

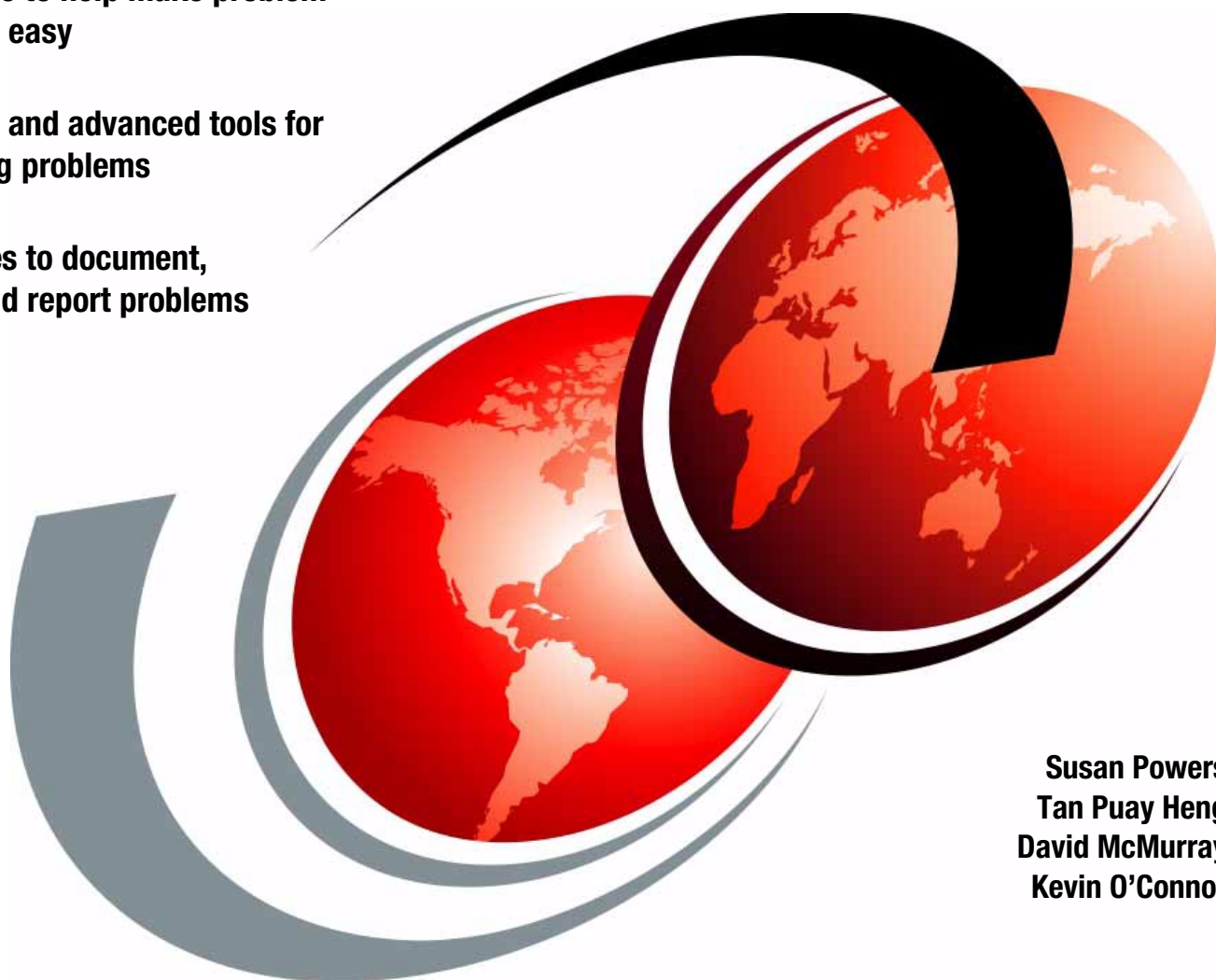
AS/400e Diagnostic Tools for System Administrators

An A to Z Reference for Problem Determination

One source to help make problem resolution easy

Beginning and advanced tools for diagnosing problems

Procedures to document, gather, and report problems



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International Technical Support Organization

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**AS/400e Diagnostic Tools for System Administrators:
An A to Z Reference for Problem Determination**

January 2001

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix M, "Special notices" on page 381.

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Preface

Although the AS/400e server rates over a 99.9% availability factor, there are times when problems occur. Some problems limit the use of a device, program, or application. More severe and pervasive problems limit the use of more components. In either circumstance, the amount of time a component is unavailable relates directly to the actions taken to manage the situation. The ability to resolve problems depends on the tools that are available, the knowledge (and attitude) of the worker, the symptoms and nature of the problem at hand, and other factors.

This IBM Redbook is designed to introduce you to the problem determination aids used in an AS/400e environment. You will become familiar with the tools that are available and the instructions for how each one works. As proficiency is built with the use of each tool and familiarity with the procedures, efficiency of the system operator and service personnel increases.

Consider this redbook as a “Don’t Panic, Read Me First” guide to help you support the AS/400e server. It discusses problem analysis, problem determination, and problem source identification. And it offers you step-by step instructions that show you how to use the AS/400 problem determination aids to produce detailed problem information.

The system administrator and operator will find Part 1 useful for the operations staff to handle problems of a routine basis. This part covers basic problem determination, fundamental steps, and the most common processes.

The system administrator will find Part 2 useful for the operations staff to gather necessary documentation for the support provider or more detailed information for analysis for in-house situations.

This redbook is based on tools and processes available for AS/400e servers of RISC technology. CISC-based AS/400 systems are covered in the legacy publication *AS/400 Data Collection Guide*, SC21-8253.

Note to the reader

The information in this redbook applies to both the AS/400e and the IBM @server iSeries 400, or simply iSeries, servers. However, it does not address the more advanced tools that the iSeries server uses. Therefore, throughout this redbook, we use the term “AS/400e” to refer to both the AS/400e and iSeries servers.

The team that wrote this redbook

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Part 1. Service tools for operators

Note to the reader

The information in this redbook applies to both the AS/400e and the IBM @server iSeries 400, or simply iSeries, servers. However, it does not address the more advanced tools that the iSeries server uses. Therefore, throughout this redbook, we use the term “AS/400e” to refer to both the AS/400e and iSeries servers.

The AS/400e system operator plays a key part in system management. They can be the first user to detect a problem. Their actions impact the effectiveness of the problem resolution effort.

As such, Part 1 of this redbook describes the tools intended primarily for use by the AS/400e system operator. The topics covered in this part include:

- An overview of problem determination
- A perspective of the documents available for system information
- The routine aids used to diagnose job problems (including job logs and spooled files)
- History files
- The system problem log
- Power problems
- Saving collected information to report as an Authorized Program Analysis Request (APAR)

Chapter 1. Problem determination overview

Locating and resolving problems in an AS/400e environment can be similar to solving a crossword puzzle. Puzzles look different from each other, but after working on a few of them, you begin to see a pattern. Each person has a slightly different method of approaching the puzzle, depending on the clues that are presented. As long as you work systematically through all of the clues, the solution eventually presents itself.

Unlike crossword puzzles, when solving AS/400e problems, a range of problem determination aids are at your disposal, including technical specialists to help you with problem analysis. When system availability is a priority, using all the appropriate tools to resolve the problem as quickly as possible is paramount.

