mapping option triplet.	APRMSGEX
X'08140126'	Object type in Begin Resource (BRS or BR) structured field is not supported.	APRMSGEX
X'08140127'	Device does not support object that begins with structured field.	APRMSGEX
X'08140128'	A required self-defining parameter is missing from structured field.	APRMSGEX
X'08140129'	Structured field contained a coded font local ID that was already used in the preceding font.	APRMSGEX
X'08140130'	Include Page Overlay not specified in MPO structured field.	APRMSGEX
X'08140131'	Coded font specified in object environment group not previously specified in MEG or AEG.	APRMSGEX
X'08140132'	Image resolution in IID does not match printer resolution.	APRMSGEX
X'08140133'	A structured field that is not valid was found between objects.	APRMSGEX
X'08140134'	A duplicate overlay local ID was found in an MMO or MPO structured field.	APRMSGEX
X'08140135'	An overlay local ID that is not valid was detected in an MMO or MPO structured field.	APRMSGEX
X'08140136'	Either no Environment Group was specified, or at least one error occurred in the Environment Group; no environment to use to print a page.	APRMSGEX
X'08140137'	Zero was specified for L-Units per unit base in structured field.	APRMSGEX
X'08140138'	Inline medium maps are not supported.	APRMSGEX
X'08140139'	An IM image object contains incorrect or not valid data.	APRMSGEX
X'08140140'	The media origin override request by installation exit APSUX07 has been ignored and the FORMDEF resource used.	APRMSGEX
X'08140141'	Complex IM image object contains incorrect or not valid data. The complex IM image object cannot be converted to an I/O object.	APRMSGEX
X'08140142'	The structured field contains too many repeating groups.	APRMSGEX
X'08140143'	X'4B' triplet missing from IOB structured field.	APRMSGEX
X'08140144'	Parameter in IOB structured field contains unacceptable data.	APRMSGEX
X'08140145'	Structured field not allowed in page segment included with an IOB.	APRMSGEX
X'08140146'	X'84' triplet is not valid in MCF2 structured field.	APRMSGEX
X'08140147'	Duplicate extended resource local ID.	APRMSGEX
X'08140148'	IOB attempting to include a non-presentation object container.	APRMSGEX
X'08140149'	OID length on MDR, BIM, BOC, or IOB FQN triplet is greater than 129 bytes.	APRMSGEX
X'08140150'	X'BE' triplet on MDR repeating group in OEG but no X'DE'.	APRMSGEX
X'08140151'	A secondary resource on an IOB is not mapped in the AEG.	APRMSGEX
X'08140152'	Bad FQN format on SF.	APRMSGEX
X'08140153'	Found X'84' or X'CE' triplet on MDR in OEG.	APRMSGEX
X'08140154'	More than one FQN per repeating group on MDR.	APRMSGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140155'	MDR specifies same resource group more than once in an environment group.	APRMSGEX
X'08140156'	MDR cannot map same reference more than once in an environment group.	APRMSGEX
X'08140157'	Printer does not support download of IOCA object.	APRMSGEX
X'08140158'	OID mismatch has occurred.	APRMSGEX
X'08140159'	Secondary resource requested but printer does not support DORE command.	APRMSGEX
X'08140160'	Printer or PSF does not support DOFs.	APRMSGEX
X'08140161'	DOF mapped but contains a bad value.	APRMSGEX
X'08140162'	FQN triplet type and PPO repeating group object type mismatch.	APRMSGEX
X'08140163'	MDR mapped a TrueType collection.	APRMSGEX
X'08140164'	Processing and caching not supported by printer or PSF.	APRMSGEX
X'08140165'	PPO resource not mapped in REG.	APRMSGEX
X'08140166'	Scope of CMR is incorrect for where the structured field is included.	APRMSGEX
X'08140167'	Unpaired FQN type X'DE' and CMR Descriptor triplets on IOB or PPO structured field.	APRMSGEX
X'08140168'	Processing mode for CMR is not valid.	APRMSGEX
X'08140169'	Printer does not support CMR Descriptor triplet, ICMR triplet, rendering intent triplet, or FQN type X'41' triplet.	APRMSGEX
X'08140170'	Printer does not support the CMR type.	APRMSGEX
X'08140171'	CMR is mapped but no CMR Descriptor triplet, or no Document Offset specified for document level CMR.	APRMSGEX
X'08140172'	Printer does not support the ICMR command.	APRMSGEX
X'08140173'	Printer does not support the SPE command.	APRMSGEX
X'08140174'	Incorrect CMR types are mapped or included inline, or CMR name is not 146 bytes long.	APRMSGEX
X'08140175'	Object area coloring on OBD, IOB, or PGD structured field is not supported by the printer.	APRMSGEX
X'08140176'	Printer does not support extended bar code colors (X'4E' was on the BDD structured field).	APRMSGEX
X'08140177'	Printer does not support bi-level color on the WIC2 command (X'F6' self-defining parameter on the IDD structured field or X'4E' on the IOB structured field).	APRMSGEX
X'08140178'	Printer does not support the extended bi-level color self-defining parameter on the WIC2 command (X'F4' self-defining parameter specified on the IDD structured field).	APRMSGEX
X'08140179'	Printer does not support Set Process Color Drawing Order for GOCA.	APRMSGEX
X'08140180'	Object type in a X'5A' triplet does not specify document (triplet is on a PEC or MDR structured field).	APRMSGEX
X'08140181'	Printer does not support Set Extended Text Color Order in PTOCA.	APRMSGEX
X'08140182'	Printer does not support the device appearance triplet or does not support the device appearance requested.	APRMSGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140183'	Printer does not support Set Text Color Order in PTOCA.	APRMSGEX
X'08140184'	Non-CMR is mapped in the DEG or medium map.	APRMSGEX
X'08140200'	No medium maps in FORMDEF.	APRMSGEX
X'08140201'	Device does not support multiple copies.	APRMSGEX
X'08140202'	Too many secure overlays specified for medium map.	APRMSGEX
X'08140203'	Duplex is not supported by either printer or bin.	APRMSGEX
X'08140204'	Bin not available.	APRMSGEX
X'08140205'	Bin disabled.	APRMSGEX
X'08140206'	Orientation in MDD is unacceptable.	APRMSGEX
X'08140207'	Duplexing is disabled.	APRMSGEX
X'08140208'	A PGP structured field specified a duplex value that is not valid.	APRMSGEX
X'08140209'	The PGP structured field does not contain a page origin value for the front side of a sheet.	APRMSGEX
X'08140210'	A Constant Forms Control value that is not valid was detected in an MMC structured field.	APRMSGEX
X'08140211'	The set of modifications specified in the MCC structured field includes conflicting constant forms control values for the same side of a sheet.	APRMSGEX
X'08140212'	An attempt was made to process a page with a medium map that specifies only constant data.	APRMSGEX
X'08140213'	Suppression local ID not acceptable in MSU.	APRMSGEX
X'08140214'	Two MMC structured fields were defined with the same ID.	APRMSGEX
X'08140215'	The token name parameters in two repeating groups in an MSU structured field have the same value.	APRMSGEX
X'08140217'	Copy specification in MCC structured field is not acceptable.	APRMSGEX
X'08140220'	More than 8 overlays specified in MMC structured field.	APRMSGEX
X'08140221'	More than 8 suppressions specified in MMC structured field.	APRMSGEX
X'08140222'	CSE caused too many copy controls for LCC.	APRMSGEX
X'08140224'	The overlay local ID in the MMC was not acceptable.	APRMSGEX
X'08140225'	MMC structured field not found to compare MMC ID in the MMC structured field.	APRMSGEX
X'08140226'	Overlay local ID in MMC structured field was not found in MMO structured field.	APRMSGEX
X'08140227'	Too many copy controls for current medium map.	APRMSGEX
X'08140228'	Simplex/duplex value in MMC structured field not acceptable.	APRMSGEX
X'08140229'	Set of modifications in MCC structured field includes both normal and tumble duplex.	APRMSGEX
X'08140230'	Input bin not supported or not enabled.	APRMSGEX
X'08140231'	MCC structured field has an odd number of copy groups but specifies duplex.	APRMSGEX
X'08140232'	Modifications in MCC structured field include both simplex and duplex.	APRMSGEX
X'08140233'	Unequal copy counts for duplex in MCC structured field.	APRMSGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140234'	Print quality value in MMC structured field not acceptable.	APRMSGEX
X'08140235'	Modifications in MCC structured field select more than one input source.	APRMSGEX
X'08140236'	Bin selection in MMC not acceptable.	APRMSGEX
X'08140237'	Suppression local ID in MMC not acceptable.	APRMSGEX
X'08140238'	Medium map specified in IMM structured field not found.	APRMSGEX
X'08140239'	Offset stacking in MMC structured field not acceptable.	APRMSGEX
X'08140240'	Forms flash in MMC structured field is not acceptable.	APRMSGEX
X'08140241'	The MCC structured field in the medium map specifies more than one copy subgroup, and the device does not support this function.	APRMSGEX
X'08140242'	N_UP was requested, but the printer does not support it.	APRMSGEX
X'08140243'	Duplex N_UP was requested, but the printer does not support it.	APRMSGEX
X'08140244'	Simple-up value in MCC structured field is not acceptable.	APRMSGEX
X'08140245'	The set of modifications specified in MCC structured field includes conflicting simple-up values.	APRMSGEX
X'08140246'	Secure overlays and N_UP are not allowed together.	APRMSGEX
X'08140247'	Medium map contains PMC, but the printer does not support page overlays.	APRMSGEX
X'08140248'	Selected Medium Modification is not available at the device.	APRMSGEX
X'08140249'	Conflicting Selectable Medium Modifications in MMCs under a single MCC.	APRMSGEX
X'08140250'	Output bin is not available or not supported.	APRMSGEX
X'08140251'	Different input bins for front and back of sheet.	APRMSGEX
X'08140252'	Printer does not support enhanced N_UP.	APRMSGEX
X'08140253'	Conflicting N_UP PGP specification.	APRMSGEX
X'08140254'	A sheet side or partition value is not valid in the PGP.	APRMSGEX
X'08140255'	Basic and Enhanced N_UP in same PGP repeating group.	APRMSGEX
X'08140256'	A page rotation specified in the PGP is not valid.	APRMSGEX
X'08140257'	A value is not valid in the PGP.	APRMSGEX
X'08140258'	Printer or input bin does not support Enhanced N_UP.	APRMSGEX
X'08140259'	A conditional eject to a partition that does not exist.	APRMSGEX
X'08140260'	Page rotation is not supported by the printer.	APRMSGEX
X'08140261'	Constant forms control and Enhanced N_UP is not allowed.	APRMSGEX
X'08140262'	A PMC ID is not valid in the PMC or PGP.	APRMSGEX
X'08140263'	DUPLEX on the output statement not allowed with enhanced N_UP.	APRMSGEX
X'08140264'	Conflicting Setup IDs in MMCs under a single MCC.	APRMSGEX
X'08140265'	Unpaired X'B4'/X'B5' keywords in an MMC.	APRMSGEX
X'08140266'	System Setup ID specified in the MMC is not available in the device.	APRMSGEX
X'08140267'	X'78' triplet is not valid in the PFC structured field.	APRMSGEX
X'08140268'	Scope of Medium Finishing Control structured field is not valid.	APRMSGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140269'	Input bin substituted for a disabled inserter bin.	APRMSGEX
X'08140270'	No back side for a media eject control—no duplex.	APRMSGEX
X'08140271'	Bin selection in MMC is not valid.	APRMSGEX
X'08140272'	Different bins for front and back sides of sheet.	APRMSGEX
X'08140273'	Duplicate conflicting values in MMC structured field.	APRMSGEX
X'08140274'	Media type local ID not valid.	APRMSGEX
X'08140275'	Duplicate finishing operation found in a medium map.	APRMSGEX
X'08140276'	Number of media collection finishing levels is greater than 4.	APRMSGEX
X'08140277'	Printer or input bin number specified for duplex cannot handle duplex.	APRMSGEX
X'08140278'	Input bin number cannot be found or is disabled.	APRMSGEX
X'08140300'	Data map specified in IDM structured field not found.	APRMSGEX
X'08140301'	No data maps were specified in the PAGEDEF.	APRMSGEX
X'08140302'	The shell, which called the AFPCCM to process a print file that contains line-mode data, failed to provide a PAGEDEF structure.	APRMSGEX
X'08140303'	Reuse record flag set but next LND structured field reusing value equals zero.	APRMSGEX
X'08140304'	LNC value equals zero.	APRMSGEX
X'08140305'	Number of LND or RCD structured fields does not match the value specified in the LNC structured field.	APRMSGEX
X'08140306'	Size specified in FDS equals zero.	APRMSGEX
X'08140307'	Nonexistent record identifier within RCD structured field.	APRMSGEX
X'08140308'	Printer does not support graphics objects.	APRMSGEX
X'08140309'	Suppression name is not valid in LND, RCD, or XMD structured field.	APRMSGEX
X'08140310'	The field RCD pointer will cause an infinite loop.	APRMSGEX
X'08140311'	Next LND, if reusing value in LND structured field, will cause infinite loop.	APRMSGEX
X'08140312'	The field RCD or XMD pointer value exceeds the LNC structured field count.	APRMSGEX
X'08140313'	Start position + length values in LND, RCD, or XMD structured field exceeds FDS structured field size.	APRMSGEX
X'08140314'	More FDX data was received than was specified in FDS structured field.	APRMSGEX
X'08140315'	A skip-to-channel that does not exist in the DATA map was found.	APRMSGEX
X'08140316'	The printer does not support right alignment.	APRMSGEX
X'08140317'	Repeating group value in CCP structured field is not valid.	APRMSGEX
X'08140318'	Number of repeating groups value in CCP structured field is not valid.	APRMSGEX
X'08140319'	Length of comparison string value in CCP structured field is not valid.	APRMSGEX
X'08140320'	Next CCP ID not found.	APRMSGEX
X'08140321'	Timing of action in CCP structured field is not valid.	APRMSGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140322'	Medium map action in CCP structured field is not valid.	APRMSGEX
X'08140323'	Data-map action in CCP structured field is not valid.	APRMSGEX
X'08140324'	Comparison value in CCP structured field is not valid.	APRMSGEX
X'08140325'	Data map specified in CCP structured field not found.	APRMSGEX
X'08140326'	Medium map specified in CCP structured field not found.	APRMSGEX
X'08140327'	In LND, RCD, or XMD structured field, Condition Processing flag set, but CCP ID was zero.	APRMSGEX
X'08140328'	CCP ID specified in LND, RCD, or XMD structured field not found.	APRMSGEX
X'08140329'	Next Line Descriptor, if condition proc value in LND, RCD, or XMD structured field, will cause infinite loop.	APRMSGEX
X'08140330'	Data length specified in LND structured field does not match length of comparison string specified in CCP structured field.	APRMSGEX
X'08140331'	The “next LND if skipping” parameter in an LND is 0.	APRMSGEX
X'08140332'	The “next LND if spacing” parameter in an LND structured field is 0.	APRMSGEX
X'08140333'	The “next LND if skipping” parameter in an LND structured field was larger than the LNC count.	APRMSGEX
X'08140334'	The “next LND if spacing” parameter in an LND structured field is larger than the LNC count.	APRMSGEX
X'08140335'	The “next LND if reusing” parameter value in an LND structured field is larger than the LNC count.	APRMSGEX
X'08140336'	The “next LND if conditional processing” parameter in an LND structured field is larger than the LNC count.	APRMSGEX
X'08140337'	No PAGEDEF specified.	APRMSGEX
X'08140338'	In an LND or RCD structured field, a page overlay was requested, but the printer does not support page overlays.	APRMSGEX
X'08140340'	In an LND or RCD structured field, the shift-out coded font local identifier was nonzero, but the generate font change flag was not set.	APRMSGEX
X'08140341'	Bar code generation was requested on an LND, RCD, or XMD structured field, but the printer does not support bar code objects.	APRMSGEX
X'08140342'	In an LND, RCD, or XMD structured field, a relative position was used, but the LND, RCD, or XMD used previously to print contained a different orientation.	APRMSGEX
X'08140343'	An LND, RCD, or XMD structured field tried to print off the page in the negative Y direction.	APRMSGEX
X'08140344'	An LND, RCD, or XMD structured field included an IOB that has an incorrect or unsupported output option.	APRMSGEX
X'08140345'	The extended local ID specified for an IOB, LND, or RCD structured field could not be found.	APRMSGEX
X'08140347'	Different types of line data specified in the same page definition.	APRMSGEX
X'08140348'	The record ID parameter value in an RCD is not valid.	APRMSGEX
X'08140349'	All RCDs in a data map are not unique.	APRMSGEX
X'08140350'	Page size is not large enough for first record placed by using an RCD or XMD.	APRMSGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140351'	An RCD structured field with an end graphic triplet has no match with a start graphic triplet identifier.	APRMSGEX
X'08140352'	RCD structured field start and length is greater than record.	APRMSGEX
X'08140353'	Fonts are needed for an RCD in a data map.	APRMSGEX
X'08140354'	RCD structured field requested page number reset, but the page number is zero.	APRMSGEX
X'08140355'	RCD or XMD double-byte font for printing a page number cannot be used when ASCII encoding scheme.	APRMSGEX
X'08140356'	PSF or printer does not support this resource as a hard resource.	APRMSGEX
X'08140357'	Bar code data or bar code data plus additional 2D bar code parameters exceeds the output buffer.	APRMSGEX
X'08140358'	Input data being used for a variable resource name in an LND or RCD is double-byte data.	APRMSGEX
X'08140359'	An XML page definition requested that the input data be used as a resource name.	APRMSGEX
X'08140360'	A DTD declaration is specified outside a DTD.	APRMSGEX
X'08140361'	Encoding scheme specified in an XML page definition is not supported.	APRMSGEX
X'08140362'	A field XMD pointer value will cause an infinite loop.	APRMSGEX
X'08140364'	An XML comment syntax is not valid.	APRMSGEX
X'08140365'	XML data formatting was requested by the page definition but this version of PSF doesn't support XML data.	APRMSGEX
X'08140366'	The data maps in a page definition specify different encoding schemes.	APRMSGEX
X'08140367'	XML end tag does not match the last start tag.	APRMSGEX
X'08140368'	End of a Document Type Declaration is not the correct syntax.	APRMSGEX
X'08140369'	A character code is not a valid value for a character reference.	APRMSGEX
X'08140370'	An entity is not defined in the Document Type Definition.	APRMSGEX
X'08140371'	A character in a tag name is not valid.	APRMSGEX
X'08140372'	Encoding scheme ID for the user data is not specified in the encoding scheme triplet on a BDM structured field.	APRMSGEX
X'08140373'	The same qualified tag was specified in more than one XMD.	APRMSGEX
X'08140374'	Relative inline positioning on an XMD structured field can only be used to place data.	APRMSGEX
X'08140375'	TRCs are not allowed when both FOCA fonts and DOFs are specified.	APRMSGEX
X'08140376'	Page-based SOSI is requested, but local IDs 1 and 2 are not supported.	APRMSGEX
X'08140377'	Data map has record format IDs that are not the same length.	APRMSGEX
X'08140378'	The page definition has a user data type of UTF16, but the record length is an odd number of bytes.	APRMSGEX
X'08140379'	CMR on IOB or PPO structured field in page definition, but no X'91' triplet specified.	APRMSGEX
X'08140380'	Data in PAGEDEF resource is not valid.	APRPTPAZ

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140401'	The requested character rotation is not available in the current font.	APRMSGEX
X'08140402'	The pattern technology in the FNC structured field is incorrect.	APRMSGEX
X'08140405'	The compression algorithm in the FNC structured field is not acceptable.	APRMSGEX
X'08140406'	CPC structured field specified default graphic character was not found in FNI structured field.	APRMSGEX
X'08140407'	FNC has a bad raster pattern data count.	APRMSGEX
X'08140408'	The flag byte value in FNC structured field is not acceptable.	APRMSGEX
X'08140409'	The pattern data alignment in FNC structured field is not acceptable.	APRMSGEX
X'08140410'	Bytes 4–9 on the FNC structured field specify metrics that are either not valid or unsupported by this printer.	APRMSGEX
X'08140414'	No FNI structured field corresponding to the font index number of FNO can be found.	APRMSGEX
X'08140415'	The printer does not support outline fonts.	APRMSGEX
X'08140416'	The printer does not support double-byte fonts.	APRMSGEX
X'08140417'	The printer does not support MICR or MICR is disabled.	APRMSGEX
X'08140418'	The font specified does not contain any raster data.	APRMSGEX
X'08140419'	The resolution of the font does not agree with the resolution of the device.	APRMSGEX
X'08140420'	The vertical point size value is not acceptable.	APRMSGEX
X'08140421'	The character pattern addresses are not valid.	APRMSGEX
X'08140422'	The double-byte outline font is not supported.	APRMSGEX
X'08140423'	The data in a font resource is not valid. It is not a double-byte outline font.	APRMSGEX
X'08140424'	The data in a font resource is not valid. The font resolution in the FNC structured field is not valid.	APRMSGEX
X'08140425'	The data in a font resource is not valid. The font data length in the FNC structured field is not valid.	APRMSGEX
X'08140426'	The data in a font resource is not valid. The FNN data count in the FNC structured field is not valid.	APRMSGEX
X'08140427'	The data in a font resource is not valid. The specified font does not contain extension information.	APRMSGEX
X'08140428'	Data in a font resource is not valid. The specified outline font character set is missing FNN structured fields.	APRMSGEX
X'08140429'	The FNM index in the FNI structured field is unacceptable.	APRMSGEX
X'08140430'	Metric technology and resolution values in the font do not match the specified values.	APRMSGEX
X'08140500'	The CPI structured field graphic character ID is null.	APRMSGEX
X'08140501'	CPC structured field default graphic character name is null.	APRMSGEX
X'08140502'	Coded font encoding scheme from MCF does not match the encoding scheme in the code page descriptor.	APRMSGEX
X'08140503'	CPI structured field missing Count of Unicode scalar values parameter.	APRMSGEX