In this redbook, the problem determination aids that may be used to produce detailed problem information are shown with step-by-step instructions. The use of the various AS/400e displays and menus are explained to assist in gathering information for your service provider.

1.1 The problem determination process

Problem determination has components of both art and science. Following a formula as in science may not always produce the desired end result. However, a “scientific”, disciplined approach is always a good start, as well as a sense of purpose and control.

The terms *problem determination* and *problem source identification* are often joined together into yet another acronym, PD/PSI. While this may seem to be an unnecessary duplication of terms, it conveys that there is an important distinction between the following components of problem analysis.

- **Problem determination:** The process of finding out exactly what the problem is and what its effects are.
- **Problem source identification:** The process of finding out what has caused the problem.

In some cases, it is not possible to give a complete explanation of the cause of a problem. Your service provider, with the assistance of appropriate diagnostic information, will be able to recommend a course of action to recover from a problem.

1.2 Problem determination tools ‘for dummies’

With the proliferation and popularity of the books with “..... for Dummies” titles, there is a temptation to follow in this vein, if only to arrest your attention.

The AS/400e environment is definitely not a computing environment for “dummies”. A major strength of the AS/400e platform is that it combines the world's most successful system architecture with the AS/400e server's renowned simplicity that can be adapted to any business environment. The AS/400e server can, in fact, be as simple or as complex as you want it to be.

With the introduction of the Operations Navigator tool, an increasing number of AS/400e operator functions are available through a graphical user interface. There is a diminishing need to be a 5250 green-screen expert. There is a large number of service-related functions better addressed through this 5250 interface, as there is a greater amount of information available through Operations Navigator.

With this in mind, it is important that those with system operator responsibility in an AS/400e environment be familiar with the keyboard functions listed in the following sections.

1.2.1 Keyboard functions

This section provides a summary of the important keyboard functions to be used in a 5250 environment. It is assumed throughout this publication that you have an understanding of the functions named.

Use Table 1 as a key to locate the functions described in this section. For example, to locate the Show command string function activated with function key F14, look for item 9 (9) in the following example screens.

Table 1. 5250 keyboard function keys

| Function | Key | Item |
|------------------------------|-----|------|
| Help | F1 | 1 |
| Exit | F3 | 2 |
| Prompt | F4 | 3 |
| Refresh | F5 | 4 |
| Show all parameters | F9 | 5 |
| Show additional parameters | F10 | 6 |
| Show keywords | F11 | 7 |
| Cancel | F12 | 8 |
| Show command string | F14 | 9 |
| Show additional options | F23 | 10 |
| Show additional command keys | F24 | 11 |
| Display options | | 12 |

The screens shown in Figure 1, Figure 2, and Figure 3 illustrate where the options and function keys are displayed on a 5250 Work with Active Jobs (WRKACTJOB) display. The options that are shown vary when different screens are displayed or various commands are prompted. Some functions remain standard on all displays, for example F3 or F12.

```

Work with Active Jobs
ITSO SYS1
07/18/99 17:27:56
CPU %: .0 Elapsed time: 00:00:00 Active jobs: 147
12
Type options, press Enter.
2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
8=Work with spooled files 13=Disconnect ...

Opt Subsystem/Job User Type CPU % Function Status
QBATCH QSYS SBS .0 DEQW
QCMN QSYS SBS .0 DEQW
QCTL QSYS SBS .0 DEQW
QSYSSCD QPGMR BCH .0 PGM-QEZSCNEP EVTW
QHHTPSVR QSYS SBS .0 DEQW
NEWADM QIMHHTTP BCH .0 PGM-QZHBHTTP CNDW
NEWADM QIMHHTTP BCI .0 TIMW
NEWADM QIMHHTTP BCI .0 TIMW
NEWADM QIMHHTTP BCI .0 TIMW
More...

Parameters or command
===>
F3=Exit 2 F5=Refresh 4 F7=Find F10=Restart statistics
F11=Display elapsed data 8 F12=Cancel 10 F23=More options 11 F24=More keys

```

Figure 1. 5250 function keys: Example screen 1 of 3

```

Work with Active Jobs (WRKACTJOB)

Type choices, press Enter.

Output . . . . . * *, *PRINT

2 3 4 6 8
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys 11

```

Figure 2. 5250 functions keys: Example screen 2 of 3

```

Work with Active Jobs (WRKACTJOB)

Type choices, press Enter.

Output . . . . . * *, *PRINT

F9=All parameters F11=Keywords F14=Command string F24=More keys
5 7 9 11

```

Figure 3. 5250 function keys: Example screen 3 of 3

1.2.1.1 The Help key (F1)

The Help key is the single most valuable keystroke for any AS/400e user. The 5250 Help key or F1 key invokes the Help function. There is extensive help text associated with every screen. Using the Help function is mandatory for problem analysis in an AS/400e environment.

1.2.1.2 Prompt (F4)

Any CL command entered on the command line may be prompted on the screen to display the mandatory and optional parameters.

Enter the command, and then press the F4 key. The parameters for the command are displayed.

1.2.1.3 More keys (F24)

The F24 key links the user to a list of further function keys that are available from the current 5250 screen. If the function you need to execute is not shown at the bottom of the display, use the F24 key to view more available function keys.

1.2.1.4 More options (F23)

The F23 key links the user to the further options that are available to be keyed on the current 5250 screen. If the option you need to execute is not shown on the screen, use the F23 key to view more available options.

1.2.1.5 All parameters (F9)

When prompting a CL command, all command parameters may not be displayed. The use of some parameters is conditional upon the values keyed for other parameters. The full set of parameters for a command may be viewed by using the F9 key.

1.2.1.6 Keywords (F11)

You can view the keyword prompts for CL command parameters by pressing the F11 key.

1.2.1.7 Command string (F14)

A display of the CL command string to be parsed by the operating system is displayed when the F14 command key is used from any command prompt. This is useful to build CL programs and to understand the system's operator interface.

1.2.1.8 System Request (SYSREQ)

The System Request function is a method to halt the execution of an interactive job while you perform another function. Use the SysReq or SysRq key on the 5250 keyboard to invoke this function. A display appears as shown in Figure 4.

When the System Request menu is displayed, your interactive job temporarily stops. You can then transfer to another job or perform tasks related to your interactive job, such as, sending and displaying messages. When you leave the System Request menu, you return to the original job. You can leave the System Request menu by pressing F3 or F12, or by pressing Enter when the Option field is blank.

| | |
|---|------------------|
| Command Entry | ITSOSYS1 |
| | Request level: 1 |
| Previous commands and messages: | |
| (No previous commands or messages) | |
| | |
| Bottom | |
| Type command, press Enter. | |
| ====> 3 | |
| <div style="display: flex; justify-content: space-between; font-size: small;"> F3=Exit F4=Prompt F9=Retrieve F10=Include detailed messages F11=Display full F12=Cancel F13=Information Assistant F24=More keys </div> | |

Figure 4. System Request key pressed

After you invoke the System Request function, an option from the System Request menu can be keyed into the prompted area at the bottom of the screen. For example, entering “3” (as shown in Figure 4) invokes the Display current job option. Pressing the Enter key when the display appears, as shown in Figure 4, results in the display shown in Figure 5.

| | |
|--|------------------|
| System Request | System: ITSOSYS1 |
| Select one of the following: | |
| <ol style="list-style-type: none"> 1. Display sign on for alternative job 2. End previous request 3. Display current job 4. Display messages 5. Send a message 6. Display system operator messages 7. Display work station user 10. Start system request at previous system 11. Transfer to previous system 13. Start system request at home system 14. Transfer to home system | |
| More... | |
| Selection | |
| <div style="display: flex; justify-content: space-between; font-size: small;"> F3=Exit F12=Cancel </div> | |
| (C) COPYRIGHT IBM CORP. 1980, 1999. | |

Figure 5. System Request menu

1.2.1.9 Assistance level (F21)

The assistance level specifies the level of assistance available to users of the system. The system value (QASTLVL) is used to tailor the level of displays available for users of the system. Displays intended for less experienced users provide a higher level of assistance than displays that are intended for expert users. Users can specify an assistance level that differs from the system value by specifying the required assistance level in the user profile.

The assistance level may be changed for individual screens by using the F21 key. If the screens displayed in this publication do not show the same level of information as displayed on your system, check the assistance level for that screen.

1.2.2 More...

When More... is displayed in the lower right corner of the display, there is more information available, which cannot be presented on the current display. Press the Page Up and Page Down (or Roll) keys to display the rest of the information to be displayed. The More... prompt is highlighted in bold in the bottom right-hand corner in Figure 5 on page 7.

1.3 Your service provider

The term “service provider” is used in this redbook to refer to the group of people that *you* use for technical support for AS/400e problems.

In some cases, this will be your local IBM office or the IBM Business Partner who supplied your AS/400e server. In countries where IBM does not have local representation, service may be available through an affiliated company.

In the majority of cases, either an IBM Hardware Maintenance Agreement or an IBM Support Line Agreement is required for entitlement to problem support from IBM or its affiliates. In some cases, both of these contracts (or their equivalent in your country) are required.

Refer to *AS/400 Basic System Operation, Administration and Problem Handling*, SC41-5206, for a discussion on obtaining problem support.

1.4 Defining problems

A motor mechanic expects the owner of the vehicle to provide sufficient information to direct them to the problem area of the problem vehicle. If you tell a mechanic that your car is running badly, but neglect to provide any detailed symptoms, they may spend unnecessary time looking for unrelated causes. Isolating a problem involves understanding the problem and defining it in terms meaningful to those who support the system.

For a detailed discussion regarding defining symptoms for the AS/400e server, refer to the *OS/400 Diagnostic Aids*, LY44-5907.

There are two classifications of symptoms that assist in defining any AS/400e system problem:

- External symptoms
- Internal symptoms

The following sections provide a summary of these two different symptom categories.

1.4.1 External symptoms

The first objective of problem isolation is to define the external symptoms accurately. The external symptoms are the attributes of the incident that first drew attention to the existence of a problem. One or more of the following symptoms will be present:

- **Incorrect output:** The displayed or printed output from a job is not as expected.
- **Messages:** There are error messages in the job log, system operator message queue, or the system history log.
- **Wait:** A job, many jobs, or the entire system may stop processing with little CPU activity.
- **Loop:** A job, or many jobs, may consume large amounts of CPU, precluding normal processing.

Tip

The job or system is either in a loop or a wait state. There is no such thing as a “hang”.

1.4.2 Internal symptoms

The second objective of problem isolation is to find one or more internal symptoms. Any number of internal symptoms can contribute to an external symptom. Each internal symptom has a special diagnostic plan that requires the collection of specific information.

Where messages are concerned, it is necessary to record any return codes, sense codes, dump identifiers, and qualifiers. Refer to Chapter 4, “Collecting messages” on page 29, for more information on messages and Table 8 on page 43 for a road map to gather useful codes.

When a loop is encountered, it is necessary to determine if there is a single job involved in the loop or if the entire system is affected.

Where a wait condition is encountered, it is necessary to determine whether the wait is at a job or a system level.

Messages are the key indicators in determining if a lock condition is held within a job environment or between jobs.

1.5 Using the Problem Report Form

Problem Report Forms are supplied in *AS/400 Basic System Operation, Administration and Problem Handling*, SC41-5206. These forms are designed to assist in the collection of details relating to a problem. The Problem Report forms

serve as a reminder to record details that may seem obvious, but vary significantly from system to system.

Some examples of the information recorded on the Problem Report Forms are:

- Error message identifiers
- Date and time of the problem
- System reference codes displayed on the operator panel

We recommend that you use the Problem Report Forms to gather details about the problem, before you contact your service provider. Using these forms serves as a checklist for recording the majority of symptoms and problem indications. Refer to *AS/400 Basic System Operation, Administration and Problem Handling*, SC41-5206, for the Problem Report Form specific to the model processor experiencing the problem, because the layout of the operator panel varies with processor model.

1.6 Information required for problems

The information listed here is required *every time* you report a problem to your service provider:

- **The version, release, and modification of OS/400 and any affected Licensed Program Product (LPP)**

Various LPPs may be installed with multiple releases of operating system. Be specific with the release levels of individual products.

Use the GO LICPGM display as shown in Figure 6 to determine the installed release of each licensed program. Enter option 10 to display the Licensed Products, and use the F11 key to display the Release information.

To produce a listing that can be forwarded to your service provider, use the DSPSFWRSC command as shown in Figure 7.

| Display Installed Licensed Programs | | | | System: | ITSOSYS1 |
|---|-------------------|-----|--|---------|----------|
| Licensed Program | Installed Release | | Description | | |
| 5769SS1 | V4R4M0 | L00 | OS/400 - Library QGPL | | |
| 5769SS1 | V4R4M0 | L00 | OS/400 - Library QUSRSYS | | |
| 5769SS1 | V4R4M0 | L00 | Operating System/400 | | |
| 5769SS1 | V4R4M0 | | OS/400 - Extended Base Support | | |
| 5769SS1 | V4R4M0 | | OS/400 - Online Information | | |
| 5769SS1 | V4R4M0 | | OS/400 - Extended Base Directory Support | | |
| 5769SS1 | V4R4M0 | | OS/400 - AFP Compatibility Fonts | | |
| 5769SS1 | V4R4M0 | | OS/400 - *PRV CL Compiler Support | | |
| 5769SS1 | V4R4M0 | | OS/400 - Host Servers | | |
| 5769SS1 | V4R4M0 | | OS/400 - System Openness Includes | | |
| 5769SS1 | V4R4M0 | | OS/400 - GDDM | | |
| 5769SS1 | V4R4M0 | | OS/400 - Common Programming APIs Toolkit | | |
| 5769SS1 | V4R4M0 | | OS/400 - Ultimeia System Facilities | | |
| 5769SS1 | V4R4M0 | | OS/400 - Media and Storage Extensions | | |
| | | | | More... | |
| Press Enter to continue. | | | | | |
| F3=Exit F11=Display option F12=Cancel F19=Display trademarks | | | | | |

Figure 6. GO LICPGM: Option 10

```

Display Software Resources (DSPSFWRSC)

Type choices, press Enter.

Output . . . . . *print      *, *PRINT, *OUTFILE

```

Figure 7. DSPSFWRSC command: Producing a software resource listing

• **The level of the cumulative package applied to your system**

Use the `DSPPTF` command to display the PTF list for OS/400, as shown in Figure 8.