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'08140504'	CPC structured field sort order flag is not valid.	APRMSGEX
X'08140700'	An inline object container has an unrecognized registration ID.	APRMSGEX
X'08140701'	The registration ID in the BOC does not match the JCL keyword used to call it out.	APRMSGEX
X'08140702'	Registered object ID in object classification triplet is not specified.	APRMSGEX
X'08140703'	There is TTC on a BR, but no base fonts are specified.	APRMSGEX
X'08140704'	A BR has an incorrect specification for a TTC or a TTF.	APRMSGEX
X'08140705'	AR buffer size exceeded.	APRMSGEX
X'08140706'	Cannot translate name.	APRMSGEX
X'08140707'	If PSF, too many CMRs to fit on LPD, ICMR, WBCC, WOCC, WGC, WIC2, IDO, or RPO command. If AFP Download Plus, too many CMRs to fit on IOB or PPO structured field, or object OID won't fit on BIM or BOC structured field.	APRMSGEX
X'08140708'	Conversion from GCSGID and CPGID pair to CCSID failed.	APRMSGEX
X'08160100'	Not enough storage for the RRB control block.	APRIOBEX
X'08160104'	The IOB specifies an object type that is not valid or unsupported.	APRIOBEX
X'08170400'	A preload repositioning request.	APRESGEX
X'09202810'	The RRB does not point to an IDB. The RRBICBP field, which points to the IDB, is zero.	APSLCLOS
X'09304804'	PSF OPEN has abended.	APSLESTA
X'09304808'	PSF CLOSE has abended.	APSLESTA
X'0930480C'	PSF READ has abended.	APSLESTA
X'09304810'	PSF CONNECT has abended.	APSLESTA
X'09304814'	PSF DISCONNECT has abended.	APSLESTA
X'09304818'	PSF OPEN reset has abended.	APSLESTA
X'0930481C'	PSF INITIALIZATION has abended.	APSLESTA
X'09304820'	PSF TERMINATION has abended.	APSLESTA
X'09304828'	PSF APSIGET has abended.	APSLESTA
X'0930482C'	PSF APSIPUT has abended.	APSLESTA
X'09304834'	The cause of an abend cannot be determined.	APSLESTA
X'09304838'	System RDJFCB has abended.	APSLESTA
X'09304846'	Repositioning of a message data set was unsuccessful.	APSLESTA
X'09304850'	A system READ has abended.	APSLESTA
X'09304854'	A system CHECK has abended.	APSLESTA
X'09304860'	A system FIND has abended.	APSLESTA
X'09304868'	Repositioning has abended.	APSLESTA
X'09304870'	PSF CLOSE RESET has abended.	APSLESTA
X'09304874'	A system BLDL has abended.	APSLESTA
X'09502004'	The object type was not specified in the PRINTDEV statement.	APSLOPEN
X'09502404'	The SOCB contains no free IDB for the object type.	APSLOPEN
X'09504C0C'	The BLDL macro returned a nonzero return code. The member requested with the RRB was not found.	APSLOPEN

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'09504C18'	The FIND macro returned a nonzero return code, and the return code should always be zero.	APSLRBS
X'09504C20'	The OPEN macro was unsuccessful. The DCBOFOPN flag was off. This indicates that the DCB was not opened.	APSLOPEN
X'09504CE0'	Insufficient storage for the IDB and the DCB.	APSLOPEN
X'09504CE4'	Insufficient storage for the JFCB.	APSLOPEN
X'09504CE8'	Insufficient storage for the buffers.	APSLOPEN
X'09504CF4'	Insufficient storage for the DSL.	APSLOPEN
X'09545404'	An I/O error or an end-of-data had already been set before APSLRUSS was entered for a schedule request. I/O is not scheduled.	APSLRUSS
X'09545408'	An I/O error or an end-of-data had already been set before APSLRUSS was entered for a prime request. The buffers are not primed.	APSLRUSS
X'09600C00'	The SYNAD routine was entered because of an error on a read request.	APSLRBS
X'09600C08'	An I/O error or an end-of-data had already been set before APSLRBS was entered for a prime request. The buffers are not primed.	APSLRBS
X'09600C0C'	An I/O error or an end-of-data had already been set before APSLRBS was entered for a schedule request. I/O is not scheduled.	APSLRBS
X'09603404'	A member was updated while data was being retrieved from it. The member cannot be processed.	APSLRBS
X'0970EF08'	Cached Resource was not found on a load request.	APSLRIDS
X'0970EF18'	Insufficient storage for the input message data set IDB.	APSLRIDS
X'09B00400'	The DCB pointer in the IDBDMCBP field of the IDB is zero.	APSLRJFC
X'09B00404'	DCB is not open.	APSLRJFC
X'09B00408'	The resource ID in DSLLIBT is not valid.	APSLRJFC
X'09B0040C'	The resource library member was not specified in the PRINTDEV statement.	APSLRJFC
X'09B00420'	The CRLCONC field is zero but must be 1–256.	APSLRJFC
X'09B00424'	The CRLRTRVD field is zero but must be 1–256.	APSLRJFC
X'09B00428'	The first data set to retrieve (DSLFIRST) was not successful retrieved by the RDJFCB function.	APSLRJFC
X'09B00C04'	The first data set to retrieve (DSLFIRST) is greater than the number of data sets in the library.	APSLRJFC
X'09B00C08'	The first data set to retrieve (ARLFIRST) is greater than the number of data sets in the library.	APSLRJFC
X'09B01004'	RDJFCB DCB exit code X'13' is not supported.	APSLRJFC
X'09B0100C'	RDJFCB DCB exit code X'13' was unsuccessful—RDJFCB.	APSLRJFC
X'09B01020'	Must be called only by APSLOPEN for type (external).	APSLRJFC
X'09B01024'	For an external request, DSLFIRST must be zero.	APSLRJFC
X'09B01028'	For an external request, DSLRETRV must be zero or one.	APSLRJFC
X'09B0102C'	Libraries have not been initialized; APSLRJFC is being called before LASI is initialized.	APSLRJFC

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'09B01408'	Not enough storage; RDJFCB.	APSLRJFC
X'09B0140C'	The request to obtain storage for CRL was unsuccessful.	APSLRJFC
X'09B01804'	Abend for RDJFCB.	APSLRJFC
X'09B01808'	Abend X'240' and return code X'0C' from RDJFCB request (RDJFCB DCB exit X'13') are not supported.	APSLRJFC
X'09B01C04'	Resource library for requested resolution was not found.	APSLRJFC
X'09B02004'	The OBTAIN request was unsuccessful.	APSLRJFC
X'09C00400'	Not enough storage was available for the SVC 99 PARM list.	APSLDYNA
X'09C00404'	The check for RACF® authority for USERLIB processing failed. Access to USERLIB libraries is denied.	APSLDYNA
X'09C00408'	The system function for the dynamic allocation of USERLIBs was not successful.	APSLDYNA
X'09C0040C'	The system function for the dynamic concatenation of USER libraries was not successful.	APSLDYNA
X'09D004CE'	Not enough storage for the IDB.	APSLUSSO
X'09D004CF'	Not enough storage for the DSL.	APSLUSSO
X'09D004D0'	Not enough storage for buffer pool.	APSLUSSO
X'09D004D2'	UNIX file system file cannot be opened.	APSLUSSO
X'09D004D3'	UNIX file system file cannot be found.	APSLUSSO
X'09D40408'	Library not found.	APSLRPNM
X'09D4040C'	Library not specified on the PRINTDEV statement.	APSLRPNM
X'09D40420'	The concatenation number for retrieval is not valid.	APSLRPNM
X'09D40424'	No path names were retrieved for this library.	APSLRPNM
X'09D40428'	The first path name to be retrieved for an internal request is not in the CRL.	APSLRPNM
X'09D40C04'	The number to start retrieval of the path names is greater than the number of paths in the concatenation.	APSLRPNM
X'09D41024'	The external request is not to retrieve from the first path name in the concatenation.	APSLRPNM
X'09D41028'	The external request is not to retrieve all the concatenations.	APSLRPNM
X'09D4102C'	LASI has not been initialized.	APSLRPNM
X'09D41030'	GETDSAB function is not installed on the system.	APSLRPNM
X'09D41034'	The DDNAME is not valid.	APSLRPNM
X'09D4140C'	No storage is available for the CRL.	APSLRPNM
X'09FF0404'	End-of-data.	APSLRIDS APSLRBS APSLRLIB APSLRUSS
X'09FF0408'	More data is at end-of-resource.	APSLRIDS APSLRLIB
X'09FF040C'	The data set is not initialized and cannot be released. This is the first call to access the data set, a stop-processing request.	APSLRIDS
X'09FF0C04'	An error exists on an APSIGET request.	APSLRUSS APSLRBS

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'09FF1004'	The message data set has no space available.	APSLWIDS
X'09FF1008'	An error exists on APSIPUT.	APSLESTA
X'09FF1404'	The message data set is empty.	APSLRIDS
X'09FF1C04'	A repositioning request was unsuccessful. PSF could not reposition the caller to the requested block and record. The RRB has not been altered.	APSLIREP
X'09FF3404'	Data management OPEN was unsuccessful.	APSLOPEN APSLRBS APSLABND APSLUSSO
X'09FF3C04'	Data management CLOSE was unsuccessful.	APSLCLOS APSLABND
X'09FF4C10'	The resource library member that was requested from a system object library was not found.	APSLOPEN
X'09FF4C11'	The resource library file that was requested from a system library was not found.	APSLUSSO
X'09FFFFFF'	The reason for the error could not be determined.	APSLABND APSLESTA
X'0A100000'	Resource exit requests that processing of this data set is stopped.	APSUREXT
X'0C000000'	A message was written to the message data set as the only entry in the message data set. This is because the JCL specifies PIMSG=NO, which prints only the message that prematurely ends the print data set.	APSMMSG
X'0C010000'	The length of the variable inserted after conversion is longer than the receiving field for an MSV structured field.	APSMMSG
X'0C020000'	Insert variables were found in a WTO message, but no insert areas exist.	APSMMSG
X'0C030000'	A WTO message does not have enough variable insert areas to contain all the insert variables passed for this message.	APSMMSG
X'0C040000'	The requested length of a decimal conversion is greater than 4. The routine will convert 1–4 bytes to decimal.	APSMMSG
X'0C050000'	The length of the message to be buffered exceeded the size of the corresponding buffer. The message was truncated.	APSMMSG
X'0C060000'	CRTMSV processing failed because storage for an MSV could not be getmained.	APSMMSG
X'0C070000'	A WRITEMSV request to the message data set was not performed because the message needed to be routed to the console but MSV messages cannot be routed to the console.	APSMMSG
X'0D010000'	Requested space is not available.	APSGGETM
X'0F010200'	PSF is finished with the data set and does not check for extra records (record interface). If end-of-file is not reached, a warning message is issued (record interface).	APSDDS APSDLOAD APSDSECD APRIPSEX
X'0F100100'	PSF is finished with the data set and should be at end-of-file. If end-of-file is not reached, a warning message is issued (record interface).	APSDLOAD APRIPSEX
X'10100400'	One or more characters in the data set name are not valid.	APSJCL2
X'10100800'	The first character of the data set name is a period.	APSJCL2

Table 16. PSF reason codes (continued)

Reason Code	Definition	Set By
X'10101200'	The last character of the data set name is a period.	APSJCL2
X'10101600'	There are more than five qualifiers in the data set name.	APSJCL2
X'10102000'	Qualifiers in the data set name are separated by more than one period.	APSJCL2
X'10102400'	A qualifier in the data set name is longer than eight characters.	APSJCL2
X'10102800'	The last qualifier in the data set name is longer than eight characters and there is no member name.	APSJCL2
X'10103200'	The data set name contains a closing parenthesis but not an opening parenthesis.	APSJCL2
X'10103600'	The closing parenthesis is not the last character in the data set name.	APSJCL2
X'10104000'	The member name is longer than eight characters.	APSJCL2
X'10104400'	The data set name ends in parentheses that do not contain a member name.	APSJCL2
X'10104800'	The qualifier before the member name is longer than eight characters.	APSJCL2
X'10105200'	There is no final qualifier between the last period in the data set name and the opening parenthesis.	APSJCL2
X'10105600'	The member name contains a period.	APSJCL2
X'10106000'	The member name contains an opening parenthesis.	APSJCL2
X'10106400'	The first character of a qualifier in the data set name is numeric.	APSJCL2
X'10106800'	The first character of the member name is numeric.	APSJCL2
X'10107200'	The interpreter failed.	APSJCK
X'10107600'	There was a failure in creating a token.	APSJCK
X'10108000'	There was a data set read error.	APSJCK
X'10108400'	There was a data set open error.	APSJCK

Appendix D. Printer information reports and system log output

You can save printer information in a data set specified in the PRTINFO DD statement in the PSF startup procedure (see “Requesting printer information with the PSF startup procedure” on page 33), or you can use the MVS MODIFY command to display printer information (see “Requesting printer information with the MODIFY command” on page 34).

When you save printer information in a data set, you can view the source data for the softcopy printer information report or format and print it as a hardcopy report. When you use the MODIFY command to display printer information, you view the information directly in the system log.

This appendix shows these examples:

- “Hardcopy report”
- “Softcopy report” on page 138

The sections you see in a printer information report depend on the printer; therefore, you might see sections in your printer information report that are different from the sections depicted in the examples.

“Softcopy record format” on page 151 shows all possible record formats for the softcopy report.