The TC entry at the top of the list identifies the Cumulative Package installed. The format is TCyyddd, where:

- yy is the year of the Cumulative Package release.
- ddd is the Julian day of the Cumulative Package release.

Note

Use one of the following commands to determine the Cumulative PTF Package level installed on your system:

```
DSPPTF LICPGM(5769SS1)
DSPPTF LICPGM(5769999)
```

When selecting 5769SS1, look for the **TCyyddd** entry.

When selecting 5769999, look for the **TLyyddd** entry.

```

Display PTF Status
System:  ITSOSYS1

Product ID . . . . . : 5769SS1
IPL source . . . . . : ##MACH#B
Release of base option . . . . . : V4R4M0 L00

Type options, press Enter.
  5=Display PTF details  6=Print cover letter  8=Display cover letter

PTF ID      Status      IPL
Opt ID      Status      Action
TC99082    Temporarily applied    None
TCP0023     Temporarily applied    None
TCP0022     Superseded             None
TCP0021     Permanently applied    None
TCP0020     Superseded             None
TCP0019     Superseded             None
TCP0018     Superseded             None
TCP0017     Superseded             None
TCP0016     Superseded             None

F3=Exit  F11=Display alternate view  F17=Position to  F12=Cancel  More...

```

Figure 8. DSPPTF command: Displaying the cumulative PTF level

- **A current program temporary fix (PTF) listing**

This listing shows any additional PTFs that have been applied to your system that may not have been applied with a cumulative package.

Use the DSPPTF command as shown in Figure 9.

```

                                Display Program Temporary Fix (DSPPTF)

Type choices, press Enter.

Product . . . . . *ALL          F4 for list
PTF numbers to select . . . . . *ALL      Character value, *ALL...
Release . . . . . *ALL          *ALL, VxRxDx
Cover letter only . . . . . *NO        *NO, *YES
Output . . . . . *print         *, *PRINT, *OUTFILE
  
```

Figure 9. DSPPTF command: Producing a PTF listing

1.7 Finding your printed output

While performing the problem determination procedures outlined in this publication, you will run commands or procedures that produce spooled output. There is more than one way to locate spooled files that are produced. The following procedure shows a simple method to locate spooled files generated within the current interactive job.

To locate spooled files for the current interactive job, perform the following steps:

1. Type WRKJOB on a command line, and press the Enter key. A display appears like the example in Figure 10.

```

                                Work with Job
                                System:  ITSOSYS1
Job:  QPADEV0015      User:  OPER01      Number:  047287

Select one of the following:

    1. Display job status attributes
    2. Display job definition attributes
    3. Display job run attributes, if active
    4. Work with spooled files

    10. Display job log, if active or on job queue
    11. Display call stack, if active
    12. Work with locks, if active
    13. Display library list, if active
    14. Display open files, if active
    15. Display file overrides, if active
    16. Display commitment control status, if active

Selection or command
====>

F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel
  
```

Figure 10. WRKJOB display

2. Type 4 in the Selection or Command prompt. A display appears like the example in Figure 11.

Work with Job Spooled Files

Job: QPADEV0015 User: OPER01 Number: 047287

Type options, press Enter.

1=Send 2=Change 3=Hold 4=Delete 5=Display 6=Release 7=Messages
8=Attributes 9=Work with printing status

| Opt | File | Device or Queue | User Data | Status | Total Pages | Current Page | Copies |
|-----|----------|-----------------|------------|--------|-------------|--------------|--------|
| | QSYSPRT | QPRINT | | RDY | 13 | | 1 |
| | QPDSPNET | QPRINT | DSPNETA | RDY | 1 | | 1 |
| | QPDSPLOG | QPRINT | | RDY | 8 | | 1 |
| | QPDSPMSG | QPRINT | | RDY | 10 | | 1 |
| | QPCSMPT | QPRINT | | RDY | 1 | | 1 |
| | QPJOBLOG | QEZZJOBLOG | QPADEV0015 | RDY | 2 | | 1 |

Bottom

Parameters for options 1, 2, 3 or command
====>

F3=Exit F10=View 3 F11=View 2 F12=Cancel F22=Printers F24=More keys

Figure 11. WRKJOB: Spooled files display

Table 2 explains the fields highlighted in Figure 11.

Table 2. Column descriptions for the Work with Job Spooled Files display

| Item | Description |
|------|--|
| 1 | The value listed in the File column is the printer file name. Various spooled files may be identified by the name in this column. For example, a job log always displays QPJOBLOG in this field. |
| 2 | The value listed in the Device or Queue column is the name of the output queue where the spooled file has been generated. The spooled file may be moved to another output queue if desired. |
| 3 | The value in the User Data column may be useful in identifying the command that has produced the output. For example, the QPDSPNET file was produced with the DSPNETA CL command. |

1.8 Recreating a problem

In some cases, the most appropriate approach to resolve a problem is to supply sufficient material to your service provider to recreate the problem on another AS/400e server.

When a problem is perceived to be a software defect in either a Licensed Program Product or an application, supplying a test environment to your service provider ensures that all the required diagnostic information can be gathered.

Follow these steps to collect the re-creation materials:

1. Create a library to hold the test environment.

2. Copy all the required objects into the test environment library, for example: applications, data files, source files, data areas, and configuration definitions.
3. Run the failing program or procedure in the test environment to ensure that the problem can be demonstrated.
4. Save the test environment to tape.
5. Forward the tape to your service provider, with the step-by-step instructions to recreate the problem.

1.9 AS/400e server problem management

The server's problem management functions are integrated into the AS/400 Licensed Internal Code and OS/400. These management functions automate problem analysis, problem logging and tracking, problem notification, and problem reporting.

System failures fall into two groups:

- System-detected failures
- User-detected errors

Problem management functions are provided for both categories of failures.

Refer to 7.1, "Analyzing problems detected by the system" on page 82, and 7.2, "Creating a new entry in the problem log" on page 83, for information on the interfaces to this function through the WRKPRB and ANZPRB commands.

For further information on the problem management functions of OS/400, refer to *OS/400 Diagnostic Aids*, LY44-5907.

1.9.1 First Failure Data Capture (FFDC)

One of the components of the system problem management functions is a facility known as First Failure Data Capture (FFDC). Software problems are not automatically analyzed by the system. However, the system may record problem log entries and capture diagnostic information through the FFDC function. This facility is enabled by setting the QSFWERRLOG system value to *LOG. The system has a default value for QSFWERRLOG of *LOG to enable the FFDC feature.

When the system detects a software problem, the error is logged in the error log. A message is sent to the system operator message queue (QSYSOPR). Then, the problem is analyzed and reported to your service provider by working with the problem log entry.

The information captured by FFDC may include a dump and other job related information. Each problem log entry created by FFDC has a library associated with it. This library is the repository for the diagnostic information automatically collected by the FFDC process. This library is referred to as the *APAR library* and has a standard naming convention. The library is named QSCnnnnnnnn, where *nnnnnnnn* is the last seven digits of the problem log identifier.

1.9.2 Flight recorders

In addition to the information that is collected automatically by FFDC and manually by the commands and procedures in this publication, AS/400e server architecture incorporates another set of tools called *flight recorders*. Some flight recorders are extracted from a Main Storage Dump or LIC Logs.

Flight recorders are integrated into LIC and OS/400. They are designed by the architects of the system to collect specific data, usually at a lower level than the user interfaces described in this publication.

Flight recorders vary in their implementation from release to release. They usually require direction from your service provider or the IBM development team to gather the information about a specific problem.

A flight recorder is typically used only under the direction of your service provider. For a closer look at flight recorders and their use, refer to Appendix F, "Using system flight recorders" on page 329.

1.10 Operations Navigator

AS/400 Operations Navigator is a powerful graphical interface for Windows clients. With AS/400 Operations Navigator, managing and administering your AS/400e servers and environments is made possible from a Windows desktop.

AS/400 Operations Navigator enables the management of communications, printing, database, security, and other system operator functions. This interface is designed as a productivity enhancement and is the only interface to some of the newer features introduced to OS/400. While the interface is being developed and further enhanced, continue to perform some AS/400e operator functions from a traditional 5250 screen.

Operations Navigator is a separately installable component of Client Access. For information on installing Operations Navigator, refer to *Client Access Express for Windows - Setup*, SC41-5507.

Further information about Operations Navigator is available in *Managing AS/400 V4R4 with Operations Navigator*, SG24-5646.

1.10.1 Operations Console

Operations Console allows a PC to function as a console device for an AS/400e server. It also allows remote PC devices to become a console device and control the console and control panel. Many of the newer models of the iSeries server do not have a Twinaxial Workstation Controller and are configured to use Operations Console.

Operations Console is shipped as part of the Client Access Express for Windows product, 5769-XE1. For information on installing the Operations Console, refer to *Client Access Express for Windows - Setup*, SC41-5507.

1.10.2 Management Central

Operations Navigator includes Management Central for managing multiple AS/400e servers centrally. Management Central is a separately installable component of Operations Navigator.

Management Central provides the following functions with V4R4 of OS/400 and later releases:

- Real-time performance monitoring
- Scheduled remote commands
- Inventory collection
- Managing software fixes
- Object distribution
- Performance data collection
- Advanced job scheduling

For further information on Management Central, refer to *Management Central: A Smart Way to Manage AS/400 Systems*, SG24-5407.

1.11 A word on PTFs

IBM periodically creates program temporary fixes (PTFs) to correct problems or prevent problems found within a particular IBM licensed program. In addition, PTFs supply fixes for problems that appear to be hardware failures, or they may provide new functions.

PTFs are designed to replace one or more objects in the licensed program. Generally, PTFs are incorporated in a future release of the system.

A program maintenance strategy is recommended for all AS/400e customers. Establishing a maintenance strategy can reduce the impact to AS/400e server operations that result from unplanned outages or program failures. Due to the broad range of customer environments, a single recommendation does not apply to all situations. It is the customer's responsibility to evaluate their AS/400e operations, identify an appropriate strategy, and apply scheduled maintenance to achieve optimal system performance and availability.

The following guidelines can help you to develop an effective Program Maintenance Strategy. A Program Maintenance Strategy for your AS/400e server should include:

- **Preventive Service:** Cumulative PTF packages, service packs, and group PTF packages
- **Corrective Service:** Single PTFs, including high-impact and pervasive (HIPER) PTFs
- **Preventive Service Planning Information:** PSPs and Alerts

It is appropriate to consider installing PTFs as part of the problem determination process. In particular, this becomes increasingly important when a software defect is suspected in IBM-supplied software. Your service provider will advise you when it is necessary to bring your system up to the latest PTF level as a problem determination step.

Chapter 2. System information documents

When the AS/400e server is not accessible using a screen, your service provider relies on previously gathered information about your system to aid them in providing a resolution to a problem. This chapter advises you on which system information to collect and keep safe for future reference, if and when it is required.

2.1 Print System Information (PRTSYSINF)

The information in Table 3, which was produced from running the Print System Information (PRTSYSINF) command, is of great value when recovering your system in the event of a system disaster. PRTSYSINF is a good documentation tool that can be incorporated into daily or routine management tasks.

Table 3. PRTSYSINF output

| Spoiled file name | User data | Description of contents |
|-------------------|-----------|--|
| QPEZBCKUP | DSPBCKUPL | List of all user libraries |
| QPEZBCKUP | DSPBCKUPL | List of all folders |
| QSYSPRT | DSPSYSVAL | Current settings for all system values |
| QDSPNET | DSPNETA | Current settings for all network attributes |
| QSYSPRT | DSCFGL | Configuration lists |
| QSYSPRT | DSPEDTD | User-defined edit descriptions (a separate spoiled file for each) |
| QSYSPRT | DSPPTF | Details of all PTFs that are installed on the system |
| QPRTRPYL | WRKRPYLE | All the reply list entries |
| QSYSPRT | DSPRCYAP | Settings for access path recovery times |
| QSYSPRT | DSPSRVA | Settings for service attributes |
| QSYSPRT | DSPNWSSTG | Network server storage spaces information |
| QSYSPRT | DSPPWSCD | Power on/off schedule |
| QSYSPRT | DSPHWRSC | Hardware configuration (a separate spoiled file for each resource type, such as *STG or *LWS) |
| QSYSPRT | WRKOPTCFG | Optical device descriptions |
| QSYSPRT | DSPRJECFG | Remote job entry configurations |
| QPDSTSRV | DSPDSTSRV | SNADS configuration |
| QPRTSBSD | DSPSBSD | Subsystem descriptions (a separate spoiled file for each subsystem description on your system) |
| QSYSPRT | DSPSFWRSC | Installed licensed programs (software resource list) |
| QPRTOBJD | DSPOBJD | A list of all journals on your system |

| Spooled file name | User data | Description of contents |
|-------------------|-----------|---|
| QPDSPJRNA | WRKJRNA | The journal attributes for each journal that is not in the QUSRSYS library (a separate file for each journal). Typically, journals in the QUSRSYS library are IBM-supplied journals. If you have your own journals in the QUSRSYS library, you need to manually print information about these journals. |
| QSYSPRT | CHGCLNUP | Settings for automatic cleanup |
| QPUSRPRF | DSPUSRPRF | Current values for the QSECOFR user profile |
| QPRTJOB | DSPJOB | Current values for the QDFTJOB job description |
| QPJOBLOG | PRTSYSINF | The job log for this job |

In the above table, note that user data automatically contains the CL command run by PRTSYSINF.

2.2 Hardware device listing

The hardware device listing is important to assist you and the service provider in determining problems with controllers and cable labelling.

2.2.1 Work with Hardware Products (WRKHDWPRD)

Type the Work with Hardware Products (WRKHDWPRD) command on a command line. Then, a menu appears like the example shown in Figure 12.

System:ITSOSYS1

Work with Hardware Products

Select one of the following:

- 4. Display description label locations
- 5. Change description label locations

Selection

F3=Exit F12=Cancel

Figure 12. Work with Hardware Products menu

Select option 4, and press Enter. A display appears as shown in Figure 13. Press F17. This produces a spooled file named QSYSPRT.

This information is particularly important when it comes to labelling the communication cables from the rear of the system unit and expansion units to communication cabinets containing hubs, routers, or multistation access units. Correctly identifying the labelled cable saves time in problem determination.