Hardcopy report

The hardcopy printer information report contains the same information as the softcopy report, but it is formatted so it is easier to read and it has page numbers. Figure 60 on page 124 shows an example of a hardcopy printer information report from an InfoPrint 4100 printer.

```
PSF Printer Information Report-4.5.0 Level 0000
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

STM Data

FF4100C0 0000000D C2C3FF10 10014022
440OA004 0014C3C6 FF10A004 B001B002
B003C005 C100C101 0014C3C6 FF30A004
B001B002 B003C01E C01FC101 006EC4C3
FF106001 60026003 61016201 70017008
702E7034 706B707B 707E70CE 8008800A
800C80F2 80F480F6 90019002 90039004
90059007 9009900A 900D900E 90139015
901690F3 90F5E000 E001E002 E003F200
F201F202 F203F204 F205F206 F401F601
F602F804 F902FB00 FF01000C C9D4FF10
10014022 A0040026 C9D6FF10 10011202
40224401 50015003 50085080 50815082
51015204 5505A004 F300F301 0024C9D6
FF111001 12024022 44015001 50035008
500A5082 50835101 52045505 A004F301
0024C9D6 FF401001 12024020 44015001
50035008 50805081 50825101 52045505
A004F301 0022C9D6 FF421001 12024020
44015001 50035008 50205082 51015204
5505A004 F3010018 C9D6FF45 10011202
40204401 50205101 5505A004 F301000C
D6C30000 12015800 F301000C D6D3FF10
11021505 A0040008 D7E2FF10 1101000C
D7E3FF30 10014022 50FF0014 E5C7FF20
10014022 41004101 41024106 A004----

X'FF'   System/370 convention
X'4100' Device type of the printer, or of the printer that
        is being emulated or mimicked
X'C0'   Model Number

BAR CODE COMMAND-SET VECTOR
X'000EC2C3FF10100140224400A004'
X'000E' 14     Length of the bar code command-set vector
X'C2C3' BC1 subset of the bar code command-set
X'FF10' BCOCA BCD1 data
X'1001' Bar code objects may be sent in any order
X'4022' Standard OCA color-support property ID


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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 1 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

X'4400' Extended bar code color support; when this
        property pair is present, the printer supports the
        Color Specification (X'4E') triplet on WBCC-BCDD
X'A004' Object area orientation-support property ID

LOADED-FONT COMMAND-SET VECTOR
X'0014C3C6FF10A004B001B002B003C005C100C101'
X'0014' 20     Length of the loaded-font command-set
               vector
X'C3C6' Loaded-font command-set ID
X'FF10' LF1 subset ID - fully described font plus font
        index
X'A004' Orientation-support property ID
X'B001' Double-byte coded fonts supported
X'B002' Underscore width and position parameters in the
        LFI command are used by the printer
X'B003' GRID-parts fields allowed in the LFC, LFCSC, and
        LCPC commands
X'C005' Coded-font pattern-technology ID, Bounded-box
        raster-font technology
X'C100' Coded-font metric-technology ID, Fixed metrics
X'C101' Coded-font metric-technology ID, Relative metrics

LOADED-FONT COMMAND-SET VECTOR
X'0014C3C6FF30A004B001B002B003C01EC01FC101'
X'0014' 20     Length of the loaded-font command-set
               vector
X'C3C6' Loaded-font command-set ID
X'FF30' LF3 subset ID - code page plus font character set
X'A004' Orientation-support property ID
X'B001' Double-byte coded fonts supported
X'B002' Underscore width and position parameters in the
        LFI command are used by the printer
X'B003' GRID-parts fields allowed in the LFC, LFCSC, and
        LCPC commands
X'C01E' Coded-font pattern-technology ID, CID-keyed
        outline-font technology
X'C01F' Coded-font pattern-technology ID, Type 1 PFB
        outline-font technology
X'C101' Coded-font metric-technology ID, Relative metrics

DEVICE-CONTROL COMMAND-SET VECTOR
X'006EC4C3FF1060016002600361016201700170087 02E7034
  706B707B707E70CE8008800A800C80F280F480F69001900290
  039004900590079009900A900D900E90139015901690F390F5
  E000E001E002E003F200F201F202F203F204F205F206F401F6
  01F602F804F902FB00FF01'
X'006E' 110    Length of the device-control command-set
               vector
X'C4C3' Device-control command-set ID
X'FF10' DC1 Subset ID
X'6001' Multiple copy & copy-subgroup support in LCC
X'6002' Media-source-selection support in LCC
X'6003' Media-destination-selection support in LCC
X'6101' Explicit page placement and orientation support in
        the LPP command


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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 2 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

X'6201' Logical page and object area coloring support
X'7001' Manage IPDS Dialog (MID) command support
X'7008' Set Presentation Environment (SPE) command support
X'702E' Activate Resource command support
X'7034' Presentation Fidelity Control Command Support
X'706B' Invoke CMR (ICMR) command support
X'707B' Rasterize Presentation Object (RPO) command
        support
X'707E' Include Saved Pages (ISP) command support
X'70CE' DUA command-support property ID
X'8008' Mark Form
X'800A' Alternate Offset Stacker
X'800C' Control Edge Marks
X'80F2' Discard Buffered Data
X'80F4' Request Resource List
X'80F6' Exception-Handling Control
X'9001' Print Buffered Data
X'9002' Deactivate Save Page Group
X'9003' Specify Group Operation
X'9004' Define Group Boundary
X'9005' Erase Residual Print Data
X'9007' Erase Residual Font Data
X'9009' Separate Continuous Forms
X'900A' Remove Saved Page Group
X'900D' Stack Received Pages
X'900E' Select Medium Modifications
X'9013' Eject to Front Facing
X'9015' Select Input Media Source
X'9016' Set Media Origin
X'90F3' Obtain Printer Characteristics
X'90F5' Page Counters Control
X'E000' CMRs can be captured
X'E001' Host-activated link color conversion CMRs
        supported
X'E002' Host-activated, non-generic halftone CMRs
        supported
X'E003' Host-activated, non-generic tone transfer curve
        CMRs supported
X'F200' Local Date and Time Stamp triplets supported in AR
        commands
X'F201' Activation-failed NACK support
X'F202' Font resolution and Metric Technology triplets
        supported in AR commands
X'F203' Metric Adjustment triplets supported in AR
        commands
X'F204' Data-object font support
X'F205' Color Management triplet support in the IDO, RPO,
        LPD, SPE, WBCC, WIC2, WGC, and WOCC commands
X'F206' Device Appearance (X'97') triplet support
X'F401' XOA RRL Multiple Entry Query Support. The printer
        supports multiple-entry queries of query type
        X'05', activation query.
X'F601' Position-Check Highlighting Support in XOA EHC
X'F602' Independent Exception Page-Print in XOA EHC
X'F804' Simplex and duplex N-up supported in the LCC
        command

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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 3 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

X'F902' Basic cut-sheet emulation mode supported
X'FB00' All architected units of measure supported
X'FF01' Positioning Exception Sense Format Supported

IM-IMAGE COMMAND-SET VECTOR
X'000CC9D4FF1010014022A004'
X'000C' 12     Length of the IM-image command-set vector
X'C9D4' IM1 subset of the IM-image command-set
X'FF10' IMD1 data
X'1001' IM-image objects may be sent in any order
X'4022' Standard OCA color-support property ID
X'A004' Orientation-Support property ID

IO-IMAGE COMMAND-SET VECTOR
X'0026C9D6FF10100112024022440150015003500850805081
  5082510152045505A004F300F301'
X'0026' 38     Length of the IO-image command-set vector
X'C9D6' IO1 subset of the IO-image command-set
X'FF10' IOCA FS10 data
X'1001' IO-image objects may be sent in any order
X'1202' IO-image objects can be downloaded in home state
        as resources
X'4022' Standard OCA color-support property ID
X'4401' Extended IOCA bi-level color support; when this
        property pair is present, the printer supports Set
        Extended Bi-level Image Color (X'F4')
        self-defining field on the WIC2-IDD
X'5001' Modified ITU-TSS Modified READ Algorithm (IBM MMR)
X'5003' Uncompressed image
X'5008' ABIC (bilevel Q-coded) Compression Algorithm
        (ABIC)
X'5080' ITU-TSS T.4 Facsimile Coding Scheme (G3 MH, one
        dimensional
X'5081' ITU-TSS T.4 Facsimile Coding Scheme (G3 MR, two
        dimensional)
X'5082' ITU-TSS T.6 Facsimile Coding Scheme (G4 MMR)
X'5101' Bit ordering supported in the IOCA Image Encoding
        Parameter
X'5204' Unpadded RIDIC recording algorithm supported
X'5505' Multiple Image content support
X'A004' Object area orientation-support property ID
X'F300' Replicate-and-trim mapping supported
X'F301' Scale-to-fill mapping supported

IO-IMAGE COMMAND-SET VECTOR
X'0024C9D6FF11100112024022440150015003500850 0A5082
  5083510152045505A004F301'
X'0024' 36     Length of the IO-image command-set vector
X'C9D6' IO1 subset of the IO-image command-set
X'FF11' IOCA FS11 data, implies FS10 is also supported
X'1001' IO-image objects may be sent in any order
X'1202' IO-image objects can be downloaded in home state
        as resources
X'4022' Standard OCA color-support property ID
X'4401' Extended IOCA bi-level color support; when this
        property pair is present, the printer supports Set

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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 4 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

        Extended Bi-level Image Color (X'F4')
        self-defining field on the WIC2-IDD
X'5001' Modified ITU-TSS Modified READ Algorithm (IBM MMR)
X'5003' Uncompressed image
X'5008' ABIC (bilevel Q-coded) Compression Algorithm
        (ABIC)
X'500A' Concatenated ABIC
X'5082' ITU-TSS T.6 Facsimile Coding Scheme (G4 MMR)
X'5083' ISO/ITU-TSS JPEG algorithms
X'5101' Bit ordering supported in the IOCA Image Encoding
        Parameter
X'5204' Unpadded RIDIC recording algorithm supported
X'5505' Multiple Image content support
X'A004' Object area orientation-support property ID
X'F301' Scale-to-fill mapping supported

IO-IMAGE COMMAND-SET VECTOR
X'0024C9D6FF401001120240204401500150035008508050815082
  5082510152045505A004F301'
X'0024' 36     Length of the IO-image command-set vector
X'C9D6' IO1 subset of the IO-image command-set
X'FF40' IOCA FS40 data
X'1001' IO-image objects may be sent in any order
X'1202' IO-image objects can be downloaded in home state
        as resources
X'4020' Standard OCA color-support property ID
X'4401' Extended IOCA bi-level color support; when this
        property pair is present, the printer supports Set
        Extended Bi-level Image Color (X'F4')
        self-defining field on the WIC2-IDD
X'5001' Modified ITU-TSS Modified READ Algorithm (IBM MMR)
X'5003' Uncompressed image
X'5008' ABIC (bilevel Q-coded) Compression Algorithm
        (ABIC)
X'5080' ITU-TSS T.4 Facsimile Coding Scheme (G3 MH, one
        dimensional)
X'5081' ITU-TSS T.4 Facsimile Coding Scheme (G3 MR, two
        dimensional)
X'5082' ITU-TSS T.6 Facsimile Coding Scheme (G4 MMR)
X'5101' Bit ordering supported in the IOCA Image Encoding
        Parameter
X'5204' Unpadded RIDIC recording algorithm supported
X'5505' Multiple Image content support
X'A004' Object area orientation-support property ID
X'F301' Scale-to-fill mapping supported

IO-IMAGE COMMAND-SET VECTOR
X'0022C9D6FF421001120240204401500150035008502050825082
  510152045505A004F301'
X'0022' 34     Length of the IO-image command-set vector
X'C9D6' IO1 subset of the IO-image command-set
X'FF42' IOCA FS42 data
X'1001' IO-image objects may be sent in any order
X'1202' IO-image obiects can be downloaded in home state
        as resources
X'4020' Standard OCA color-support property ID

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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 5 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

X'4401' Extended IOCA bi-level color support; when this
        property pair is present, the printer supports Set
        Extended Bi-level Image Color (X'F4')
        self-defining field on the WIC2-IDD
X'5001' Modified ITU-TSS Modified READ Algorithm (IBM MMR)
X'5003' Uncompressed image
X'5008' ABIC (bilevel Q-coded) Compression Algorithm
        (ABIC)
X'5020' Solid Fill Rectangle
X'5082' ITU-TSS T.6 Facsimile Coding Scheme (G4 MMR)
X'5101' Bit ordering supported in the IOCA Image Encoding
        Parameter
X'5204' Unpadded RIDIC recording algorithm supported
X'5505' Multiple Image content support
X'A004' Object area orientation-support property ID
X'F301' Scale-to-fill mapping supported

IO-IMAGE COMMAND-SET VECTOR
X'0018C9D6FF4510011202402044015020510155O5A004F301'
X'0018' 24     Length of the IO-image command-set vector
X'C9D6' IO1 subset of the IO-image command-set
X'FF45' IOCA FS45 data, implies FS42 is also supported
X'1001' IO-image objects may be sent in any order
X'1202' IO-image objects can be downloaded in home state
        as resources
X'4O2O' Standard OCA color-support property ID
X'4401' Extended IOCA bi-level color support; when this
        property pair is present, the printer supports Set
        Extended Bi-level Image Color (X'F4')
        self-defining field on the WIC2-IDD
X'5020' Solid Fill Rectangle
X'5101' Bit ordering supported in the IOCA Image Encoding
        Parameter
X'5505' Multiple Image content support
X'A004' Object area orientation-support property ID
X'F301' Scale-to-fill mapping supported

OBJECT CONTAINER COMMAND-SET VECTOR
X'000CD6C3000012015800F301'
X'000C' 12     Length of the object container command-set
               vector
X'D6C3' OC1 subset of the object container command-set
X'0000' No levels defined
X'1201' Data-object-resource support
X'5800' Image Resolution (X'9A') triplet supported in IDO,
        RPO, and WOCC commands
X'F301' Scale-to-fill mapping supported

OVERLAY COMMAND-SET VECTOR
X'000CD6D3FF1011021505A004'
X'000C' 12     Length of the overlay command-set vector
X'D6D3' Overlay command-set ID
X'FF10' OL1 subset ID
X'1102' Extended overlay support, up to 32,511 overlays
        can be activated at one time
X'1505' x'15nn'- Overlay nesting up to nn levels is

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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 6 of 14)

```
        supported
X'A004' Page-overlay-rotation support, all 4 orientations
        supported in the IO command

PAGE SEGMENT COMMAND-SET VECTOR
X'0008D7E2FF101101'
X'0008' 8      Length of the page segment command-set
               vector
X'D7E2' Page segment command-set ID
X'FF10' PS1 subset ID
X'1101' Extended page segment support, up to 32,511 page
        segments can be activated at one time.

TEXT COMMAND-SET VECTOR
X'000CD7E3FF301001402250FF'
X'000C' 12     Length of the text command-set vector
X'D7E3' TX1 subset of the text command-set
X'FF30' PTOCA PT3 data
X'1001' Unordered text supported
X'4022' Standard OCA color-support property ID
X'50FF' Multiple text-orientation support for all
        supported media origins

GRAPHICS COMMAND-SET VECTOR
X'0014E5C7FF2010014022410041014102 4106A004'
X'0014' 20     Length of the graphics command-set vector
X'E5C7' GR1 subset of the graphics command-set
X'FF20' GOCA DR/2V0 data
X'1001' Graphics objects may be sent in any order
X'4022' Standard OCA color-support property ID
X'4100' Set Process Color drawing order support
X'4101' Box drawing orders supported
X'4102' Partial Arc drawing orders supported
X'4106' Set Fractional Line Width drawing order supported
X'A004' Object area orientation-support property ID
```


Figure 60. Example of a Hardcopy Printer Information Report (Part 7 of 14)

Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

OPC Data

```
00180001 00000000 38405FA0 3DE00000
00003DE0 5FA0B000 000A0003 00FF1770
1770000A 00100001 00010001 004B0004
1301010E E6B28000 00000000 11001200
1300141B 01020EE6 B2800000 00000021
00220023 00240031 00320033 00341901
03008000 00000000 00004000 42004800
4A005000 60007000 08000601 000B0000
08000701 000B0000 34000A01 00010302
00020303 00040005 00060006 03070007
03080009 00100010 03110312 00120320
08400040 09410042 00420900 20000B01
03010603 03030606 03070308 03080609
06100310 07400941 0A420900 18000E0D
11181A1B 1C1D1E1F 20212286 87919296
97989A00 06001201 03005800 13310001
F0F0F4F1 F0F0D4C4 F1C9C2D4 F1F0F0F0
F0F0F0F0 F0F0F0F0 F0F00000 F0F0F0F0
F0F0F0F0 F0F1F54B FOF44BF2 F1F823OO
03C99586 96D79989 95A340F4 F1F0F000
00000000 00000000 00000000 00000000
0000D800 14420106 072B1200 0401010E
00000000 00000006 072B1200 0401013C
00000000 00000006 072B1200 04010116
00000000 00000006 072B1200 04010117
00000000 00000092 0206072B 12000401
01140000 00000000 0006072B 12000401
012F0000 00000000 0006072B 12000401
01330000 00000000 0006072B 12000401
01350000 00000000 0006072B 12000401
01390000 00000000 0006072B 12000401
010E0000 00000000 0006072B 12000401
013C0000 00000000 0006072B 12000401
01160000 00000000 0006072B 12000401
01170000 00000000 00000A00 15225051
5D5E5F00 06001675 96------ --------
```


Figure 60. Example of a Hardcopy Printer Information Report (Part 8 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

PRINTABLE AREA SELF-DEFINING FIELD
X'0018000100000000038405FA03DE0000000003DE05FA0B000'
X'0018' 24     Length of this SDF, including itself
X'0001' Printable Area Self-Defining Field
X'00'   Media-source ID
X'00'   Reserved
X'00'   Unit base equals 10 inches
X'00'   Reserved
X'3840' 14,400  Units per unit base value for this
                self-defining field
X'5FA0' 24,480  Actual width of the medium presentation
                space in L-units
X'3DE0' 15,840  Actual length of the medium presentation
                space in L-units
X'0000' 0       Xm offset of the physical printable area in
                L-units
X'0000' 0       Ym offset of the physical printable area in
                L-units
X'3DE0' 15,840  Xm extent of the physical printable area in
                L-units
X'5FA0' 24,480  Ym extent of the physical printable area in
                L-units
X'B000' B'1011000000000000' Input Media Source
                            Characteristics
1... .... Duplex
.01. .... Continuous forms
...1 .... Media source available
.... 0... Retired item 119
.... .0.. Not envelope media
.... ..0. Automatic media feed
.... ...0 Not computer output microfilm media
0... .... Continuous forms media with carrier strips
.0.. .... Not an inserter bin
..00 0000 Reserved

IM-IMAGE AND CODED-FONT RESOLUTION SELF-DEFINING FIELD
X'000A000300FF17701770'
X'000A' 10     Length of this SDF, including itself
X'0003' IM-Image and Coded-Font Resolution Self-Defining
        Field
X'00'   Ten-inch increments
X'FF'   All resolutions in the range X'0001' - X'7FFF'
X'1770' 6,000  X pels per unit base
X'1770' 6,000  Y pels per unit base

MEDIA-DESTINATIONS SELF-DEFINING FIELD
X'000A0010000100010001'
X'000A' 10     Length of this SDF, including itself
X'0010' Media-Destinations Self-Defining Field
X'0001' Default media-destination ID
X'0001' First number in a range of available, contiguous
        media-destination IDs
X'0001' Last number in a range of available, contiguous
        media destination IDs

STORAGE POOLS SELF-DEFINING FIELD

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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 9 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

X'004B00041301010EE6B280000000000011001200130014 1B
  01020EE6B2800000000000210022002300240031003200 3300
  3419010300800000000000000040004200480040A0050006000
  70'
X'004B' 75     Length of this SDF, including itself
X'0004' Storage Pools Self-Defining Field
X'13'   19     Length of the entry, including itself
X'01'   Entry ID
X'01'   Storage pool ID
X'0EE6B280'  250,000,000  Size of the storage pool, in
                          bytes, when empty
X'00000000'  Reserved
X'0011' Page graphics data
X'0012' Page image data
X'0013' Page text data
X'0014' Page bar code data
X'1B'   27     Length of the entry, including itself
X'01'   Entry ID
X'02'   Storage pool ID
X'0EE6B280'  250,000,000  Size of the storage pool, in
                          bytes, when empty
X'00000000'  Reserved
X'0021' Overlay graphics data
X'0022' Overlay image data
X'0023' Overlay text data
X'0024' Overlay bar code data
X'0031' Page segment graphics data
X'0032' Page segment image data
X'0033' Page segment text data
X'0034' Page segment bar code data
X'19'   25     Length of the entry, including itself
X'01'   Entry ID
X'03'   Storage pool ID
X'00800000' 8,388,608    Size of the storage pool, in
                         bytes, when empty
X'00000000' Reserved
X'0040' Single-byte coded-font index tables
X'0042' Single-byte coded-font patterns
X'0048' Double-byte coded-font index tables
X'004A' Double-byte coded-font patterns
X'0050' Code pages
X'0060' Font character sets
X'0070' Coded fonts

INSTALLED FEATURES SELF-DEFINING FIELD
X'00080006010000B00'
X'0008' 8      Length of this SDF, including itself
X'0006' Installed Features Self-Defining Field
X'0100' Duplex
X'0B00' Continuous-Forms Output

AVAILABLE FEATURES SELF-DEFINING FIELD
X'00080007010000B00'
X'0008' 8      Length of this SDF, including itself
X'0007' Available Features Self-Defining Field
X'0100' Duplex available from at least one media source


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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 10 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

X'0B00' Continuous-Forms Output

XOA RRL RT & RIDF SUPPORT SELF-DEFINING FIELD
X'0034000A0100010302000203030004000500060006030700
  0703080009001000100311031200120320084000400941004 2
  004209'
X'0034' 52     Length of this SDF, including itself
X'000A' XOA RRL RT & RIDF Support Self-Defining Field
X'01'   Single-byte LF1-type and LF2-type coded font
X'00'   Host-Assigned Resource ID
X'01'   Single-byte LF1-type and LF2-type coded font
X'03'   GRID-parts format
X'02'   Double-byte LF1-type coded font
X'00'   Host-Assigned Resource ID
X'02'   Double-byte LF1-type coded font
X'03'   GRID-parts format
X'03'   Double-byte LF1-type coded-font section
X'00'   Host-Assigned Resource ID
X'04'   Page segment
X'00'   Host-Assigned Resource ID
X'05'   Overlay
X'00'   Host-Assigned Resource ID
X'06'   Device-version code page
X'00'   Host-Assigned Resource ID
X'06'   Device-version code page
X'03'   GRID-parts format
X'07'   Font character set
X'00'   Host-Assigned Resource ID
X'07'   Font character set
X'03'   GRID-parts format
X'08'   Single-byte coded font index
X'00'   Host-Assigned Resource ID
X'09'   Double-byte coded font section index
X'00'   Host-Assigned Resource ID
X'10'   Coded font
X'00'   Host-Assigned Resource ID
X'10'   Coded font
X'03'   GRID-parts format
X'11'   Graphic character set supported in a font
        character set
X'03'   GRID-parts format
X'12'   Specific code page
X'00'   Host-Assigned Resource ID
X'12'   Specific code page
X'03'   GRID-parts format
X'20'   Saved page group
X'08'   Variable-length group ID triplet
X'40'   Data object resource
X'00'   Host-Assigned Resource ID
X'40'   Data object resource
X'09'   Object-OID format
X'41'   Data-object font
X'00'   Host-Assigned Resource ID
X'42'   Data-object-font components
X'00'   Host-Assigned Resource ID
X'42'   Data-object-font components

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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 11 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

X'09'   Object-OID format

ACTIVATE RESOURCE RT & RIDF SUPPORT SELF-DEFINING FIELD
X'0020000B0103010603030306060307030803080609061003
  10074009410A4209'
X'0020' 32     Length of this SDF, including itself
X'000B' Activate Resource RT & RIDF Support Self-Defining
        Field
X'01'   Single-byte LF1-type and LF2-type coded font
X'03'   GRID-parts format
X'01'   Single-byte LF1-type and LF2-type coded font
X'06'   MVS Host Unalterable Remote Font Environment
X'03'   Double-byte LF1-type coded-font section
X'03'   GRID-parts format
X'03'   Double-byte LF1-type coded-font section
X'06'   MVS Host Unalterable Remote Font Environment
X'06'   Code page
X'03'   GRID-parts format
X'07'   Font character set
X'03'   GRID-parts format
X'08'   Single-byte LF1-type coded-font index
X'03'   GRID-parts format
X'08'   Single-byte LF1-type coded-font index
X'06'   MVS Host Unalterable Remote Font Environment
X'09'   Double-byte LF1-type coded-font section index
X'06'   MVS Host Unalterable Remote Font Environment
X'10'   Coded font
X'03'   GRID-parts format
X'10'   Coded font
X'07'   Coded-font format
X'40'   Data object resource
X'09'   Object-OID format
X'41'   Data-object font
X'0A'   Data-object-font format
X'42'   Data-object-font components
X'09'   Object-OID format

COMMON BAR CODE TYPE/MODIFIER SELF-DEFINING FIELD
X'0018000E0D11181A1B1C1D1E1F2021228687919296979 89A'
X'0018' 24     Length of this SDF, including itself
X'000E' Common Bar Code Type/Modifier Self-Defining Field
X'0D'   Codabar - modifier-byte options X'01' and X'02'
X'11'   Code 128 - modifier-byte option X'02'
X'18'   POSTNET - modifier-byte options X'00' through
        X'03'
X'1A'   RM4SCC - modifier-byte option X'00'
X'1B'   Japan Postal Bar Code - modifier-byte options
        X'00' and X'01'
X'1C'   Data Matrix. Modifier Byte option X'00'.
X'1D'   MaxiCode. Modifier Byte option X'00'.
X'1E'   PDF417 - modifier Byte options X'00' and X'01'
X'1F'   Australia Post Bar Code - modifier-byte options
        X'01'-X'08'
X'20'   QR Code, modifier-byte option X'02'
X'21'   Code 93, modifier-byte option X'00'
X'22'   USPS Four-State, modifier-byte options X'00'

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```

Figure 60. Example of a Hardcopy Printer Information Report (Part 12 of 14)

```
        through X'03'
X'86'   UPC-Two-digit Supplemental - modifier-byte options
        X'01'and X'02'
X'87'   UPC-Five-digit Supplemental - modifier-byte
        options X'01' and X'02'
X'91'   Code 128, modifier-byte option X'03'
X'92'   Code 128, modifier-byte option X'04'
X'96'   EAN Two-digit Supplemental - modifer-byte option
        X'01'
X'97'   EAN Five-digit Supplemental - modifier-byte option
        X'01'
X'98'   POSTNET, modifier-byte option X'04'
X'9A'   RM4SCC, modifier-byte option X'01'