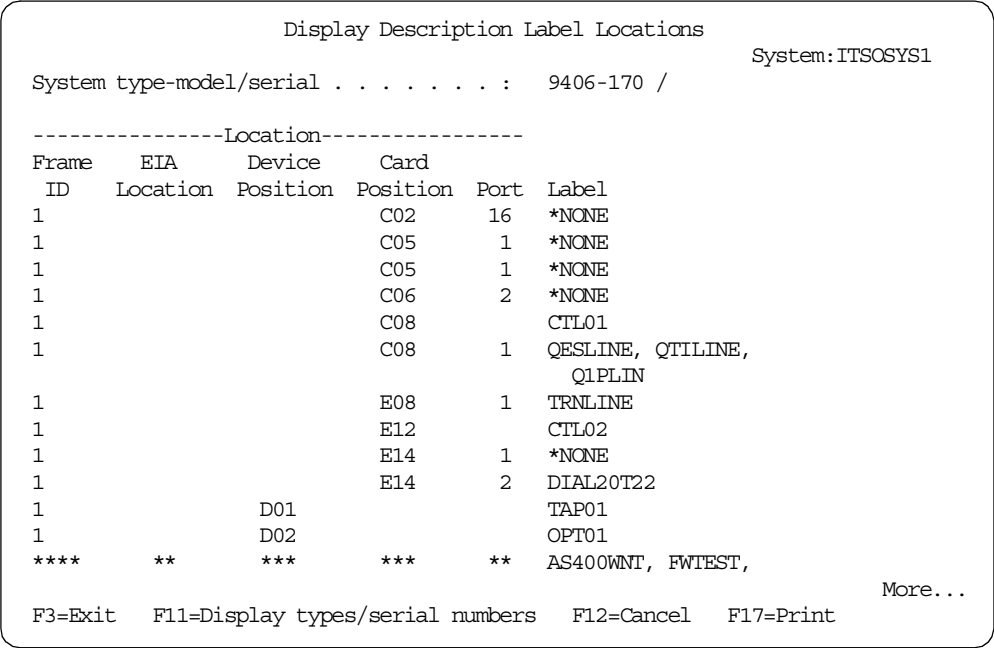


Figure 13. Display Description Label Locations display

2.3 Printing local device addresses

This information is particularly beneficial in detecting workstation device and cabling problems on your system. On some larger system configurations, this can reduce the amount of time spent trying to track down a “rogue” workstation.

2.3.1 Print Device Addresses (PRTDEVADR)

To determine which workstation controllers are configured on your system, first type `WRKCTLD *LWS` on a command line. Press Enter. A display appears like the example in Figure 14 on page 20. The controller names are shown.

Work with Controller Descriptions

System: ITSOSYS1

Position to

Starting characters

Type options, press Enter.

2=Change

3=Copy

4=Delete

5=Display

6=Print

7=Rename

8=Work with status

9=Retrieve source

12=Print device addresses

| Opt | Controller | Type | Text |
|-----|------------|------|--|
| | CTL01 | 266C | CREATED BY AUTO-CONFIGURATION |
| | CTL02 | 2722 | CREATED BY AUTO-CONFIGURATION |
| | QCTL | 266C | Controller description created during IPL. |
| | CTL03 | 6050 | CREATED BY AUTO-CONFIGURATION |

Bottom

Parameters or command

====>

F3=Exit

F4=Prompt

F5=Refresh

F6=Create

F9=Retrieve

F12=Cancel

F14=Work with status

Figure 14. Work with Controller Descriptions display

Now, type PRIDEVADR <controller name> on the command line, and press Enter. This creates a spooled file named QPDCDEVA for each controller you request, as shown in Figure 15.

Display Spooled File

Page/Line 1/1

Columns 1 - 130

File QPDCDEVA

Control

Find

*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8...+...9...+...0...+...1...+...2...+...3

5769SS1 V4R4M0 990521

Device Addresses for AS26 11/07/00 12:10:12 Page 1

Local Work Station Controller CTL01

Type 266C

Switch Setting --> 0

1

2

3

4

5

6

| | | | | | | | |
|----------|---------|---------|---------|---------|---|---|---|
| : | : | : | : | : | : | : | : |
| Port 0 : | DSP01 | DSP02 | DSP03 | DSP04 | : | : | : |
| : | *DSP | *DSP | *DSP | *DSP | : | : | : |
| : | 3487 HC | 3487 HC | 3487 HC | 3487 HC | : | : | : |
| : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : |
| : | : | : | : | : | : | : | : |
| Port 1 : | : | : | : | : | : | : | : |

More...

Figure 15. Display Spooled File display of file QPDCDEVA

2.4 System configuration list

The system configuration list contains information on the system, packaging hardware, logical hardware resource, and a legend. This particular list is very helpful in determining the point of failure from system reference codes displayed on the front panel.

2.4.1 Printing the system configuration list

Contact the security officer or system administrator to obtain service authority to use System Service Tools (SST). This authority is necessary to use SST. Refer to Chapter 19, “Using System Service Tools (SST)” on page 253, to access SST. Follow these steps to print the system configuration list:

1. On the Start a Service Tool display, select option 7 (Hardware Service Manager).
2. Select the Print (F6) function key on the Hardware Service Manager display, as shown in Figure 16.

Hardware Service Manager

Attention: This utility is provided for service representative use only.

System unit : 9406-720 10-12345
Release : V4R4M0 (1)

Select one of the following:

1. Packaging hardware resources (systems, frames, cards,...)
2. Logical hardware resources (buses, IOPs, controllers,...)
3. Locate resource by resource name
4. Failed and non-reporting hardware resources
5. System power control network (SPCN)
6. Work with service action log
7. Display label location work sheet
8. Device Concurrent Maintenance

Selection

F3=Exit **F6=Print configuration** F9=Display card gap information
F10=Display resources requiring attention F12=Cancel

Figure 16. Hardware Service Manager display

3. On the next display, accept the defaults, and press Enter. A spooled file name of QPCSMPRT is created, as shown in Figure 17.

```

Display Spooled File
File . . . . . : QPCSMPT
Control . . . . .
Find . . . . .
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8...+...9.. ..+...0...+...1...+...2...+...3
Hardware Service Manager - System Configuration List
AS26 11/07/00 13:42:23

System Information
System type . . . . . : 9406
System model . . . . . : 170
System serial number . . . . . : 10-4BLTM
Release . . . . . : V4R4M0 (1)
* * * * * E N D S Y S T E M I N F O R M A T I O N * * * * *
Hardware Service Manager - System Configuration List
ITSCSYS1 11/07/00 13:42:23

Packaging Hardware Resource Information
Resource Name Type-Model Serial Number Part Number Frame ID Card Pos Dev Pos
SYS01 9406-170 10-4BLTM 1
FR01 9406-170 10-4BLTM 1
EM01 2468-001 00-0000000 0000021F5772 1
C11 * < 6757-003 10-9140055 0000091H4105 1 C01
C18 2761-001 10-9314698 0000097H7678 1 C03
C02 2748-001 10-9264050 0000004N2255 1 C07

F3=Exit F12=Cancel F19=Left F20=Right F24=More keys
More...

```

Figure 17. Display spooled file for QPCSMPT

Note

When any system changes have taken place, either hardware or software, we advise that you record these changes by performing the tasks in this section.

2.5 Retrieve Configuration Resource (RTVCFGSRC)

The Retrieve Configuration Resource (RTVCFGSRC) command is another useful documentation tool that can be used to recreate configurations if they are deleted, damaged, or change. This is discussed in 12.2.3, “Retrieving the configuration source” on page 158.