SUPPORTED GROUP OPERATIONS SELF-DEFINING FIELD
X'000600120103'
X'0006' 6      Length of this SDF, including itself
X'0012' Supported Group Operations Self-Defining Field
X'01'   Keep group together as a print unit
X'03'   Save pages

PRODUCT IDENTIFIER SELF-DEFINING FIELD
X'00580013310001F0F0F4F1F0F0D4C4F1C9C2D4F1F0F0F0F0
  FOFOFOFOFOFOFOFOFOOOOOFOFOFOFOFOFOFOFOFOF1F54BFOF4
  4BF2F1F8230003C9958696D7998995A340F4F1F0F000000000
  00000000000000000000000000000000'
X'0058' 88     Length of this SDF, including itself
X'0013' Product Identifier Self-Defining Field
X'31'   49     Product-identifier parameter length,
               including itself
X'0001' Unique Product Identifier
004100        Device Type
MD1           Model Number
IBM           Manufacturer
10            Plant of manufacture
000000000000  Sequence number
X'0000' Tag
000000000     Engineering Change level
X'F1F54BFOF44BF2F1F8'
        Device-specific information
X'23'   35    Product-identifier parameter length,
              including itself
X'0003' Printer Name Identifier
InfoPrint 4100
        External name of the printer

OBJECT CONTAINER TYPE SUPPORT SELF-DEFINING FIELD
X'00D80014420106072B12000401010E000000000000000607
  2B12000401013C000000000000000006072B1200040101160000
  000000000006072B12000401011700000000000000092020607
  2B12000401011400000000000000006072B12000401012F0000
  000000000006072B12000401013300000000000000006072B12
  000401013500000000000000006072B1200040101390000000
  00000006072B12000401010E000000000000006072B120004
  01013C000000000000000006072B12000401011600000000000
  0006072B120004010117000000000000'
X'0008' 216    Length of this SDF, including itself
```


Figure 60. Example of a Hardcopy Printer Information Report (Part 13 of 14)

```
Printer Information from PSFMVS.WTRES600.DEV6.PRTINFO(PRT619)

X'0014'  Object Container Type Support Self-Defining Field
X'42'    66      Type Record Length
X'01'    Page or overlay state
X'06072B12000401010E00000000000000' Tag Image File Format
                                    (TIFF)
X'06072B12000401013C00000000000000' Tag Image File Format
                                    (TIFF) without
                                    Transparency
X'06072B12000401011600000000000000' Graphics-Interchange
                                    Format (GIF)
X'06072B12000401011700000000000000' AFPC JPEG Subset (JPEG)
X'92'   146   Type Record Length
X'02'   Home state
X'06072B12000401011400000000000000' Color Mapping Table
                                    Setup File
X'06072B12000401012F00000000000000' IOCA Tile Resource
X'06072B12000401013300000000000000' TrueType/OpenType Font
X'06072B12000401013500000000000000' TrueType/OpenType
                                    Collection
X'06072B12000401013900000000000000' Color Management
                                    Resource (CMR)
X'06072B12000401010E00000000000000' Tag Image File Format
                                    (TIFF)
X'06072B12000401013C00000000000000' Tage Image File Format
                                    (TIFF) without
                                    Transparency
X'06072B12000401011600000000000000' Graphics Interchange
                                    Format (GIF)
X'06072B12000401011700000000000000' AFPC JPEG Subset (JPEG)

DF DEACTIVATION TYPES SUPPORTED SELF-DEFINING FIELD
X'000A00152250515D5E5F'
X'000A' 10     Length of this SDF, including itself
X'0015' DF Deactivation Types Supported Self-Defining
        Field
X'22'   Deactivate a font index for a double-byte coded
        font section
X'50'   Deactivate a coded font
X'51'   Deactivate a coded font and all associated
        components
X'5D'   Deactivate all resident coded fonts and all
        associated components
X'5E'   Deactivate all coded fonts
X'5F'   Deactivate all coded fonts and all associated
        components

PFC TRIPLETS SUPPORTED SELF-DEFINING FIELD
X'000600167596'
X'0006' 6      Length of this SDF, including itself
X'0016' PFC Triplets Supported Self-Defining Field
X'75'   Color Fidelity triplet
X'96'   CMR Tag Fidelity triplet


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Figure 60. Example of a Hardcopy Printer Information Report (Part 14 of 14)

Softcopy report

Figure 61 shows an example of the softcopy report from an InfoPrint 4100 printer. You can view this softcopy report or format and print it as a hardcopy report. You can also display this same report in the system log.

```
REPORTLVL  PRTINFO  4.5.0   0000 PSF Printer Information Report
HEADING    Printer Information from SAMPROC1.PRTINFO(PRT619)
DATETIME   04/26/2014 11:11:20.57
COMMENT    ******************************************************
TITLE      STM Data
COMMENT    ******************************************************
STMDUMP    FF4100C0 0000000E C2C3FF10 10014022
STMDUMP    4400A004 0014C3C6 FF10A004 B001B002
STMDUMP    B003C005 C100C101 0014C3C6 FF30A004
STMDUMP    B001B002 B003C01E C01FC101 006EC4C3
STMDUMP    FF106001 60026003 61016201 70017008
STMDUMP    702E7034 706B707B 707E70CE 8008800A
STMDUMP    800C80F2 80F480F6 90019002 90039004
STMDUMP    90059007 9009900A 900D900E 90139015
STMDUMP    901690F3 90F5E000 E001E002 E003F200
STMDUMP    F201F202 F203F204 F205F206 F401F601
STMDUMP    F602F804 F902FB00 FF01000C C9D4FF10
STMDUMP    10014022 A0040026 C9D6FF10 10011202
STMDUMP    40224401 50015003 50085080 50815082
STMDUMP    51015204 5505A004 F300F301 0024C9D6
STMDUMP    FF111001 12024022 44015001 50035008
STMDUMP    500A5082 50835101 52045505 A004F301
STMDUMP    0024C9D6 FF401001 12024020 44015001
STMDUMP    50035008 50805081 50825101 52045505
STMDUMP    A004F301 0022C9D6 FF421001 12024020
STMDUMP    44015001 50035008 50205082 51015204
STMDUMP    5505A004 F3010018 C9D6FF45 10011202
STMDUMP    40204401 50205101 5505A004 F301000C
STMDUMP    D6C30000 12015800 F301000C D6D3FF10
STMDUMP    11021505 A0040008 D7E2FF10 1101000C
STMDUMP    D7E3FF30 10014022 50FF0014 E5C7FF20
STMDUMP    10014022 41004101 41024106 A004----
STMBEGIN   X'FF'   "System/370 convention"
STMTYPE    X'4100' "Device type of the printer, or of the printer that"
STMTCONT           "is being emulated or mimicked"
STMMODEL   X'C0'   "Model Number"
STMRSRV    X'0000' "Reserved"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "BAR CODE COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'000EC2C3FF10100140224400A004'
STMLENGTH  X'000E' 14     "Length of the bar code command-set vector"
STMSUBSET  X'C2C3' "BC1 subset of the bar code command-set"
STMLEVEL   X'FF10' "BCOCA BCD1 data"
STMPPAIR   X'1001' "Bar code objects may be sent in any order"
STMPPAIR   X'4022' "Standard OCA color-support property ID"
STMPPAIR   X'4400' "Extended bar code color support; when this"
STMPCONT           "property pair is present, the printer supports the"
STMPCONT           "Color Specification (X'4E') triplet on WBCC-BCDD"
STMPPAIR   X'A004' "Object area orientation-support property ID"
STMTITLE
```

Figure 61. Example of the Softcopy Printer Information Report (Part 1 of 13)

```
COMMENT    ******************************************************
STMTITLE   "LOADED-FONT COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0014C3C6FF10A004B001B002B003C005C100C101'
STMLENGTH  X'0014' 20     "Length of the loaded-font command-set"
STMLENCONT                "vector"
STMCMDSET  X'C3C6' "Loaded-font command-set ID"
STMSUBSET  X'FF10' "LF1 subset ID - fully described font plus font"
STMSUBCONT         "index"
STMPPAIR   X'A004' "Orientation-support property ID"
STMPPAIR   X'B001' "Double-byte coded fonts supported"
STMPPAIR   X'B002' "Underscore width and position parameters in the"
STMPCONT           "LFI command are used by the printer"
STMPPAIR   X'B003' "GRID-parts fields allowed in the LFC, LFCSC, and"
STMPCONT           "LCPC commands"
STMPPAIR   X'C005' "Coded-font pattern-technology ID, Bounded-box"
STMPCONT           "raster-font technology"
STMPPAIR   X'C100' "Coded-font metric-technology ID, Fixed metrics"
STMPPAIR   X'C101' "Coded-font metric-technology ID, Relative metrics"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "LOADED-FONT COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0014C3C6FF30A004B001B002B003C01EC01FC101'
STMLENGTH  X'0014' 20     "Length of the loaded-font command-set"
STMLENCONT                "vector"
STMCMDSET  X'C3C6' "Loaded-font command-set ID"
STMSUBSET  X'FF30' "LF3 subset ID - code page plus font character set"
STMPPAIR   X'A004' "Orientation-support property ID"
STMPPAIR   X'B001' "Double-byte coded fonts supported"
STMPPAIR   X'B002' "Underscore width and position parameters in the"
STMPCONT           "LFI command are used by the printer"
STMPPAIR   X'B003' "GRID-parts fields allowed in the LFC, LFCSC, and"
STMPCONT           "LCPC commands"
STMPPAIR   X'C01E' "Coded-font pattern-technology ID, CID-keyed"
STMPCONT           "outline-font technology"
STMPPAIR   X'C01F' "Coded-font pattern-technology ID, Type 1 PFB"
STMPCONT           "outline-font technology"
STMPPAIR   X'C101' "Coded-font metric-technology ID, Relative metrics"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "DEVICE-CONTROL COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'006EC4C3FF1060016002600361016201700170087 02E7034
STMVCONT   706B707B707E70CE8008800A800C80F280F480F69001900290
STMVCONT   039004900590079009900A900D900E90139015901690F390F5
STMVCONT   E000E001E002E003F200F201F202F203F204F205F206F401F6
STMVCONT   01F602F804F902FB00FF01'
STMLENGTH  X'006E' 110    "Length of the device-control command-set"
STMLENCONT                "vector"
STMCMDSET  X'C4C3' "Device-control command-set ID"
STMSUBSET  X'FF10' "DC1 Subset ID"
STMPPAIR   X'6001' "Multiple copy & copy-subgroup support in LCC"
STMPPAIR   X'6002' "Media-source-selection support in LCC"
STMPPAIR   X'6003' "Media-destination-selection support in LCC"
STMPPAIR   X'6101' "Explicit page placement and orientation support in"
STMPCONT           "the LPP command"
STMPPAIR   X'6201' "Logical page and object area coloring support"
STMPPAIR   X'7001' "Manage IPDS Dialog (MID) command support"
STMPPAIR   X'7008' "Set Presentation Environment (SPE) command support"
STMPPAIR   X'702E' "Activate Resource command support"
STMPPAIR   X'7034' "Presentation Fidelity Control Command Support"
STMPPAIR   X'706B' "Invoke CMR (ICMR) command support"
```

Figure 61. Example of the Softcopy Printer Information Report (Part 2 of 13)

```
STMPPAIR   X'707B' "Rasterize Presentation Object (RPO) command"
STMPCONT           "support"
STMPPAIR   X'707E' "Include Saved Pages (ISP) command support"
STMPPAIR   X'70CE' "DUA command-support property ID"
STMPPAIR   X'8008' "Mark Form"
STMPPAIR   X'800A' "Alternate Offset Stacker"
STMPPAIR   X'800C' "Control Edge Marks"
STMPPAIR   X'80F2' "Discard Buffered Data"
STMPPAIR   X'80F4' "Request Resource List"
STMPPAIR   X'80F6' "Exception-Handling Control"
STMPPAIR   X'9001' "Print Buffered Data"
STMPPAIR   X'9002' "Deactivate Save Page Group"
STMPPAIR   X'9003' "Specify Group Operation"
STMPPAIR   X'9004' "Define Group Boundary"
STMPPAIR   X'9005' "Erase Residual Print Data"
STMPPAIR   X'9007' "Erase Residual Font Data"
STMPPAIR   X'9009' "Separate Continuous Forms"
STMPPAIR   X'900A' "Remove Saved Page Group"
STMPPAIR   X'900D' "Stack Received Pages"
STMPPAIR   X'900E' "Select Medium Modifications"
STMPPAIR   X'9013' "Eject to Front Facing"
STMPPAIR   X'9015' "Select Input Media Source"
STMPPAIR   X'9016' "Set Media Origin"
STMPPAIR   X'90F3' "Obtain Printer Characteristics"
STMPPAIR   X'90F5' "Page Counters Control"
STMPPAIR   X'E000' "CMRs can be captured"
STMPPAIR   X'E001' "Host-activated link color conversion CMRs"
STMPCONT           "supported"
STMPPAIR   X'E002' "Host-activated, non-generic halftone CMRs"
STMPCONT           "supported"
STMPPAIR   X'E003' "Host-activated, non-generic tone transfer curve"
STMPCONT           "CMRs supported"
STMPPAIR   X'F200' "Local Date and Time Stamp triplets supported in AR"
STMPCONT           "commands"
STMPPAIR   X'F201' "Activation-failed NACK support"
STMPPAIR   X'F202' "Font Resolution and Metric Technology triplets"
STMPCONT           "supported in AR commands"
STMPPAIR   X'F203' "Metric Adjustment triplets supported in AR"
STMPCONT           "commands"
STMPPAIR   X'F204' "Data-object font support"
STMPPAIR   X'F205' "Color Management triplet support in the IDO, RPO,"
STMPCONT           "LPD, SPE, WBCC, WIC2, WGC, and WOCC commands"
STMPPAIR   X'F206' "Device Appearance (X'97') triplet support"
STMPPAIR   X'F401' "XOA RRL Multiple Entry Query Support. The printer"
STMPCONT           "supports multiple-entry queries of query type"
STMPCONT           "X'05', activation query."
STMPPAIR   X'F601' "Position-Check Highlighting Support in XOA EHC"
STMPPAIR   X'F602' "Independent Exception Page-Print in XOA EHC"
STMPPAIR   X'F804' "Simplex and duplex N-up supported in the LCC"
STMPCONT           "command"
STMPPAIR   X'F902' "Basic cut-sheet emulation mode supported"
STMPPAIR   X'FB00' "All architected units of measure supported"
STMPPAIR   X'FF01' "Positioning Exception Sense Format Supported"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "IM-IMAGE COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'000CC9D4FF1010014022A004'
STMLENGTH  X'000C' 12     "Length of the IM-image command-set vector"
STMSUBSET  X'C9D4' "IM1 subset of the IM-image command-set"
STMLEVEL   X'FF10' "IMD1 data"
STMPPAIR   X'1001' "IM-image objects may be sent in any order"
```

Figure 61. Example of the Softcopy Printer Information Report (Part 3 of 13)

```
STMPPAIR   X'4022' "Standard OCA color-support property ID"
STMPPAIR   X'A004' "Orientation-Support property ID"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "IO-IMAGE COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0026C9D6FF1010011202402244015001500350085080508l'
STMVCONT   50825101520455O5A004F300F301'
STMLENGTH  X'0026' 38     "Length of the IO-image command-set vector"
STMSUBSET  X'C9D6' "IO1 subset of the IO-image command-set"
STMLEVEL   X'FF10' "IOCA FS10 data"
STMPPAIR   X'1001' "IO-image objects may be sent in any order"
STMPPAIR   X'1202' "IO-image objects can be downloaded in home state"
STMPCONT           "as resources"
STMPPAIR   X'4022' "Standard OCA color-support property ID"
STMPPAIR   X'4401' "Extended IOCA bi-level color support; when this"
STMPCONT           "property pair is present, the printer supports Set"
STMPCONT           "Extended Bi-level Image Color (X'F4')"
STMPCONT           "self-defining field on the WIC2-IDD"
STMPPAIR   X'5001' "Modified ITU-TSS Modified READ Algorithm (IBM MMR)"
STMPPAIR   X'5003' "Uncompressed image"
STMPPAIR   X'5008' "ABIC (bilevel Q-coded) Compression Algorithm"
STMPCONT           "(ABIC)"
STMPPAIR   X'5080' "ITU-TSS T.4 Facsimile Coding Scheme (G3 MH, one"
STMPCONT           "dimensional)"
STMPPAIR   X'5081' "ITU-TSS T.4 Facsimile Coding Scheme (G3 MR, two"
STMPCONT           "dimensional)"
STMPPAIR   X'5082' "ITU-TSS T.6 Facsimile Coding Scheme (G4 MMR)"
STMPPAIR   X'5101' "Bit ordering supported in the IOCA Image Encoding"
STMPCONT           "Parameter"
STMPPAIR   X'5204' "Unpadded RIDIC recording algorithm supported"
STMPPAIR   X'5505' "Multiple Image content support"
STMPPAIR   X'A004' "Object area orientation-support property ID"
STMPPAIR   X'F300' "Replicate-and-trim mapping supported"
STMPPAIR   X'F301' "Scale-to-fill mapping supported"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "IO-IMAGE COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0024C9D6FF1110011202402244015001500350085005082
STMVCONT   50835101520455O5A004F301'
STMLENGTH  X'0024' 36     "Length of the IO-image command-set vector"
STMSUBSET  X'C9D6' "IO1 subset of the IO-image command-set"
STMLEVEL   X'FF11' "IOCA FS11 data, implies FS10 is also supported"
STMPPAIR   X'1001' "IO-image objects may be sent in any order"
STMPPAIR   X'1202' "IO-image objects can be downloaded in home state"
STMPCONT           "as resources"
STMPPAIR   X'4022' "Standard OCA color-support property ID"
STMPPAIR   X'4401' "Extended IOCA bi-level color support; when this"
STMPCONT           "property pair is present, the printer supports Set"
STMPCONT           "Extended Bi-level Image Color (X'F4')"
STMPCONT           "self-defining field on the WIC2-IDD"
STMPPAIR   X'5001' "Modified ITU-TSS Modified READ Algorithm (IBM MMR)"
STMPPAIR   X'5003' "Uncompressed image"
STMPPAIR   X'5008' "ABIC (bilevel Q-coded) Compression Algorithm"
STMPCONT           "(ABIC)"
STMPPAIR   X'500A' "Concatenated ABIC"
STMPPAIR   X'5082' "ITU-TSS T.6 Facsimile Coding Scheme (G4 MMR)"
STMPPAIR   X'5083' "ISO/ITU-TSS JPEG algorithms"
STMPPAIR   X'5101' "Bit ordering supported in the IOCA Image Encoding"
STMPCONT           "Parameter"
STMPPAIR   X'5204' "Unpadded RIDIC recording algorithm supported"
```

Figure 61. Example of the Softcopy Printer Information Report (Part 4 of 13)

```
STMPPAIR   X'5505' "Multiple Image content support"
STMPPAIR   X'A004' "Object area orientation-support property ID"
STMPPAIR   X'F301' "Scale-to-fill mapping supported"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "IO-IMAGE COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0024C9D6FF401001120240204401500150035008508050 81
STMVCONT   50825101520455 05A004F301'
STMLENGTH  X'0024' 36     "Length of the IO-image command-set vector"
STMSUBSET  X'C9D6' "IO1 subset of the IO-image command-set"
STMLEVEL   X'FF40' "IOCA FS40 data"
STMPPAIR   X'1001' "IO-image objects may be sent in any order"
STMPPAIR   X'1202' "IO-image objects can be downloaded in home state"
STMPCONT           "as resources"
STMPPAIR   X'4020' "Standard OCA color-support property ID"
STMPPAIR   X'4401' "Extended IOCA bi-level color support; when this"
STMPCONT           "property pair is present, the printer supports Set"
STMPCONT           "Extended Bi-level Image Color (X'F4')"
STMPCONT           "self-defining field on the WIC2-IDD"
STMPPAIR   X'5001' "Modified ITU-TSS Modified READ Algorithm (IBM MMR)"
STMPPAIR   X'5003' "Uncompressed image"
STMPPAIR   X'5008' "ABIC (bilevel Q-coded) Compression Algorithm"
STMPCONT           "(ABIC)"
STMPPAIR   X'5080' "ITU-TSS T.4 Facsimile Coding Scheme (G3 MH, one"
STMPCONT           "dimensional)"
STMPPAIR   X'5081' "ITU-TSS T.4 Facsimile Coding Scheme (G3 MR, two"
STMPCONT           "dimensional)"
STMPPAIR   X'5082' "ITU-TSS T.6 Facsimile Coding Scheme (G4 MMR)"
STMPPAIR   X'5101' "Bit ordering supported in the IOCA Image Encoding"
STMPCONT           "Parameter"
STMPPAIR   X'5204' "Unpadded RIDIC recording algorithm supported"
STMPPAIR   X'5505' "Multiple Image content support"
STMPPAIR   X'A004' "Object area orientation-support property ID"
STMPPAIR   X'F301' "Scale-to-fill mapping supported"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "IO-IMAGE COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0022C9D6FF421001120240204401500150035008502050 82
STMVCONT   510152045505A004F301'
STMLENGTH  X'0022' 34     "Length of the IO-image command-set vector"
STMSUBSET  X'C9D6' "IO1 subset of the IO-image command-set"
STMLEVEL   X'FF42' "IOCA FS42 data"
STMPPAIR   X'1001' "IO-image objects may be sent in any order"
STMPPAIR   X'1202' "IO-image objects can be downloaded in home state"
STMPCONT           "as resources"
STMPPAIR   X'4020' "Standard OCA color-support property ID"
STMPPAIR   X'4401' "Extended IOCA bi-level color support; when this"
STMPCONT           "property pair is present, the printer supports Set"
STMPCONT           "Extended Bi-level Image Color (X'F4')"
STMPCONT           "self-defining field on the WIC2-IDD"
STMPPAIR   X'5001' "Modified ITU-TSS Modified READ Algorithm (IBM MMR)"
STMPPAIR   X'5003' "Uncompressed image"
STMPPAIR   X'5008' "ABIC (bilevel Q-coded) Compression Algorithm"
STMPCONT           "(ABIC)"
STMPPAIR   X'5020' "Solid Fill Rectangle"
STMPPAIR   X'5082' "ITU-TSS T.6 Facsimile Coding Scheme (G4 MMR)"
STMPPAIR   X'5101' "Bit ordering supported in the IOCA Image Encoding"
STMPCONT           "Parameter"
STMPPAIR   X'5204' "Unpadded RIDIC recording algorithm supported"
STMPPAIR   X'5505' "Multiple Image content support"
```

Figure 61. Example of the Softcopy Printer Information Report (Part 5 of 13)

```
STMPPAIR   X'A004' "Object area orientation-support property ID"
STMPPAIR   X'F301' "Scale-to-fill mapping supported"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "IO-IMAGE COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0018C9D6FF45100112024020440150205101550 5A004F301'
STMLENGTH  X'0018' 24     "Length of the IO-image command-set vector"
STMSUBSET  X'C9D6' "IO1 subset of the IO-image command-set"
STMLEVEL   X'FF45' "IOCA FS45 data, implies FS42 is also supported"
STMPPAIR   X'1001' "IO-image objects may be sent in any order"
STMPPAIR   X'1202' "IO-image objects can be downloaded in home state"
STMPCONT           "as resources"
STMPPAIR   X'4020' "Standard OCA color-support property ID"
STMPPAIR   X'4401' "Extended IOCA bi-level color support; when this"
STMPCONT           "property pair is present, the printer supports Set"
STMPCONT           "Extended Bi-level Image Color (X'F4')"
STMPCONT           "self-defining field on the WIC2-IDD"
STMPPAIR   X'5020' "Solid Fill Rectangle"
STMPPAIR   X'5101' "Bit ordering supported in the IOCA Image Encoding"
STMPCONT           "Parameter"
STMPPAIR   X'5505' "Multiple Image content support"
STMPPAIR   X'A004' "Object area orientation-support property ID"
STMPPAIR   X'F301' "Scale-to-fill mapping supported"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "OBJECT CONTAINER COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'000CD6C3000012015800F301'
STMLENGTH  X'000C' 12     "Length of the object container command-set"
STMLENCONT                "vector"
STMSUBSET  X'D6C3' "OC1 subset of the object container command-set"
STMLEVEL   X'0000' "No levels defined"
STMPPAIR   X'1201' "Data-object-resource support"
STMPPAIR   X'5800' "Image Resolution (X'9A') triplet supported in IDO,"
STMPCONT           "RPO, and WOCC commands"
STMPPAIR   X'F301' "Scale-to-fill mapping supported"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "OVERLAY COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'000CD6D3FF1011021505A004'
STMLENGTH  X'000C' 12     "Length of the overlay command-set vector"
STMCMDSET  X'D6D3' "Overlay command-set ID"
STMSUBSET  X'FF10' "OL1 subset ID"
STMPPAIR   X'1102' "Extended overlay support, up to 32,511 overlays"
STMPCONT           "can be activated at one time"
STMPPAIR   X'1505' "x'15nn' - Overlay nesting up to nn levels is"
STMPCONT           "supported"
STMPPAIR   X'A004' "Page-overlay-rotation support, all 4 orientations"
STMPCONT           "supported in the IO command"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "PAGE SEGMENT COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0008D7E2FF101101'
STMLENGTH  X'0008' 8      "Length of the page segment command-set"
STMLENCONT                "vector"
STMCMDSET  X'D7E2' "Page segment command-set ID"
STMSUBSET  X'FF10' "PS1 subset ID"
```

Figure 61. Example of the Softcopy Printer Information Report (Part 6 of 13)

```
STMPPAIR   X'1101' "Extended page segment support, up to 32,511 page"
STMPCONT           "segments can be activated at one time."
STMTITLE
COMMENT    ******************************************************
STMTITLE   "TEXT COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'000CD7E3FF301001402250FF'
STMLENGTH  X'000C' 12     "Length of the text command-set vector"
STMSUBSET  X'D7E3' "TX1 subset of the text command-set"
STMLEVEL   X'FF30' "PTOCA PT3 data"
STMPPAIR   X'1001' "Unordered text supported"
STMPPAIR   X'4022' "Standard OCA color-support property ID"
STMPPAIR   X'50FF' "Multiple text-orientation support for all"
STMPCONT           "supported media origins"
STMTITLE
COMMENT    ******************************************************
STMTITLE   "GRAPHICS COMMAND-SET VECTOR"
COMMENT    ******************************************************
STMVCTR    X'0014E5C7FF2010014022410041014102 4106A004'
STMLENGTH  X'0014' 20     "Length of the graphics command-set vector"
STMSUBSET  X'E5C7' "GR1 subset of the graphics command-set"
STMLEVEL   X'FF20' "GOCA DR/2V0 data"
STMPPAIR   X'1001' "Graphics objects may be sent in any order"
STMPPAIR   X'4022' "Standard OCA color-support property ID"
STMPPAIR   X'4100' "Set Process Color drawing order support"
STMPPAIR   X'4101' "Box drawing orders supported"
STMPPAIR   X'4102' "Partial Arc drawing orders supported"
STMPPAIR   X'4106' "Set Fractional Line Width drawing order supported"
STMPPAIR   X'A004' "Object area orientation-support property ID"
STMEND
COMMENT    ******************************************************
TITLE      OPC Data
COMMENT    ******************************************************
OPCDUMP    00180001 00000000 38405FA0 3DE00000
OPCDUMP    00003DE0 5FA0B000 000A0003 00FF1770
OPCDUMP    1770000A 00100001 00010001 004B0004
OPCDUMP    1301010E E6B28000 00000000 11001200
OPCDUMP    1300141B 01020EE6 B2800000 00000021
OPCDUMP    00220023 00240031 00320033 00341901
OPCDUMP    03008000 00000000 00004000 42004800
OPCDUMP    4A005000 60007000 08000601 000B0000
OPCDUMP    08000701 000B0000 34000A01 00010302
OPCDUMP    00020303 00040005 00060006 03070007
OPCDUMP    03080009 00100010 03110312 00120320
OPCDUMP    08400040 09410042 00420900 20000B01
OPCDUMP    03010603 03030606 03070308 03080609
OPCDUMP    06100310 07400941 0A420900 18000E0D
OPCDUMP    11181A1B 1C1D1E1F 20212286 87919296
OPCDUMP    97989A00 06001201 03005800 13310001
OPCDUMP    F0F0F4F1 F0F0D4C4 F1C9C2D4 F1F0F0F0
OPCDUMP    F0F0F0F0 F0F0F0F0 F0F00000 F0F0F0F0
OPCDUMP    F0F0F0F0 F0F1F54B F0F44BF2 F1F82300
OPCDUMP    03C99586 96D79989 95A340F4 F1F0F000
OPCDUMP    00000000 00000000 00000000 00000000
OPCDUMP    0000D800 14420106 072B1200 0401010E
OPCDUMP    00000000 00000006 072B1200 0401013C
OPCDUMP    00000000 00000006 072B1200 04010116
OPCDUMP    00000000 00000006 072B1200 04010117
OPCDUMP    00000000 00000092 0206072B 12000401
OPCDUMP    01140000 00000000 0006072B 12000401
OPCDUMP    012F0000 00000000 0006072B 12000401
OPCDUMP    01330000 00000000 0006072B 12000401
OPCDUMP    01350000 00000000 0006072B 12000401
OPCDUMP    01390000 00000000 0006072B 12000401
```

Figure 61. Example of the Softcopy Printer Information Report (Part 7 of 13)

```
OPCDUMP    010E0000 00000000 0006072B 12000401
OPCDUMP    013C0000 00000000 0006072B 12000401
OPCDUMP    01160000 00000000 0006072B 12000401
OPCDUMP    01170000 00000000 00000A00 15225051
OPCDUMP    5D5E5F00 06001675 96------ --------
OPCTITLE
COMMENT    *****************************************************
OPCTITLE   "PRINTABLE AREA SELF-DEFINING FIELD"
COMMENT    *****************************************************
OPCSDF     X'0018000100000000038405FA03DE0000000003DE05FA0B000'
OPCLENGTH  X'0018' 24     "Length of this SDF, including itself"
OPCSDFID   X'0001' "Printable Area Self-Defining Field"
OPCCODE    X'00'   "Media-source ID"
OPCCODE    X'00'   "Reserved"
OPCCODE    X'00'   "Unit base equals 10 inches"
OPCCODE    X'00'   "Reserved"
OPCVAL     X'3840' 14,400 "Units per unit base value for this"
OPCVALCONT                "self-defining field"
OPCVAL     X'5FA0' 24,480 "Actual width of the medium presentation"
OPCVALCONT                "space in L-units"
OPCVAL     X'3DE0' 15,840 "Actual length of the medium presentation"
OPCVALCONT                "space in L-units"
OPCVAL     X'0000' 0      "Xm offset of the physical printable area in"
OPCVALCONT                "L-units"
OPCVAL     X'0000' 0      "Ym offset of the physical printable area in"
OPCVALCONT                "L-units"
OPCVAL     X'3DE0' 15,840 "Xm extent of the physical printable area in"
OPCVALCONT                "L-units"
OPCVAL     X'5FA0' 24,480 "Ym extent of the physical printable area in"
OPCVALCONT                "L-units"
OPCBITS    X'B000' B'1011000000000000' "Input Media Source"
OPCBCONT                               "Characteristics"
OPCBIT     1... .... "Duplex"
OPCBIT     .01. .... "Continuous forms"
OPCBIT     ...1 .... "Media source available"
OPCBIT     .... 0... "Retired item 119"
OPCBIT     .... .0.. "Not envelope media"
OPCBIT     .... ..0. "Automatic media feed"
OPCBIT     .... ...0 "Not computer output microfilm media"
OPCBIT     0... .... "Continuous forms media with carrier strips"
OPCBIT     .0.. .... "Not an inserter bin"
OPCBIT     ..00 0000 "Reserved"
OPCTITLE
COMMENT    *****************************************************
OPCTITLE   "IM-IMAGE AND CODED-FONT RESOLUTION SELF-DEFINING FIELD"
COMMENT    *****************************************************
OPCSDF     X'000A000300FF17701770'
OPCLENGTH  X'000A' 10     "Length of this SDF, including itself"
OPCSDFID   X'0003' "IM-Image and Coded-Font Resolution Self-Defining"
OPCSIDCONT         "Field"
OPCCODE    X'00'   "Ten-inch increments"
OPCCODE    X'FF'   "All resolutions in the range X'0001' - X'7FFF'"
OPCVAL     X'1770' 6,000  "X pels per unit base"
OPCVAL     X'1770' 6,000  "Y pels per unit base"
OPCTITLE
COMMENT    *****************************************************
OPCTITLE   "MEDIA-DESTINATIONS SELF-DEFINING FIELD"
COMMENT    *****************************************************
OPCSDF     X'000A0010000100010001'
OPCLENGTH  X'000A' 10     "Length of this SDF, including itself"
OPCSDFID   X'0010' "Media-Destinations Self-Defining Field"
```

Figure 61. Example of the Softcopy Printer Information Report (Part 8 of 13)

```
OPCCODE    X'0001' "Default media-destination ID"
OPCCODE    X'0001' "First number in a range of available, contiguous"
OPCCDCONT          "media-destination IDs"
OPCCODE    X'0001' "Last number in a range of available, contiguous"
OPCCDCONT          "media-destination IDs"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "STORAGE POOLS SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'004B00041301010EE6B280000000000011001200130014 1B
OPCSDFCONT 01020EE6B2800000000000210022002300240031003200330 0
OPCSDFCONT 3419010300800000000000000040004200480040050006000
OPCSDFCONT 70'
OPCLENGTH  X'004B' 75     "Length of this SDF, including itself"
OPCSDFID   X'0004' "Storage Pools Self-Defining Field"
OPCLENGTH  X'13'   19    "Length of the entry, including itself"
OPCCODE    X'01'   "Entry ID"
OPCCODE    X'01'   "Storage pool ID"
OPCVAL4    X'0EE6B280' 250,000,000   "Size of the storage pool, in"
OPCV4CONT                            "bytes, when empty"
OPCDATA    X'00000000' "Reserved"
OPCCODE    X'0011' "Page graphics data"
OPCCODE    X'0012' "Page image data"
OPCCODE    X'0013' "Page text data"
OPCCODE    X'0014' "Page bar code data"
OPCLENGTH  X'1B'   27    "Length of the entry, including itself"
OPCCODE    X'01'   "Entry ID"
OPCCODE    X'02'   "Storage pool ID"
OPCVAL4    X'0EE6B280' 250,000,000   "Size of the storage pool, in"
OPCV4CONT                            "bytes, when empty"
OPCDATA    X'00000000' "Reserved"
OPCCODE    X'0021' "Overlay graphics data"
OPCCODE    X'0022' "Overlay image data"
OPCCODE    X'0023' "Overlay text data"
OPCCODE    X'0024' "Overlay bar code data"
OPCCODE    X'0031' "Page segment graphics data"
OPCCODE    X'0032' "Page segment image data"
OPCCODE    X'0033' "Page segment text data"
OPCCODE    X'0034' "Page segment bar code data"
OPCLENGTH  X'19'   25    "Length of the entry, including itself"
OPCCODE    X'01'   "Entry ID"
OPCCODE    X'03'   "Storage pool ID"
OPCVAL4    X'00800000' 8,388,608    "Size of the storage pool, in"
OPCV4CONT                           "bytes, when empty"
OPCDATA    X'00000000' "Reserved"
OPCCODE    X'0040' "Single-byte coded-font index tables"
OPCCODE    X'0042' "Single-byte coded-font patterns"
OPCCODE    X'0048' "Double-byte coded-font index tables"
OPCCODE    X'004A' "Double-byte coded-font patterns"
OPCCODE    X'0050' "Code pages"
OPCCODE    X'0060' "Font character sets"
OPCCODE    X'0070' "Coded fonts"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "INSTALLED FEATURES SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'0008000601000B00'
OPCLENGTH  X'0008' 8      "Length of this SDF, including itself"
OPCSDFID   X'0006' "Installed Features Self-Defining Field"
OPCCODE    X'0100' "Duplex"
OPCCODE    X'0B00' "Continuous-Forms Output"
OPCTITLE
```

Figure 61. Example of the Softcopy Printer Information Report (Part 9 of 13)

```
COMMENT    ******************************************************
OPCTITLE   "AVAILABLE FEATURES SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'0008000701000B00'
OPCLENGTH  X'0008' 8      "Length of this SDF, including itself"
OPCSDFID   X'0007' "Available Features Self-Defining Field"
OPCCODE    X'0100' "Duplex available from at least one media source"
OPCCODE    X'0B00' "Continuous-Forms Output"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "XOA RRL RT & RIDF SUPPORT SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'0034000A0100010302000203030004000500060006030700
OPCSDFCONT 0703080009001000100311031200120320084000400941004 2
OPCSDFCONT 004209'
OPCLENGTH  X'0034' 52     "Length of this SDF, including itself"
OPCSDFID   X'000A' "XOA RRL RT & RIDF Support Self-Defining Field"
OPCCODE    X'01'   "Single-byte LF1-type and LF2-type coded font"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'01'   "Single-byte LF1-type and LF2-type coded font"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'02'   "Double-byte LF1-type coded font"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'02'   "Double-byte LF1-type coded font"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'03'   "Double-byte LF1-type coded-font section"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'04'   "Page segment"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'05'   "Overlay"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'06'   "Device-version code page"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'06'   "Device-version code page"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'07'   "Font character set"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'07'   "Font character set"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'08'   "Single-byte coded font index"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'09'   "Double-byte coded font section index"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'10'   "Coded font"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'10'   "Coded font"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'11'   "Graphic character set supported in a font"
OPCCDCONT          "character set"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'12'   "Specific code page"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'12'   "Specific code page"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'20'   "Saved page group"
OPCCODE    X'08'   "Variable-length group ID triplet"
OPCCODE    X'40'   "Data object resource"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'40'   "Data object resource"
OPCCODE    X'09'   "Object-OID format"
OPCCODE    X'41'   "Data-object font"
OPCCODE    X'00'   "Host-Assigned Resource ID"
```

Figure 61. Example of the Softcopy Printer Information Report (Part 10 of 13)

```
OPCCODE    X'42'   "Data-object-font components"
OPCCODE    X'00'   "Host-Assigned Resource ID"
OPCCODE    X'42'   "Data-object-font components"
OPCCODE    X'09'   "Object-OID format"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "ACTIVATE RESOURCE RT & RIDF SUPPORT SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'0020000B0103010603030306060307030803080609061003
OPCSDFCONT 10074009410A4209'
OPCLENGTH  X'0020' 32     "Length of this SDF, including itself"
OPCSDFID   X'000B' "Activate Resource RT & RIDF Support Self-Defining"
OPCSIDCONT         "Field"
OPCCODE    X'01'   "Single-byte LF1-type and LF2-type coded font"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'01'   "Single-byte LF1-type and LF2-type coded font"
OPCCODE    X'06'   "MVS Host Unalterable Remote Font Environment"
OPCCODE    X'03'   "Double-byte LF1-type coded-font section"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'03'   "Double-byte LF1-type coded-font section"
OPCCODE    X'06'   "MVS Host Unalterable Remote Font Environment"
OPCCODE    X'06'   "Code page"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'07'   "Font character set"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'08'   "Single-byte LF1-type coded-font index"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'08'   "Single-byte LF1-type coded-font index"
OPCCODE    X'06'   "MVS Host Unalterable Remote Font Environment"
OPCCODE    X'09'   "Double-byte LF1-type coded-font section index"
OPCCODE    X'06'   "MVS Host Unalterable Remote Font Environment"
OPCCODE    X'10'   "Coded font"
OPCCODE    X'03'   "GRID-parts format"
OPCCODE    X'10'   "Coded font"
OPCCODE    X'07'   "Coded-font format"
OPCCODE    X'40'   "Data object resource"
OPCCODE    X'09'   "Object-OID format"
OPCCODE    X'41'   "Data-object font"
OPCCODE    X'0A'   "Data-object-font format"
OPCCODE    X'42'   "Data-object-font components"
OPCCODE    X'09'   "Object-OID format"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "COMMON BAR CODE TYPE/MODIFIER SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'0018000E0D11181A1B1C1D1E1F2021228687919296979 89A'
OPCLENGTH  X'0018' 24     "Length of this SDF, including itself"
OPCSDFID   X'000E' "Common Bar Code Type/Modifier Self-Defining Field"
OPCCODE    X'0D'   "Codabar - modifier-byte options X'01' and X'02'"
OPCCODE    X'11'   "Code 128 - modifier-byte option X'02'"
OPCCODE    X'18'   "POSTNET - modifier-byte options X'00' through"
OPCCDCONT          "X'03'"
OPCCODE    X'1A'   "RM4SCC - modifier-byte option X'00'"
OPCCODE    X'1B'   "Japan Postal Bar Code - modifier-byte options"
OPCCDCONT          "X'00' and X'01'"
OPCCODE    X'1C'   "Data Matrix. Modifier Byte option X'00'."
OPCCODE    X'1D'   "MaxiCode. Modifier Byte option X'00'."
OPCCODE    X'1E'   "PDF417 - modifier Byte options X'00' and X'01'"
OPCCODE    X'1F'   "Australia Post Bar Code - modifier-byte options"
OPCCDCONT          "X'01'-X'08'"
OPCCODE    X'20'   "QR Code, modifier-byte option X'02'"
OPCCODE    X'21'   "Code 93, modifier-byte option X'00'"
```