2.6 Additional information

For more information on collecting system information, refer to *AS/400 Basic System Operation, Administration and Problem Handling*, SC41-5206.

Chapter 3. Easy data collection

When you encounter a problem on your server and need assistance from a service provider, you can begin collecting data about the problem using a standard tool known as Operational Assistant (OA).

OA does not require any initial procedures before collecting data related to your problem. If you just encountered a problem with your job and want to collect data about the problem without making choices, use OA to gather the data. Otherwise, use the *save APAR data* functions as described in Chapter 7, “System problem log and Save APAR Data” on page 81.

If you plan to save APAR data, it is helpful to know whether there is a problem log entry associated with your problem. If you used the Analyze a Problem (ANZPRB) command, a problem log entry exists. The system also creates problem log entries for certain hardware and software errors. Both types of errors have associated problem log entries.

Note

Software errors detected by the system are logged only if the system value QSWERRLOG is set to *LOG.

Refer to Table 4 for more information to help you choose either OA or save APAR data.

Table 4. Operational Assistant or SAVAPARDTA functions

| Function | Authorized users | Data collected | Output queue | Selection list? | Reference |
|----------------|---|---|--------------------------------|-----------------|--|
| OA | Any | Your job log, your job information, PTFs, QHST, active jobs, your message queues, QSYSOPR, PTFs | QEZDEBUG in library QUSRYSYS | No | See 3.1, “Using Operational Assistant to collect data” on page 23. |
| Save APAR data | System operator, service representative | All of the above plus VLIC logs, error logs, etc. | QSCAPAROQ in library QSCxxxxxx | Yes | See 7.4, “Using Save APAR Data (SAVAPARDTA) to collect data” on page 91. |

3.1 Using Operational Assistant to collect data

OA is an easy to use interface to AS/400e operations. One of the features is collecting data for a problem you are having in your current sign-on session or job. Data collection is automatic and requires no input from the user.

The following data is collected in the QEZDEBUG output queue in the QUSRYSYS library:

- The job log for this sign-on session
- The job information for this sign-on session
- PTFs
- The history log (QHST)
- Currently active jobs

- Messages on your user message queue
- Messages on your workstation message queue
- Messages on QSYSOPR message queue

To use OA to collect data associated with your immediate problem, perform the following steps:

1. Enter the following command:

```
GO USERHELP
```

The display shown in Figure 18 appears.

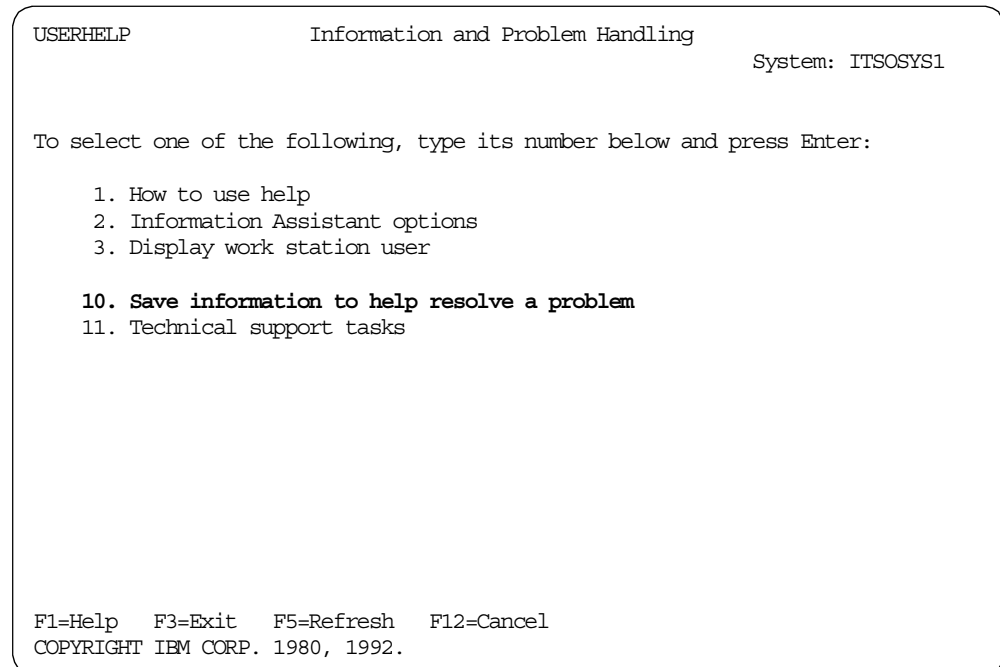


Figure 18. Information and Problem Handling display

2. Select option 10 (Save information to help resolve a problem). The display shown in Figure 19 appears.

Save Information to Help Resolve a Problem

System: ITSOSYS1

To save information about a problem with your session, enter a brief description and press Enter.

Brief description of problem

Enter notes about problem Y Y=Yes, N=No

Type a menu option below

F1=Help F3=Exit F9=Command line F12=Cancel
(C) COPYRIGHT IBM CORP. 1980, 1992.

Figure 19. Save Information to Help Resolve a Problem display

3. Enter a short description of the problem. Press the Enter key to display an area to enter notes. The notes can describe the problem in more detail, list the procedure to recreate the problem, and provide information about the system itself. The display shown in Figure 20 appears.

Enter Notes

System: ITSOSYS1

Problem ID : 9209853018
Origin : RPC.AS377
Current status : OPENED
Problem : Problem with TIMEDELAY application.

Type notes, press Enter.

The problem occurred when I ran the TIMEDELAY program. I received__
message

Bottom

F3=Exit F6=Insert line F12=Cancel F14=Delete line F17=Top
F18=Bottom F20=Right

Figure 20. Enter Notes display

- ```

Enter Notes : ITSOSYS1
:
: :
: Exit Notes :
: :
: Type choice, press enter: :
: :
: Option 1 1=Save notes and exit :
: 2=Exit without saving notes :
: 3=Resume entering notes :
: :
: F12=Cancel : _____
: : _____
: : _____
:.....:_____

_____Bottom
F3=Exit F6=Insert line F12=Cancel F14>Delete line F17=Top

F18=Bottom F20=Right

```

6. Select option 1 (Save notes and exit).

When all the data has been collected, a message appears at the bottom of the display, for example:

This is the number of the problem log entry created. All the spooled files created have this number as the user data.

- APAR data can be saved from a Save APAR Data display or by using the Save APAR Data (SAVAPARDTA) command. The Save APAR Data display appears when using the problem log, the Analyze a Problem (ANZPRB) command, or F14 from the QSYSOPR message queue. See Table 5 to find a path to the Save APAR Data display. Then go to 7.5, “Selecting APAR data to collect” on page 94.