Figure 61. Example of the Softcopy Printer Information Report (Part 11 of 13)

```
OPCCODE    X'22'   "USPS Four-State, modifier-byte options X'00'"
OPCCDCONT          "through X'03'"
OPCCODE    X'86'   "UPC-Two-digit Supplemental - modifier-byte options"
OPCCDCONT          "X'01' and X'02'"
OPCCODE    X'87'   "UPC-Five-digit Supplemental - modifier-byte"
OPCCDCONT          "options X'01' and X'02'"
OPCCODE    X'91'   "Code 128, modifier-byte option X'03'"
OPCCODE    X'92'   "Code 128, modifier-byte option X'04'"
OPCCODE    X'96'   "EAN Two-digit Supplemental - modifer-byte option"
OPCCDCONT          "X'01'"
OPCCODE    X'97'   "EAN Five-digit Supplemental - modifier-byte option"
OPCCDCONT          "X'01'"
OPCCODE    X'98'   "POSTNET, modifier-byte option X'04'"
OPCCODE    X'9A'   "RM4SCC, modifier-byte option X'01'"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "SUPPORTED GROUP OPERATIONS SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'000600120103'
OPCLENGTH  X'0006' 6      "Length of this SDF, including itself"
OPCSDFID   X'0012' "Supported Group Operations Self-Defining Field"
OPCCODE    X'01'   "Keep group together as a print unit"
OPCCODE    X'03'   "Save pages"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "PRODUCT IDENTIFIER SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'00580013310001F0F0F4F1F0F0D4C4F1C9C2D4F1F0F0F0F0
OPCSDFCONT F0F0F0F0F0F0F0F0F00000F0F0F0F0F0F0F0F0F0F1F54BF0F4
OPCSDFCONT 4BF2F1F8230003C9958696D7998995A340F4F1F0F000000000
OPCSDFCONT 00000000000000000000000000000'
OPCLENGTH  X'0058' 88     "Length of this SDF, including itself"
OPCSDFID   X'0013' "Product Identifier Self-Defining Field"
OPCLENGTH  X'31'   49    "Product-identifier parameter length,"
OPCLENCONT               "including itself"
OPCCODE    X'0001' "Unique Product Identifier"
OPCCHAR    004100       "Device Type"
OPCCHAR    MD1          "Model Number"
OPCCHAR    IBM          "Manufacturer"
OPCCHAR    10           "Plant of manufacture"
OPCCHAR    000000000000 "Sequence number"
OPCCODE    X'0000' "Tag"
OPCCHAR    000000000    "Engineering Change level"
OPCSDF     X'F1F54BF0F44BF2F1F8'
OPCDATA            "Device-specific information"
OPCLENGTH  X'23'   35    "Product-identifier parameter length,"
OPCLENCONT               "including itself"
OPCCODE    X'0003' "Printer Name Identifier"
OPCSDF     InfoPrint 4100
OPCCHAR            "External name of the printer"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "OBJECT CONTAINER TYPE SUPPORT SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'00D80014420106072B12000401010E000000000000000607
OPCSDFCONT 2B12000401013C000000000000006072B1200040101160000
OPCSDFCONT 000000000006072B12000401011700000000000000092020607
OPCSDFCONT 2B12000401011400000000000000006072B12000401012F0000
OPCSDFCONT 000000000006072B12000401013300000000000000006072B12
OPCSDFCONT 00040101350000000000000006072B12000401013900000000
OPCSDFCONT 00000006072B12000401010E000000000000006072B120004
OPCSDFCONT 01013C000000000000006072B12000401011600000000000
```

Figure 61. Example of the Softcopy Printer Information Report (Part 12 of 13)

```
OPCSDFCONT 0006072B12000401011700000000000000'
OPCLENGTH  X'00D8' 216    "Length of this SDF, including itself"
OPCSDFID   X'0014' "Object Container Type Support Self-Defining Field"
OPCLENGTH  X'42'   66    "Type Record Length"
OPCCODE    X'01'   "Page or overlay state"
OPCCODE16  X'06072B12000401010E00000000000000' "Tag Image File Format"
OPCC16CONT                                     "(TIFF)"
OPCCODE16  X'06072B12000401013C00000000000000' "Tag Image File Format"
OPCC16CONT                                     "(TIFF) without"
OPCC16CONT                                     "Transparency"
OPCCODE16  X'06072B12000401011600000000000000' "Graphics Interchange"
OPCC16CONT                                     "Format (GIF)"
OPCCODE16  X'06072B12000401011700000000000000' "AFPC JPEG Subset (JPEG)"
OPCLENGTH  X'92'   146   "Type Record Length"
OPCCODE    X'02'   "Home state"
OPCCODE16  X'06072B12000401011400000000000000' "Color Mapping Table"
OPCC16CONT                                     "Setup File"
OPCCODE16  X'06072B12000401012F00000000000000' "IOCA Tile Resource"
OPCCODE16  X'06072B12000401013300000000000000' "TrueType/OpenType Font"
OPCCODE16  X'06072B12000401013500000000000000' "TrueType/OpenType"
OPCC16CONT                                     "Collection"
OPCCODE16  X'06072B12000401013900000000000000' "Color Management"
OPCC16CONT                                     "Resource (CMR)"
OPCCODE16  X'06072B12000401010E00000000000000' "Tag Image File Format"
OPCC16CONT                                     "(TIFF)"
OPCCODE16  X'06072B12000401013C00000000000000' "Tag Image File Format"
OPCC16CONT                                     "(TIFF) without"
OPCC16CONT                                     "Transparency"
OPCCODE16  X'06072B12000401011600000000000000' "Graphics Interchange"
OPCC16CONT                                     "Format (GIF)"
OPCCODE16  X'06072B12000401011700000000000000' "AFPC JPEG Subset (JPEG)"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "DF DEACTIVATION TYPES SUPPORTED SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'000A00152250515D5E5F'
OPCLENGTH  X'000A' 10     "Length of this SDF, including itself"
OPCSDFID   X'0015' "DF Deactivation Types Supported Self-Defining"
OPCSIDCONT         "Field"
OPCCODE    X'22'   "Deactivate a font index for a double-byte coded"
OPCCDCONT          "font section"
OPCCODE    X'50'   "Deactivate a coded font"
OPCCODE    X'51'   "Deactivate a coded font and all associated"
OPCCDCONT          "components"
OPCCODE    X'5D'   "Deactivate all resident coded fonts and all"
OPCCDCONT          "associated components"
OPCCODE    X'5E'   "Deactivate all coded fonts"
OPCCODE    X'5F'   "Deactivate all coded fonts and all associated"
OPCCDCONT          "components"
OPCTITLE
COMMENT    ******************************************************
OPCTITLE   "PFC TRIPLETS SUPPORTED SELF-DEFINING FIELD"
COMMENT    ******************************************************
OPCSDF     X'000600167596'
OPCLENGTH  X'0006' 6      "Length of this SDF, including itself"
OPCSDFID   X'0016' "PFC Triplets Supported Self-Defining Field"
OPCCODE    X'75'   "Color Fidelity triplet"
OPCCODE    X'96'   "CMR Tag Fidelity triplet"
OPCEND
```

Figure 61. Example of the Softcopy Printer Information Report (Part 13 of 13)

Softcopy record format

Figure 62 gives detailed information about the format of the softcopy printer information report in Figure 61 on page 138. It lists each record that can be in the report, along with a detailed description. You can use this information to format your own hardcopy printer information report.

```
================================================================================
This is the generic mapping used by all records in the report.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               The Record Label (ID)
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               The variable part of the rec.


================================================================================
The HEADING record contains text with the name of the PRTINFO member.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: HEADING
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Text with "Printer Information
                                                   from " followed by PDS
                                                   name(member name)

================================================================================
The REPORT LEVEL record contains the information relevant to uniquely identify the
report's format.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID value: REPORTLVL
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        8               Report Identifier
      19     (13) CHARACTER        1               Column Separator
      20     (14) CHARACTER        8               PSF version, release, and
                                                   modification
      28     (1C) CHARACTER        1               Column Separator
      29     (1D) CHARACTER        4               Report Level Identifier
      33     (21) CHARACTER        1               Column Separator
      34     (22) CHARACTER       30               Report Description
      64     (40) CHARACTER        1               Column Separator
      65     (41) CHARACTER        8               FSA name
      73     (49) CHARACTER        1               Column Separator
      74     (4A) CHARACTER       12               CPU ID
      86     (56) CHARACTER        1               Column separator
      87     (57) CHARACTER        8               System name
      95     (5F) CHARACTER        1               Column separator
      96     (60) CHARACTER      250               IP address or LU name
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 1 of 12)

```
================================================================================
The DATETIME record has the date mm/dd/yyyy and the time hh:mm:ss.tu.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: DATETIME
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER       10               Date mm/dd/yyyy
      21     (15) CHARACTER        1               Column separator
      22     (16) CHARACTER       11               Time hh:mm:ss.tu

================================================================================
The COMMENT record contains asterisks to make the softcopy report more readable.
Comment records are not printed in the hardcopy report.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: COMMENT
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               One line of *****

 ================================================================================
The TITLE record contains text that will be printed as a section heading.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: TITLE
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               One line of text

================================================================================
The STMDUMP record contains 16 bytes of hex data returned in the IPDS STM response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: STMDUMP
      10      (A) CHARACTER        1               Column Separator
      11      (B) STRUCTURE        8               4 bytes of hex data
      19     (13) CHARACTER        1               Column Separator
      20     (14) STRUCTURE        8               4 bytes of hex data
      28     (1C) CHARACTER        1               Column Separator
      29     (1D) STRUCTURE        8               4 bytes of hex data
      37     (25) CHARACTER        1               Column Separator
      38     (26) STRUCTURE        8               4 bytes of hex data

================================================================================
The STMBEGIN record contains the first byte of the IPDS STM response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: STMBEGIN
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        5               X'FF'
      16     (10) CHARACTER        3               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 2 of 12)

```
================================================================================
The STMTYPE record contains the Device type of the IPDS STM response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: STMTYPE
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        7               Device type X'nnnn'
      18     (12) CHARACTER        1               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)

================================================================================
The STMTCONT record contains the continuation of English description of STMTYPE.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: STMTCONT
      10      (A) CHARACTER        9               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)

================================================================================
The STMMODEL record contains the model number in the IPDS STM response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: STMMODEL
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        5               Model number X'nn'
      16     (10) CHARACTER        3               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)

================================================================================
The STMMCONT record contains the continuation of the description for STMMODEL.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: STMMCONT
      10      (A) CHARACTER        9               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)

================================================================================
The STMRSRV record contains 2 bytes of hex data labeled Reserved in the IPDS STM
response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: STMRSRV
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        7               Hex data X'nnnn'
      18     (12) CHARACTER        1               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 3 of 12)

```
================================================================================
The STMTITLE record contains blanks or text for an STM vector title.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: STMTITLE
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER      501                Blanks or vector title
                                                    delimited by quotes("s)

================================================================================
The STMTLCONT record contains the continuation of the description for STMTITLE.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: STMTLCONT
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER      501                Continuation of vector title
                                                    delimited by quotes("s)

================================================================================
The STMVCTR record contains the hex data for one STM vector.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: STMVCTR
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER      501                Hex vector data

================================================================================
The STMVCONT record contains the continuation of the hex data for STMVCTR.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: STMVCONT
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER      501                Hex vector data

================================================================================
The STMCONT record contains the continuation of the description for all STM records
that don't have a defined continuation record.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: STMCONT
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER      501                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMLENGTH record contains the length of the STM vector in hex and in decimal.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: STMLENGTH
      10      (A) CHARACTER        1                Column Separator
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 4 of 12)

```
      11      (B) CHARACTER        7                Length in hex
      18     (12) CHARACTER        1                Column Separator
      19     (13) CHARACTER        6                Length in decimal
      25     (19) CHARACTER        1                Column Separator
      26     (1A) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMLENCONT record contains the continuation of the description of STMLENGTH.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: STMLENCONT
      10      (A) CHARACTER       16                Column Separator
      26     (1A) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMSUBSET record contains the 2-byte subset ID in the IPDS STM response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: STMSUBSET
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER        7                Subset ID X'nnnn'
      18     (12) CHARACTER        1                Column Separator
      19     (13) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMSUBCONT record contains the continuation of the description for STMSUBSET.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: STMSUBCONT
      10      (A) CHARACTER        9                Column Separator
      19     (13) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMCMDSET record contains the 2-byte command set ID in the IPDS STM response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: STMCMDSET
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER        7                Command Set ID X'nnnn'
      18     (12) CHARACTER        1                Column Separator
      19     (13) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMCMDCONT record contains the continuation of the description for STMCMDSET.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: STMCMDCONT
      10      (A) CHARACTER        9                Column Separator
      19     (13) CHARACTER        *                The English description
                                                    delimited by quotes ("s)
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 5 of 12)

```
================================================================================
The STMLEVEL record contains the 2-byte level ID in the IPDS STM response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ================================
       0      (0) CHARACTER       10                Layout ID Value: STMLEVEL
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER        7                Level ID X'nnnn'
      18     (12) CHARACTER        1                Column Separator
      19     (13) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMLEVCONT record contains the continuation of the description for STMLEVEL.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ================================
       0      (0) CHARACTER       10                Layout ID Value: STMLEVCONT
      10      (A) CHARACTER        9                Column Separator
      19     (13) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMPPAIR record contains the 2-byte property pair ID in the IPDS STM response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ================================
       0      (0) CHARACTER       10                Layout ID Value: STMPPAIR
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER        7                Property Pair X'nnnn'
      18     (12) CHARACTER        1                Column Separator
      19     (13) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMPCONT record contains the continuation of the description for STMPPAIR.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ================================
       0      (0) CHARACTER       10                Layout ID Value: STMPCONT
      10      (A) CHARACTER        9                Column Separator
      19     (13) CHARACTER        *                The English description
                                                    delimited by quotes ("s)

================================================================================
The STMEND record indicates the end of the STM data.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ================================
       0      (0) CHARACTER       10                Layout ID Value: STMEND
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER      501                Blanks
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 6 of 12)

```
================================================================================
The OPCDUMP record contains 16 bytes of hex data returned in the IPDS XOH OPC.
response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCDUMP
      10      (A) CHARACTER        1               Column Separator
      11      (B) STRUCTURE        8               4 bytes of hex data
      19     (13) CHARACTER        1               Column Separator
      20     (14) STRUCTURE        8               4 bytes of hex data
      28     (1C) CHARACTER        1               Column Separator
      29     (1D) STRUCTURE        8               4 bytes of hex data
      37     (25) CHARACTER        1               Column Separator
      38     (26) STRUCTURE        8               4 bytes of hex data

================================================================================
The OPCTITLE record contains blanks or text for an XOH OPC self-defining field
(SDF).

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCTITLE
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Blanks or SDF title

================================================================================
The OPCTCONT record contains the continuation of the description for OPCTITLE.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCTCONT
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Continuation of SDF title

================================================================================
The OPCCONT record contains the continuation of the description for other XOH OPC
records that don't have a specific continuation record defined.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCCONT
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Continuation of text

================================================================================
The OPCSDF record contains the hex data for one XOH OPC self-defining field (SDF).

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCSDF
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Hex SDF data
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 7 of 12)

```
================================================================================
The OPCSDFCONT record contains the continuation of the hex data for OPCSDF.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCSDFCONT
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Hex SDF data

================================================================================
The OPCLENGTH record contains the length of the XOH OPC SDF in hex and in decimal.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCLENGTH
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        7               Length in hex
      18     (12) CHARACTER        1               Column Separator
      19     (13) CHARACTER        6               Length in decimal
      25     (19) CHARACTER        1               Column Separator
      26     (1A) CHARACTER        *               The English description
                                                   delimited by quotes ("s)

================================================================================
The OPCLENCONT record contains the continuation of the description for OPCLENGTH.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCLENCONT
      10      (A) CHARACTER       16               Column Separator
      26     (1A) CHARACTER        *               The English description
                                                   delimited by quotes ("s)

================================================================================
The OPCSDFID record contains the 2-byte self-defining field ID in the XOH OPC
response.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCSDFID
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        7               SDF ID X'nnnn'
      18     (12) CHARACTER        1               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)

================================================================================
The OPCSIDCONT record contains the continuation of the description for OPCSDFID.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCSIDCONT
      10      (A) CHARACTER        9               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 8 of 12)

```
================================================================================
The OPCCODE record contains 1 or 2 bytes of a hex code value within an XOH OPC SDF.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCCODE
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        7               Hex code X'nn' or X'nnnn'
      18     (12) CHARACTER        1               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)


================================================================================
The OPCCDCONT record contains the continuation of the description for OPCCODE.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCCDCONT
      10      (A) CHARACTER        9               Column Separator
      19     (13) CHARACTER        *               The English description
                                                   delimited by quotes ("s)


================================================================================
The OPCDATA record contains a variable number of hex bytes for XOH OPC SDF entries
where the printer returns printer defined information.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCDATA
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Hex code X'nn...' followed by
                                                   the English description
                                                   delimited by quotes ("s)


================================================================================
The OPCDCONT record contains the continuation of OPCDATA.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCDCONT
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Continuation of whatever was
                                                   still to be written for OPCDATA
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 9 of 12)

```
================================================================================
The OPCCHAR record contains a variable length printable text string followed by the
English description of that entry.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCCHAR
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Text string without quotes
                                                   followed by
                                                   the English description
                                                   delimited by quotes ("s)


================================================================================
The OPCCCONT record contains the continuation of OPCCHAR.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCCCONT
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER      501               Continuation of whatever was
                                                   still to be written for OPCCHAR


================================================================================
The OPCVAL record contains 1 or 2 bytes of hex data followed by
the decimal equivalent of the entry and an English description of the value.
in an XOH OPC SDF.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCVAL
      10      (A) CHARACTER        1               Column Separator
      11      (B) CHARACTER        7               Hex data X'nn' or X'nnnn'
      18     (12) CHARACTER        1               Column Separator
      19     (13) CHARACTER        6               Value in decimal
      25     (19) CHARACTER        1               Column Separator
      26     (1A) CHARACTER        *               The English description
                                                   delimited by quotes ("s)


================================================================================
The OPCVALCONT record contains the continuation of the description of OPCVAL.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ==============================
       0      (0) CHARACTER       10               Layout ID Value: OPCVALCONT
      10      (A) CHARACTER       16               Column Separator
      26     (1A) CHARACTER        *               The English description
                                                   delimited by quotes ("s)
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 10 of 12)

```
================================================================================
The OPCVAL4 record contains 4 bytes of hex data followed by
the decimal equivalent of the entry and an English description of the value
in an XOH OPC SDF.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: OPCVAL4
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER       11                Hex data X'nnnnnnnn'
      22     (16) CHARACTER        1                Column Separator
      23     (17) CHARACTER       13                Value in decimal
      36     (24) CHARACTER        1                Column Separator
      37     (25) CHARACTER        *                The English description
                                                    delimited by quotes ("s)


================================================================================
The OPCV4CONT record contains the continuation of the description for OPCVAL4.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: OPCV4CONT
      10      (A) CHARACTER       27                Column Separator
      37     (25) CHARACTER        *                The English description
                                                    delimited by quotes ("s)


================================================================================
The OPCBITS record has 1 or 2 bytes of hex data followed by the bit string.
equivalent and the English description.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: OPCBITS
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER        7                Hex data X'nn' or X'nnnn'
      18     (12) CHARACTER        1                Column separator
      19     (13) CHARACTER       19                Bit string B'nnn...n'
      38     (26) CHARACTER        1                Column separator
      39     (27) CHARACTER        *                The English description
                                                    delimited by quotes ("s)


================================================================================
The OPCBCONT record contains the continuation of the description for OPCBITS
equivalent and the English description.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========               ================================
       0      (0) CHARACTER       10                Layout ID Value: OPCBCONT
      10      (A) CHARACTER       29                Column Separator
      39     (27) CHARACTER        *                The English description
                                                    delimited by quotes ("s)
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 11 of 12)

```
================================================================================
The OPCBIT record contains a single bit entry value followed by its description.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: OPCBIT
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER        9                Dotted bit string (1... ....)
      20     (14) CHARACTER        1                Column separator
      21     (15) CHARACTER        *                The English description
                                                    delimited by quotes ("s)


================================================================================
The OPCBITCONT record contains the continuation of the description for OPCBIT.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: OPCBITCONT
      10      (A) CHARACTER       11                Column Separator
      21     (15) CHARACTER        *                The English description
                                                    delimited by quotes ("s)


================================================================================
The OPCCODE16 record has 16 bytes of hex data followed by its English description.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: OPCCODE16
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER       35                Hex data X'nn...n'
      46     (2E) CHARACTER        1                Column separator
      47     (2F) CHARACTER        *                The English description
                                                    delimited by quotes ("s)


================================================================================
The OPCC16CONT record has the continuation of the description for OPCCODE16.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: OPCC16CONT
      10      (A) CHARACTER       37                Column Separator
      47     (2F) CHARACTER        *                The English description
                                                    delimited by quotes ("s)


================================================================================
The OPCEND record indicates the end of the XOH OPC data.

  OFFSET   OFFSET
 DECIMAL     HEX  TYPE        LENGTH                DESCRIPTION
======== ======== ========= ========                ==============================
       0      (0) CHARACTER       10                Layout ID Value: OPCEND
      10      (A) CHARACTER        1                Column Separator
      11      (B) CHARACTER      501                Blanks
```

Figure 62. Record formats for the Softcopy Printer Information Report (Part 12 of 12)

Appendix E. Accessibility

Accessible publications for this product are offered through the z/OS Information Center, which is available at http://www.ibm.com/systems/z/os/zos/bkserv/. If you experience any accessibility problems with the z/OS Information Center, send an email to mhvrcfs@us.ibm.com or write to the following address:

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USA

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, use software products successfully. The major accessibility features in z/OS let users:

- Use assistive technologies such as screen readers and screen magnifier software.
- Operate specific or equivalent features by using only the keyboard.
- Customize display attributes such as color, contrast, and font size.

Using assistive technologies

Assistive technology products, such as screen readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using such products to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces by using TSO/E or ISPF. For more information, see *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Vol I*. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

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These cross-references are used in this glossary:

- **See.** Refers to preferred synonyms or to defined terms for acronyms and abbreviations.
- **See also.** Refers to related terms that have similar, but not synonymous, meanings, or to contrasted terms that have opposite or substantively different meanings.

A

abend. See abnormal end of task.

abnormal end of task (abend). The termination of a task, job, or subsystem because of an error condition that recovery facilities cannot resolve during processing

access method. A technique for moving data between main storage and input/output devices.

ACK. See positive acknowledgment reply.

acknowledgment character (ACK character). A transmission control character that is sent as an affirmative response to a data transmission.

addressable point. For page printers, any defined position or picture element in a presentation surface or physical medium that can be referenced. See also picture element and print position.

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

AFP. See Advanced Function Presentation.

AFP Statistics (AFPSTATS) report. Contains summary data about the resources used to print a document. The AFPSTATS report is used to indicate in which libraries PSF found a resource, diagnose some resource selection problems, obtain statistical data about how a print file is printed, and diagnose some print file printing performance problems.

AFPSTATS report. See AFP Statistics report.

AFPSTATS repository. A data set where AFP Statistics (AFPSTATS) reports are written.

all-points addressability (APA). The capability to address, reference, and position text, overlays, and images at any defined position or picture element on the printable area of the paper. This capability depends on the ability of the hardware to address and to display each picture element.

all-points addressable (APA). Pertaining to addressing, referencing, and positioning text, overlays, and images at any defined position or picture element on the printable area of the paper.

American Standard Code for Information Interchange (ASCII). A standard code used for information exchange among data processing systems, data communication systems, and associated equipment. ASCII uses a coded character set consisting of 7-bit coded characters. See also Extended Binary Coded Decimal Interchange Code.

APA. See all-points addressability or all-points addressable.

APAR. See authorized program analysis report.

application program. A program used to communicate with stations in a network, enabling users to perform application-oriented activities.

ASCII. See American Standard Code for Information Interchange.

authorized program analysis report (APAR). A request for correction of a defect in a supported release of an IBM-supplied program.

auxiliary data set. In AFP printing, a data set that contains job header, data set header, job trailer, or message data. See also print data set.

B

baseline. A conceptual line with respect to which successive characters are aligned.

bin. An enclosure on a printer that contains source or destination media, including paper, foils, labels, card stock, or microfilm. See also cassette and stacker.

bounded-box font. A font in bounded-box format. See also unbounded-box font.

C

carriage control character. A character that is used to specify a write, space, or skip operation. See also control character.

cassette. In cut-sheet printers, a removable container for a supply of paper. See also bin.

channel-attached. Pertaining to the attachment of devices directly by input/output channels to a host processor. See also SNA-attached and TCP/IP-attached.

character. (1) Any symbol that can be entered on a keyboard, printed, or displayed. For example, letters, numbers, and punctuation marks are all characters. (2) In a computer system, a member of a set of elements that is used for the representation, organization, or control of data. See also control character, glyph, and graphic character.

character box. The area that completely contains the character pattern.

character data. Data in the form of letters and special characters, such as punctuation marks. See also numeric data.

character identifier. The standard identifier for a character, regardless of its style. For example, all uppercase A's have the same character identifier. See also graphic character identifier.

character increment. The distance from the character reference point to the character escapement point. Character increment is the sum of the A-space, B-space, and C-space.

character rotation. The alignment of a character with respect to its character baseline, measured in degrees in a clockwise direction. See also rotation and orientation.

character set. A defined set of characters that can be recognized by a configured hardware or software system. A character set can be defined by alphabet, language, script, or any combination of these items. See also font character set.

checkpoint. A place in a program at which a check is made, or at which a recording of data is made to allow the program to be restarted in case of interruption.

client. A software program or computer that requests access to data, services, programs, and resources from a server. See also server and host.

coded font. A font file that associates a code page and a font character set. For double-byte fonts, a coded font associates multiple pairs of code pages and font character sets.

coded font local identifier. A 1-byte identifier that the Map Coded Font structured field assigns to each coded font it selects. The identifier is then specified in the text-control sequence that precedes the string of text to be printed with the particular font. See also local identifier.

code page. A particular assignment of code points to graphic characters. Within a given code page, a code point can only represent one character. A code page also identifies how undefined code points are handled. See also coded font.

code point. A unique bit pattern that represents a character in a code page.

command. A request from a terminal or automated operator for the performance of an operation or service, or a request in a batch-processing job or print file for the operation or execution of a particular program.

communication. See data communication.

compatibility mode. A mode of operation in which a device can simulate the function of another device or model. The device functions like a different device of the same type, ignoring some or all of the additional features that the device might possess. Compatibility mode permits a migration between devices with minimal impact on programs that have device dependencies.

completion code. An indicator that reflects the status of a task set at the time of its completion.

composed text. Text that has been formatted and that contains text-control information to direct the presentation of the text.

composed-text page. A page of data composed entirely of AFP structured fields. This type of page is typically the output of a text formatting program, such as DCF, or transformed from a page of line data or XML data by ACIF or AFP Download Plus.

concatenated data set. A group of logically connected data sets that are treated as one data set for the duration of a job step. See also data set, partitioned data set, and library.

conditional processing. A page definition function that allows input data records to partially control their own formatting.

console. A display station from which an operator can control and observe the system operation.

consolidated software inventory (CSI). A key-sequenced VSAM data set, used by SMP/E and logically divided into zones.

continuous forms. A series of connected forms that feed continuously through a printing device. The connection between the forms is perforated so that the

user can tear them apart. Before printing, the forms are folded in a stack, with the folds along the perforations. See also cut-sheet paper.

control character. (1) A character that represents a command that is sent to an output device, such as a printer or monitor. Examples are line-feed, shift-in, shift-out, carriage return, font change, and end of transmission. See also carriage control character. (2) A character whose occurrence in a particular context initiates, modifies, or stops a control function.

copy group. An internal object in a form definition or a print data set that controls such items as modifications to a form, page placement, and overlays.

CSE. See cut-sheet emulation.

CSI. See consolidated software inventory.

current print position. The picture element that defines the character reference point or the upper-left corner of an image.

cut-sheet emulation (CSE). The ability of a continuous-forms printer to provide output similar to output from a cut-sheet printer.

cut-sheet paper. Paper that is cut into uniform-size sheets before it is loaded into the printer. See also continuous forms.

D

DASD. See direct access storage device.

data communication. Transfer of data among functional units by means of data transmission protocols.

data control block (DCB). A control block used by access method routines in storing and retrieving data.

data link. The physical connection (communications lines, modems, controller, work stations, other communications equipment), and the rules (protocols) for sending and receiving data between two or more locations in a data network. See also telecommunication line.

data map. An internal object in a page definition that specifies fonts, page segments, fixed text, page size, and the placement and orientation of text.

data object resource. An object container resource or IOCA image resource that is either printer resident or downloaded. Data object resources can be:

- Used to prepare for the presentation of a data object, such as with a resident color profile resource object
- Included in a page or overlay through the Include Object (IOB) structured field; for example, PDF single-page and multiple-page objects, Encapsulated PostScript (EPS) objects, and IOCA images
- Called from within a data object; for example, PDF resource objects

data set. The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access. See also file, concatenated data set, partitioned data set, and sequential data set.

data set header. A page in printed output that separates multiple data sets or multiple copies of a data set within a print job. See also job header.

DCB. See data control block.

DCF. See Document Composition Facility.

default. Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.

deferred-printing mode. A printing mode that spools output through JES to a data set instead of printing it immediately. Output is controlled by using JCL statements. See also direct-printing mode.

device manager. The subcomponent of PSF that manages the interface to the printer.

direct access storage device (DASD). A device that allows storage to be directly accessed, such as a disk drive.

Direct Printer Services Subsystem (DPSS). The PSF subcomponent that acts as the interface between PSF and an application program when the JES is not spooling jobs for a printer. DPSS attaches PSF as a subtask for use in the direct-printing mode.

direct-printing mode. A printing mode that gives PSF exclusive use of a channel-attached printer. Output is printed immediately and is not spooled through JES. See also deferred-printing mode.

disabled mechanism. A function of a printer that is temporarily out of operation or is not supported. In such a case, the device manager, such as PSF, might allow jobs to print with alternative options. See also enabled.

document. (1) A machine-readable collection of one or more objects that represent a composition, a work, or a collection of data. (2) Data that has already been composed into pages and that contains a Begin Document and an End Document structured field.

Document Composition Facility (DCF). An IBM licensed program used to format input to a printer.

double-byte coded font. A font in which the characters are defined by 2 bytes. The first byte defines

the coded font section; the second byte defines the code point in the code page specified for that section. See also single-byte coded font.

double-dot image. An image that is enlarged by doubling the pel pattern horizontally and vertically.

download. To transfer data from a computer to a connected device, such as a workstation or a printer. Typically, users download from a large computer to a diskette or fixed disk on a smaller computer or from a system unit to an adapter.

DPSS. See Direct Printer Services Subsystem.

duplex. Pertaining to printing on both sides of a sheet of paper. See also normal duplex, simplex, and tumble duplex.

E

EBCDIC. See Extended Binary Coded Decimal Interchange Code.

EID. See event identifier.

enabled. (1) Pertaining to a state of the processing unit that allows the occurrence of certain types of interruptions. (2) A condition of the printer (physically selected) in which the printer is available to the host processor for typical work. The printer is online when in an enabled condition. See also disabled mechanism.

Enterprise Systems Architecture (ESA). A hardware architecture that reduces the effort required for managing data sets and extends addressability for system, subsystem, and application functions.

ESA. See Enterprise Systems Architecture.

ESTAE. See extended specify task abnormal exit.

event identifier (EID). A 2-byte hexadecimal number that identifies the event producing a trace record.

EWS. Early warning system.

exception. A condition or event that cannot be handled by a normal process.

Extended Binary Coded Decimal Interchange Code (EBCDIC). A coded character set of 256 eight-bit characters developed for the representation of textual data. EBCDIC is not compatible with ASCII character coding. See also American Standard Code for Information Interchange.

extended specify task abnormal exit (ESTAE). A z/OS macro that provides recovery capability and gives control to the user-specified exit routine for processing, diagnosing an abend, or specifying a retry address.

F

FGID. See font typeface global identifier.

file. (1) A collection of related data that is stored and retrieved by an assigned name. A file can include information that starts a program (program-file object), contains text or graphics (data-file object), or processes a series of commands (batch file). (2) See also data set, partitioned data set, sequential data set, and library.

fixed metrics. Measurement information in specific units such as pels, inches, or centimeters for individual or collections of graphic characters. See also font metrics and relative metrics.

font. (1) A family or assortment of characters of a given size and style, for example, 9-point Bodoni modern. A font has a unique name and might have a registry number. (2) A particular type style (for example, Bodoni or Times Roman) that contains definitions of character sets, marker sets, and pattern sets. See also coded font and double-byte coded font.

font character set. (1) Part of an AFP font that contains the raster patterns, identifiers, and descriptions of characters. See also character set. (2) A Font Object Content Architecture (FOCA) resource containing descriptive information, font metrics, and the digital representation of character shapes for a specified graphic character set.

font metrics. Measurement information that defines individual character values, such as height, width, and space, as well as overall font values, such as averages and maximums. Font metrics can be expressed in specified fixed units, such as pels, or in relative units that are independent of both the resolution and size of the font. See also fixed metrics and relative metrics.

font typeface global identifier (FGID). A unique font identifier that can be expressed as either a 2-byte binary value or a 5-digit decimal value. The FGID is used to identify a type style and the following characteristics: posture, weight, and width.

form. (1) A physical piece of paper or other medium on which data is printed. See also medium, page, and sheet. (2) A display screen, printed document, or file with defined spaces for information to be inserted.

format. The shape, size, printing requirements, and general makeup of a printed document or presentation display.

form definition. An AFP resource object used by PSF that defines the characteristics of the form or printed media, including: overlays to be used, duplex printing, text suppression, the position of composed-text data on the form, and the number and modifications of a page.

forms flash. In AFP support on the 3800 Printing Subsystem, a means of printing an overlay by using a negative plate projected on a form.

FSA. See functional subsystem application.

FSI. See functional subsystem interface.

FSS. See functional subsystem.

functional subsystem (FSS). An extension of JES that runs in an address space separate from the JES address space. An FSS provides support for an auxiliary function to JES processing, such as a peripheral device or other component.

functional subsystem application (FSA). (1) An area within the functional subsystem (FSS) that drives and manages a single printer. FSAs are identified with JES printer definitions. (2) An application that uses the support facilities of the functional subsystem (FSS) to communicate with JES.

functional subsystem interface (FSI). A set of services that allows communication between the JES address space or DPSS and the PSF functional subsystem.

G

generalized trace facility (GTF). A z/OS service program that records significant system events such as I/O interrupts, SVC interrupts, program interrupts, or external interrupts.

glyph. (1) A graphic symbol whose appearance conveys information, for example, the vertical and horizontal arrows on cursor keys that indicate the directions in which they control cursor movement. (2) An image, typically of a character, in a font. See also character and graphic character.

graphical user interface (GUI). A type of computer interface that presents a visual metaphor of a real-world scene, often of a desktop, by combining high-resolution graphics, pointing devices, menu bars and other menus, overlapping windows, icons and the object-action relationship. See also programming interface for customers.

graphic character. (1) A visual representation of a character, other than a control character, that is typically produced by writing, printing, or displaying. See also glyph. (2) A member of a set of symbols that represent data. Graphic characters can be letters, digits, punctuation marks, or other symbols.

graphic character identifier. The unique name for a graphic character in a font or in a graphic character set. See also character identifier.

GTF. See generalized trace facility.

GUI. See graphical user interface.

H

hexadecimal. Pertaining to a numbering system that has a base of 16.

host. (1) A computer that is connected to a network and provides an access point to that network. The host can be a client, a server, or both a client and server simultaneously. See also client and server. (2) In TCP/IP, any system that has at least one Internet address associated with it.

host system. See host.

I

ID. See identifier.

identifier (ID). A sequence of bits or characters that identifies a user, program, device, or system to another user, program, device, or system.

image. (1) A pattern of toned and untoned pels that form a picture. See also impression. (2) An electronic representation of an original document or picture produced by a scanning device or created from software.

image block. A structure that contains a raster pattern and the instructions for placing the pattern on the page.

image data. (1) A pattern of bits with 0 and 1 values that define the pels in an image. A 1-bit is a toned pel. (2) Digital data derived from electrical signals that represent a visual image. (3) Rectangular arrays of raster information that define an image.

impression. The transfer of an image to a sheet of paper. Multiple impressions can be printed on each side of a sheet. Printer speed is often measured in impressions per minute (ipm).

Infoprint Server. An element of z/OS that supports printing on local printers and remote printers in an Internet Protocol or SNA network. With Infoprint Server, users can submit print requests from remote workstations in an Internet Protocol network, from z/OS UNIX System Services applications, from batch applications, from VTAM applications (such as CICS® or IMS™), and from SAP R/3.

initialize. (1) In programming languages, to set the starting value of a data object. (2) To set the addresses, switches, or the contents of storage to zero, or to the starting value set by the manufacturer. (3) To prepare a system, device, or program for operation; for example, to initialize a diskette. See also initial program load.

initial program load (IPL). (1) The process that loads the system programs from the system auxiliary storage, checks the system hardware, and prepares the system

for user operations. (2) The process of loading the operating system and other basic software into main storage.

inline. Pertaining to spooled input data that is read into a job by a reader. See also inline resource.

inline direction. The direction in which successive characters are added to a line of text.

inline resource. A resource contained in a print file or a print data set.

input/output (I/O). Pertaining to a device, process, channel, or communication path involved in data input, data output, or both.

installation exit. The means specifically described in an IBM software product's documentation by which an IBM software product can be modified by a customer's system programmers to change or extend the functions of the IBM software product. Such modifications consist of exit routines written to replace one or more existing modules of an IBM software product, or to add one or more modules or subroutines to an IBM software product.

Intelligent Printer Data Stream (IPDS). An all-points-addressable data stream that lets users position text, images, graphics, and bar codes at any defined point on a printed page. IPDS is the strategic AFP printer data stream generated by PSF.

interface. A shared boundary between independent systems. An interface can be a hardware component used to link two devices, a convention that supports communication between software systems, or a method for a user to communicate with the operating system, such as a keyboard.

internal object. A structured field that can be included as part of a resource or a print job (data set or file), but that cannot be accessed separately.

Internet Protocol (IP). A protocol that routes data through a network or interconnected networks. This protocol acts as an intermediary between the higher protocol layers and the physical network. See also Transmission Control Protocol and Transmission Control Protocol/Internet Protocol.

intervention-required condition. An error that causes printing to stop until an operator performs a required action.

I/O. See input/output.

I/O error manager. The PSF subcomponent that analyzes I/O errors, determines the recovery action, and directs I/O error recovery and cleanup.

IP. See Internet Protocol.

IPDS. See Intelligent Printer Data Stream.

IPL. See initial program load.

J

JCL. See job control language.

JES. See Job Entry Subsystem.

JES2. An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for processing, 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. See also Job Entry Subsystem and JES3.

JES3. An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for processing, 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 by using a common job queue. See also Job Entry Subsystem and JES2.

job control language (JCL). A command language that identifies a job to an operating system and describes the job's requirements.

Job Entry Subsystem (JES). An IBM licensed program that receives jobs into the system and processes all output data that is produced by jobs. See also JES2 and JES3.

job header. A page in printed output that indicates the beginning of a user job. A user job can contain one or more data sets, or one or more copies of a print job. See also data set header.

job trailer. A page in the printed output that indicates the end of a user job.

L

LASI. See library access system interface.

library. (1) A system object that serves as a directory to other objects. A library groups related objects, and allows the user to find objects by name. (2) A data file that contains copies of a number of individual files and control information that allows them to be accessed individually. (3) A partitioned data set or a series of concatenated partitioned data sets.

library access system interface (LASI). The PSF subcomponent that gets resources from the libraries and stores and obtains records in a message data set.

library member. A named collection of records or statements in a library. See also resource object.

line data. Data prepared for printing on a line printer without any data placement or presentation information. Line data can contain carriage-control characters and table-reference characters (TRC) for spacing and font selections. See also record format line data and traditional line data.

line descriptor. Specifications that describe how traditional line data records are formatted into individual print lines. Line descriptors are interpreted by PSF when formatting printed output.

local identifier. A 1-byte identifier assigned to parts of the data stream to facilitate PSF processing. For example, the Map Coded Font structured field assigns each coded font a local identifier. When a coded font is required for processing, this identifier is specified in the Set Coded Font Local text control. Other local identifiers are assigned to suppressions and overlays. See also coded font local identifier.

logical page. The defined presentation space on the physical form. All the text and images in the print data must fit within the boundaries of the logical page, which has specified characteristics, such as size, shape, orientation, and offset. See also form and physical page.

logical page origin. The point on the logical page from which positions of images, graphics, page overlays, and text with 0-degree inline direction are measured.

M

macro. An instruction that causes the execution of a predefined sequence of instructions.

magnetic ink character recognition (MICR). The identification of characters through the use of magnetic ink.

media origin. The reference point from which the logical page origin is positioned by the medium map. This point is represented by Xm=0, Ym=0 in the Xm, Ym coordinate system. The media origin is defined relative to the upper-left corner of the form. See also logical page origin. See also logical page origin.

medium. (1) The material on which computer information is stored. Examples of media are diskettes, CDs, DVDs, and tape. (2) The physical material, such as paper, on which data is printed. See also form, page, and sheet.

medium map. See copy group.

medium overlay. An electronic overlay that is called by the medium map of a form definition for printing at a fixed position on the form. See also page overlay.

member name. The name under which a file is stored in a library. For example, X1BITR is the member name of a font in the font library.

message data set. (1) In PSF, a virtual data set built by the library access system interface (LASI) subcomponent in memory to store error messages for printing at the end of the document. (2) A data set on disk storage that contains queues of messages awaiting transmission to particular terminal operators or to the host system.

metrics. See font metrics.

MICR. See magnetic ink character recognition.

migration. The movement of data when software is upgraded or the data is transferred to a different hardware server or model.

Mixed Object Document Content Architecture (MO:DCA). An architected, device-independent data stream for interchanging documents.

Mixed Object Document Content Architecture for Presentation (MO:DCA-P). The subset of MO:DCA that defines presentation documents. PSF supports MO:DCA Presentation Interchange Set data streams.

MO:DCA. See Mixed Object Document Content Architecture.

MO:DCA data. Print data that has been composed into pages. Text-formatting programs (such as DCF) can produce composed text data consisting entirely of structured fields. ACIF or AFP Download Plus can transform line data or XML data to MO:DCA data.

MO:DCA-P. See Mixed Object Document Content Architecture for Presentation.

MO:DCA IS/1. See MO:DCA Presentation Interchange Set 1.

MO:DCA IS/3. See MO:DCA Presentation Interchange Set 3.

MO:DCA Presentation Interchange Set 1 (MO:DCA IS/1). A subset of MO:DCA that defines an interchange format for presentation documents.

MO:DCA Presentation Interchange Set 3 (MO:DCA IS/3). A subset of MO:DCA that defines an interchange format for presentation documents. The MO:DCA IS/3 data stream includes structured fields that are not found in MO:DCA IS/1.

Multiple Virtual Storage (MVS). An IBM operating system that accesses multiple address spaces in virtual storage.

MVS. See Multiple Virtual Storage.

N

NACK. See negative acknowledgment reply.

negative acknowledgment reply (NACK). A reply from a printer to a host indicating that an exception has occurred. See also positive acknowledgment reply

normal duplex. Pertaining to printing on both sides of the paper such that the top of one side is at the same end as the top of the other side. Normal duplex printing is used for forms that are bound on the long edge of the paper, regardless of whether the printing is portrait or landscape. See also duplex and tumble duplex.

notify subtask (NST). (1) A PSF subcomponent that returns processed data sets to JES or to the DPSS and performs checkpoint processing on data sets as they are printed. (2) An external trace that contains information pertaining to the releasing and checkpointing of data sets by PSF.

NST. See notify subtask.

null name. A token name with X'FFFF' in the first 2 bytes. A null name in an end structured field; for example, end page matches any name in a begin structured field.

null value. A parameter position for which no value is specified.

numeric data. Data represented by numerals. See also character data.

O

object. In AFP architecture, a collection of structured fields, bounded by a begin-object function and an end-object function. The object can contain other structured fields containing data elements of a particular type. Examples of objects are text, fonts, graphics, images, and bar codes.

object container. A MO:DCA structure that carries object data, which might or might not be defined by a presentation architecture.

offset stacking. A function that allows the printed output pages to be offset for easy separation of the print jobs.

OGL. See Overlay Generation Language.

option. A specification in a statement that can influence the running of the statement.

orientation. In printing, the number of degrees an object is rotated relative to a reference; for example, the orientation of an overlay relative to the logical page origin, or the orientation of printing on a page relative to the page coordinates. Orientation typically applies to blocks of information, whereas character rotation applies to individual characters. See also character rotation.

origin. (1) A position from which the placement and orientation of an element is specified. (2) The point in a coordinate system where the axes intersect. Examples of origins are the addressable position in an X m ,Ym coordinate system where both coordinate values are zero and the character reference point in a character coordinate system.

outline font. A font whose graphic character shapes are defined by mathematical equations rather than by raster patterns. See also raster font.

overlay. (1) A resource object that contains predefined presentation data, such as text, image, graphics, and bar code data, that can be merged with variable data on a page or form while printing. See also page overlay and medium overlay. (2) The final representation of a collection of predefined presentation data on a physical medium.

Overlay Generation Language (OGL). An IBM licensed program used for designing objects (such as lines, boxes, shadings, and irregular shapes) for electronic overlays.

P

page. (1) A collection of data that can be printed on one side of a sheet of paper or a form. (2) A data stream object delimited by a Begin Page structured field and an End Page structured field. A page can contain presentation data such as text, image, graphics, and bar code data. See also logical page and physical page.

page definition. An AFP resource object used by PSF that defines the rules for transforming line data and XML data into MO:DCA data and text controls, such as width of margins and text orientation.

page format. See data map.

page origin. See logical page origin.

page overlay. An electronic overlay that can be called for printing and positioned at any point on the page by an Invoke Page Overlay structured field in the print data. See also medium overlay.

Page Printer Communication Component (PPCC). The access method that provides the SNA communication interface between printers and PSF.

Page Printer Formatting Aid (PPFA). An IBM licensed program with which to create and store form definitions and page definitions, which are resource

objects used for print-job management. These stored objects are used to format printed output.

page segment. An AFP resource object containing text, image, graphics, or bar code data that can be positioned on any addressable point on a page or an electronic overlay.

parameter. A value or reference passed to a function, command, or program that serves as input or controls actions. The value is supplied by a user or by another program or process.

partition. In basic N_UP printing, the division of the medium presentation space into a specified number of equal-sized areas in a manner determined by the current physical medium.

partitioned data set (PDS). A data set in direct-access storage that is divided into partitions, called members, each of which can contain a program, part of a program, or data. See also sequential data set.

PDS. See partitioned data set.

pel. See picture element.

pending page queue (PPQ). A list of pages that has been processed by PSF but has not been released from JES or stacked by the printer.

physical medium. A physical entity on which information is presented; for example, a sheet of paper, a roll of paper, microfilm, an envelope, label, or display screen.

physical page. A single surface (front or back) of a form. See also form, logical page, and page.

picture element (pel, pixel). (1) An element of a raster pattern about which a toned area on the photoconductor might appear. When used with a number, "pel" indicates resolution. Examples include 240-pel and 300-pel. (2) The smallest printable or displayable unit that can be displayed. A common measurement of device resolution is picture elements per inch. Typical monitors display between 72 and 96 pixels per inch. Characters and graphics are created by turning pixels on or off.

pixel. See picture element.

point size. The height of a font in points.

positive acknowledgment reply (ACK). A reply from a printer to a host in which no exception condition is reported. See also negative acknowledgment reply.

PPCC. See Page Printer Communication Component.

PPFA. See Page Printer Formatting Aid.

PPQ. See pending page queue.

presentation text. See composed text.

printable area. The area on a sheet of paper where print can be placed.

print data set. A data set created by an application program that contains the actual information to be printed and, optionally, some of the data that controls the format of the printing. The types of print data sets are composed text, line format, XML data, and mixed format. See also auxiliary data set and print file.

Printer Control Language (PCL). The Hewlett Packard page description language that is used in laser and ink-jet printers.

Printer Inventory. In Infoprint Server, a set of files that contain information about printers. The Printer Inventory includes such objects as printer definitions, functional subsystem (FSS) definitions, and job selection rules for IP PrintWay.

print file. A file that is created for the purpose of printing data. A print file includes information to be printed and, optionally, some of the data that controls the format of the printing. See also print data set.

print job. One or more documents submitted in the same job to be printed on the same printer.

print labeling. A controlled method of placing identification labels on each page of PSF printed output.

print position. Any location on a medium where a character can be printed.

print quality. The measure of the quality of printed output relative to existing standards and in comparison with jobs printed previously.

Print Services Facility (PSF). An IBM licensed program that manages and controls the input data stream and output data stream required by supported page printers.

processor. In a computer, the part that interprets and processes instructions. Two typical components of a processor are a control unit and an arithmetic logic unit.

programming interface for customers. Any product method that lets a customer-written program obtain the services of the product (for example, CSECT names, data areas or control blocks, data sets or files, exits, macros, parameter lists, and programming languages). Not all products have programming interfaces for customers; some products provide their services through graphical user interfaces, while others provide their services only to other products. See also graphical user interface.

program status word (PSW). An area in storage used to indicate the order in which instructions are processed, and to hold and indicate the status of the computer system.

program temporary fix (PTF). For System i®, System p®, and System z® products, a package containing individual or multiple fixes that is made available to all licensed customers. A PTF resolves defects and might provide enhancements.

PSF. See Print Services Facility.

PSW. See program status word.

PTF. See program temporary fix.

R

RACF. See Resource Access Control Facility.

raster font. A font in which the characters are defined directly by the raster bit map. See also outline font.

raster pattern. A series of picture elements (pels) arranged in scan lines to form an image. The toned or untoned status of each pel creates an image. A digitized raster pattern is an array of bits. The on or off status of each bit determines the toned or untoned status of each pel.

RDW. See record descriptor word.

record descriptor word (RDW). Data preceding a variable record or a structured field that specifies the length of the entire record including the RDW.

record format line data. A form of line data where each record is preceded by a 10-byte identifier. See also line data.

record interface. A program that coordinates the transmitting of printer resources needed to print a document.

region size. The amount of main storage available for a program to run.

relative metrics. Measurement information that is defined in relation to some other units. Relative values are expressed as fractional parts of a unit-square design space (em square), whose sides correspond to the vertical size of the font. See also fixed metrics and font metrics.

repositioning. A process in which PSF, following an indication from the printer of a potentially recoverable error, locates the proper spool record for recomposing one or more pages for printing.

resident resource. A resource, such as a font, symbol set, page segment, or overlay, that resides in a printer or an intermediary device, such as a personal computer.

resolution. A measure of the sharpness of an image, expressed as the number of lines per unit of length or the number of points per unit of area discernible in that image.

resource. A collection of printing instructions used, in addition to the print data set, to produce the printed output. Resources include coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions.

Resource Access Control Facility (RACF). An IBM licensed program that provides for access control by identifying users to the system, verifying users of the system, authorizing access to protected resources, logging unauthorized attempts to enter the system, and logging accesses to protected resources.

resource manager. An application, program, or transaction that manages and controls access to shared resources, such as memory buffers and data sets.

resource name. The name under which an AFP resource object is stored, the first 2 characters of which indicate the resource type.

resource object. In AFP, a collection of printing instructions, and sometimes data to be printed, that consists entirely of structured fields. A resource object is stored as a member (or file) of a library and can be called for by PSF when needed. The different resource objects include: coded font, font character set, code page, page segment, overlay, form definition, and page definition. See also library member.

rotation. The number of degrees a graphic character is turned relative to the page coordinates. See character rotation. See also orientation.

routine. (1) A set of statements in a program that causes the system to perform an operation or a series of related operations. (2) A program or sequence of instructions called by a program. Typically, a routine has a general purpose and is frequently used.

RRB. Record resource block.

rule. A solid or patterned line of any weight (line width) that extends horizontally across a row or page, or vertically down a column or page.

S

security definitions library. A partitioned data set or a series of concatenated partitioned data sets that contain the security definitions for an entire system.

segment. A collection of composed text and images, prepared before formatting and included in a document when it is printed. See also page segment.

sequence number. A 2-byte field in the structured field introducer that identifies the position of the structured field in the data set.

sequential data set. A data set whose records are organized on the basis of their successive physical positions, such as on magnetic tape. See also partitioned data set.

server. A software program or a computer that provides services to other software programs or other computers. The program or computer making the request of the server is typically called the client. See also client and host.

service program. See utility program.

sheet. A division of the physical medium; multiple sheets can exist on a physical medium. For example, a roll of paper might be divided by a printer into rectangular pieces of paper, each representing a sheet. Envelopes are an example of a physical medium that comprises only one sheet. The IPDS architecture defines four types of sheets: cut-sheets, continuous forms, envelopes, and computer output on microfilm. Each type of sheet has a top edge. A sheet has two sides, a front side and a back side. See also form.

shift-out, shift-in (SOSI). Special EBCDIC or ASCII characters that exist in the data stream to indicate the switches between double-byte fonts and single-byte fonts.

simplex. Pertaining to printing on only one side of the paper. See also duplex, normal duplex, and tumble duplex.

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. See also double-byte coded font.

skip. (1) A move of the current print position to another location. (2) To ignore one or more instructions in a sequence of instructions. (3) To pass over one or more positions on a data medium; for example, to perform one or more line feed operations.

SMP/E. See System Modification Program/Extended.

SNA. See Systems Network Architecture.

SNA-attached. Pertaining to a device that is linked to the host system through VTAM or ACF/VTAM and uses an SNA protocol to transfer data. It does not need to be physically connected to the host; some printers are attached to a control unit, a communication controller, or both, and they can transfer data over telecommunication lines. For example, an IBM 3825 Page Printer attached to a communication controller that uses the LU 6.2 communication protocol to transfer data to a communication controller is considered an SNA-attached printer. See also channel-attached and TCP/IP-attached.

SOSI. See shift-out, shift-in.

SRM. See system resources manager.

SSI. See subsystem interface.

stacker. An enclosure in a printer in which printed media is stacked.

startup procedure. A program used to start an application and to specify initialization parameters, libraries that contain system resources, and routing-control information.

storage. (1) A functional unit in which data can be placed and retained, and from which it can be retrieved. See also virtual storage. (2) The location of saved information.

structured field. (1) A self-identifying string of bytes and its data or parameters. (2) A mechanism that permits variable length data to be encoded for transmission in the data stream.

structured field introducer. The first 8 bytes of a structured field that indicate its length, type, and number.

subgroup. A set of modifications in a copy group that applies to a certain number of copies of a form. A copy group can contain more than one subgroup.

subsystem interface (SSI). The means by which system routines request services of the master subsystem, a job entry subsystem, or other subsystems defined to the subsystem interface. See also functional subsystem interface.

supervisor call (SVC). An instruction that interrupts the program being run and passes control to the supervisor so that it can perform the specific service indicated by the instruction.

suppression. A method used to prevent presentation of specified data. In AFP support, a page- and form-definition function that is used to identify fields in a print record that are not printed on selected pages of a document. See also text suppression.

suppression local ID. A value assigned in the Map Suppression coded field to a suppression named in a Line Descriptor (LND) or Record Descriptor (RCD) structured field. This value is contained in the Begin and End Suppression text controls.

SVC. See supervisor call.

symbol set. A type of font that resides in a printer but has fewer attributes than can be specified for resident coded fonts. See also character set.

SYSIN. See system input stream.

SYSOUT. See system output stream.

system input stream (SYSIN). A data definition (DD) statement used to begin an in-stream data set. See also system output stream.

System Modification Program/Extended (SMP/E). An IBM licensed program that is used to install software and software changes on z/OS operating systems. In addition to providing the services of SMP, SMP/E consolidates installation data, it allows more flexibility in selecting changes to be installed, provides a dialog interface, and supports dynamic allocation of data sets.

system output stream (SYSOUT). A data definition (DD) statement used to identify a data set as a system output data set. See also system input stream.

system resources manager. A group of programs that controls the use of system resources, such as programs, devices, and storage areas that are assigned for use in jobs.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through the networks and controlling the configuration and operation of networks. The layered structure of SNA allows the ultimate origins and destinations of information (the users) to be independent of and unaffected by the specific SNA network services and facilities that are used for information exchange. See also Page Printer Communication Component.

T

TCP. See Transmission Control Protocol.

TCP/IP. See Transmission Control Protocol/Internet Protocol.

TCP/IP-attached. Pertaining to a device that is linked to an operating system through an Internet Protocol network and receives data from the system by using an application-layer protocol for IPDS printers. Some TCP/IP-attached printers require the i-data 7913 IPDS Printer LAN Attachment. See also channel-attached and SNA-attached.

telecommunication line. The part of a data circuit external to the equipment that connects to a data-switching exchange. See also data link.

text. A sequence of characters that can be read by a person and encoded into formats such as ASCII that can be interpreted by a computer.

text control. Structured field data that control the format, placement, and appearance of text.

text control sequence. A text control and its associated data.

text orientation. A description of the appearance of text as a combination of print direction and character rotation.

text suppression. The intentional omission of portions of text in copy groups specified in the form definition.

throughput. (1) The measure of the amount of work performed by a device, such as a computer or printer, over a period of time, for example, the number of jobs per day. (2) In data communications, the total traffic between stations over a period of time.

token name. An 8-byte name that can be given to all internal objects and resource objects.

trace. (1) A record of the processing of a computer program or transaction. The information collected from a trace can be used to assess problems and performance. (2) A DB2® for z/OS facility that provides the ability to collect monitoring, auditing, performance, accounting, statistics, and serviceability (global) data.

traditional line data. A form of line data that is prepared for printing on a line printer. See also line data.

Transmission Control Protocol (TCP). A communications protocol used in the Internet and in any network that follows the Internet Engineering Task Force (IETF) standards for internetwork protocol. TCP provides a reliable host-to-host protocol in packet-switched communications networks and in interconnected systems of such networks. See also Internet Protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). An industry-standard, nonproprietary set of communications protocols that provide reliable end-to-end connections between applications over interconnected networks of different types.

tray. See bin.

tumble duplex. Pertaining to printing on both sides of the paper such that the top of one side is at the same end as the bottom of the other side. Tumble duplex printing is used for forms that are bound on the short edge of the paper, regardless of whether the printing is portrait or landscape. See also duplex, normal duplex, and simplex.

U

unbounded-box font. A font designed to use unbounded-character boxes. See also bounded-box font.

UPA. See user printable area.

user printable area (UPA). The area within the valid printable area (VPA) where user-generated data can print without causing an exception condition. See also valid printable area.

utility program. A computer program in general support of computer processes; for example, a diagnostic program, a trace program, or a sort program.

V

valid printable area (VPA). The intersection of the current logical page or current overlay with the physical page in which printing is allowed. See also user printable area.

value. In programming, the alphabetic or numeric contents of a variable, parameter, special register, field, or storage location.

virtual storage. The storage space that can be regarded as addressable main storage by the user of a computer system in which virtual addresses are mapped into real addresses. The size of virtual storage is limited by the addressing scheme of the computer system and by the amount of auxiliary storage available, not by the actual number of main storage locations. See also storage.

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.

VPA. See valid printable area.

VTAM. See Virtual Telecommunications Access Method.

W

write to operator (WTO). An optional user-coded service that allows a message to be written to the system console operator informing the operator of errors and unusual system conditions that might need to be corrected.

WTO. See write to operator.

X

X-axis. In printing, an axis perpendicular to the direction in which the paper moves through the printer. See also Y-axis.

X-extent. A measurement along the X-axis.

XML data. Data identified with the Extensible Markup Language (XML), which is a standard metalanguage for defining markup languages that is based on Standard Generalized Markup Language (SGML). For printing on page printers, a page definition is required to provide the data placement and presentation information. The XML data processed by PSF can be encoded in EBCDIC, ASCII, UTF-8 or UTF-16.

Xm, Ym coordinate system. The media coordinate system.

Y

Y-axis. In printing, an axis parallel with the direction in which the paper moves through the printer. See also X-axis.

Y-extent. A measurement along the Y-axis.

Z

z/OS. An IBM mainframe operating system that uses 64-bit real storage.

Bibliography

This bibliography lists the titles of publications containing additional information about PSF, AFP, the z/OS operating system, and related products.

The titles and order numbers might change from time to time. To verify the current title or order number, consult your IBM marketing representative.

You can obtain many of the publications listed in this bibliography from the AFP Consortium, `http://www.afpcinc.org`, and the z/OS printing software web page: `http://www.ibm.com/systems/z/zos/printsoftware/supportmanuals_ww.html`

Advanced Function Presentation (AFP)

Publication	Order Number
AFP Toolbox User's Guide	S544-5292
Guide to Advanced Function Presentation	G544-3876
Overlay Generation Language User's Guide and Reference	S544-3702
Architecture	
Advanced Function Presentation: Programming Guide and Line Data Reference	S544-3884
AFP Consortium: AFP Color Management Architecture (ACMA)	AFPCC
Bar Code Object Content Architecture Reference	AFPC-0005
Color Management Object Content Architecture Reference	AFPC-0006
Font Object Content Architecture Reference	S544-3285
Graphics Object Content Architecture for Advanced Function Presentation Reference	AFPC-0008
Image Object Content Architecture Reference	AFPC-0003
Intelligent Printer Data Stream Reference	AFPC-0001
Mixed Object Document Content Architecture Reference	AFPC-0004
Presentation Text Object Content Architecture Reference	SC31-6803

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