Table 5. Display or command selection

| Starting from     | Command           | Option or F key | On this display                  | Reference                                                                    |
|-------------------|-------------------|-----------------|----------------------------------|------------------------------------------------------------------------------|
| Problem log       | WRKPRB            | 8               |                                  |                                                                              |
|                   |                   | 30              | Work with Problem                | See 7.4.2, "Saving APAR data from an existing problem log entry" on page 93. |
| Analyze a problem | ANZPRB (hardware) | F15             | Display Problem Analysis Results | See 7.4.1, "Saving APAR data from the ANZPRB command display" on page 92.    |
|                   | ANZPRB (software) | Y               | Save Problem Data                | See 7.4.1, "Saving APAR data from the ANZPRB command display" on page 92.    |
| F14               | DSPMSG QSYSOPR    | F15             | Display Problem Analysis Results | See 7.4.1, "Saving APAR data from the ANZPRB command display" on page 92.    |
| Command line      | SAVAPARDTA        | Enter key       | Save APAR Data                   | See 7.4.3, "Saving APAR data using the SAVAPARDTA command" on page 93.       |



---

## Chapter 4. Collecting messages

This chapter covers information on working with messages in message queues, finding additional information about your messages, and displaying messages for the system operator. Operations Navigator provides the ability to display user and system operator messages on a personal computer, in a graphical user interface. Refer to *Managing AS/400 V4R4 with Operations Navigator*, SG24-5646, for more information, or log on to the Operations Navigator Web site at:

<http://publib.boulder.ibm.com/pubs/html/as400/infocenter.htm>

Messages provide answers to many problems and assist you with most of the problem isolation. When the system detects an error, it usually provides a message that describes the problem and the actions needed to solve the problem.

A message can contain the following information:

- Name of the failing programs or jobs
- Return codes and error codes
- From and To programs and instruction numbers of each program
- References to Vertical Licensed Internal Code (VLIC) logs and error logs (Product Activity Log or PAL)
- Information that explains the problem
- Information about how to solve the problem

### Tip

When you move the cursor to anywhere on the text of a message and press the F1 (Help) key, the additional message information panel appears. This additional information is also called *message help text* or *second-level text*. To save this information to a spooled file, press F6 (Print).

Messages are found in the following places:

- At the bottom of displays or on the Command Entry display after a command is entered
- In a job message queue (or job log) for an active user, subsystem, and system job
- In QHST (history log)
- In QSYSOPR (system operator message queue)

Messages are sent by your job, a program, the system you are using, or a system in the network. All messages sent to QSYSOPR are also sent to QHST. The reverse is not true. Further information regarding messages can be found in *System Operation*, SC41-4203.

---

## 4.1 Getting started

Use Table 6 to locate further information on locating messages in your AS/400e server.

*Table 6. Finding messages*

| Look for a message                                                   | Go to                                                                             |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| On a display                                                         | Section 4.2, “Viewing and saving messages that appear on a display” on page 30    |
| In a message queue (or job log) for your own (or another user’s) job | Section 4.3, “Finding messages in a job log” on page 33                           |
| In a system or subsystem job                                         | Section 4.4, “Messages for subsystem and system jobs” on page 39                  |
| In the system operator message queue (QSYSOPR)                       | Section 4.5, “Messages in the system operator message queue (QSYSOPR)” on page 41 |
| In the history log (QHST)                                            |                                                                                   |
| Look for the message text when the message number is known           | Section 4.8, “Finding details on a specific message number” on page 47            |
| Look for messages using Operations Navigator                         | Section 4.9, “Viewing messages with Operations Navigator” on page 49              |

**Note**

Review the method for locating the printed output in 1.7, “Finding your printed output” on page 12.

---

## 4.2 Viewing and saving messages that appear on a display

Figure 22 shows an example of a message that appears at the bottom of the display.

```
MAIN AS/400 Main Menu System: ITSOSYS1

Select one of the following:

 1. User tasks
 2. Office tasks
 3. General system tasks
 4. Files, libraries, and folders
 5. Programming
 6. Communications
 7. Define or change the system
 8. Problem handling
 9. Display a menu
 10. Information Assistant options
 11. Client Access/400 tasks

 90. Sign off

Selection or command
====> sndsrvrqs *test

F3=Exit F4=Prompt F9=Retrieve F12=Cancel F13=Information Assistant
F23=Set initial menu
Last request at level 3 ended.
```

Figure 22. A message on a display

Follow the steps that are listed to collect all the information that relates to the message.

#### Important

The Print Screen key can be used to capture messages that appear on a display. However, a screen print does *not* give sufficient information for use in problem determination, because detailed message information is not captured. Follow the instructions in this section to capture the information in a format that will give your service provider sufficient information to analyze your problem.

To view and save additional message information for a message that appears on a display (when the user's assistance level is set to intermediate), follow the steps listed here:

1. Move the cursor to the line with the message that you want to save.
2. Press the F1 (Help) key to view the additional message information. A display appears for the message, as shown in Figure 23 on page 32.

Additional Message Information

|                        |          |                     |          |
|------------------------|----------|---------------------|----------|
| Message ID . . . . .   | CPF1907  | Severity . . . . .  | 00       |
| Message type . . . . . | Escape   |                     |          |
| Date sent . . . . .    | 07/01/99 | Time sent . . . . . | 10:44:29 |

Message . . . . . : Last request at level 3 ended.

Bottom

Press Enter to continue.

F3=Exit
**F6=Print**
F9=Display message details

**F10=Display messages in job log**
F12=Cancel
F21=Select assistance level

*Figure 23. Additional Message Information*

3. If this message relates to the problem, continue with the next step. Otherwise, go to step 5.
4. To keep a record of this message for problem determination purposes, press F6 (Print) to store to a spooled file (file name QPMHAMI). This ensures that you have captured all the relevant information pertaining to this message.
5. Press F12 (Cancel) to cancel and return to the display that showed the message.
6. If “More...” appears in the lower right corner of the display, continue with the next step. Otherwise, go to step 8.
7. Page forward to see more messages.
8. To continue looking for more messages, repeat steps 1 through 5. Collect the additional message information for each message that relates to the problem until all the message information has been saved.
9. If F10 (Display messages in job log) is shown on the Additional Message Information display, go to 4.3, “Finding messages in a job log” on page 33, to save any messages that relate to the problem in the job log. Otherwise, continue with the next step.
10. If you have found all the messages that relate to the problem, go to 4.6, “Checking the contents of the additional message information” on page 42, to determine whether more information needs to be collected using this guide.
11. If you need to find other messages that relate to the problem, go to step 1 and repeat this process.



#### Note

In the context of problem determination and problem source identification, it is common to print the entire job log. A complete job log gives your service provider information on the sequence, timing, and context of the messages that are issued to the job. Refer to 4.3, “Finding messages in a job log” on page 33, for further information.

---

## 4.3 Finding messages in a job log

There are two types of jobs in an AS/400e server:

- Inactive jobs
- Active jobs

Inactive jobs no longer have their job structures in the system, so the job message queue is no longer available. The messages associated with the job are written to the job log when the job terminates. If the logging level in the job description is set for maximum logging (4, 0, \*SECLEVEL), then all the information is captured in the spooled file. To find the messages in the job log of an inactive job, go to 4.3.2, “Finding a job log for an inactive job” on page 37.

Active jobs have their job structures in the system and the associated job message queue is available. Perform the following steps to display the messages for an active job:

1. Return to a command line.
2. If you are looking for messages for:
  - Your own job, go to step 9 on page 35.
  - Another user's job, continue with the next step.
3. Enter `WRKACTJOB` to display a list of active jobs. A display of active jobs appears, as shown in Figure 24 on page 34.

```

Work with Active Jobs ITSOSYS1
 07/01/99 15:00:49
CPU %: .0 Elapsed time: 00:00:00 Active jobs: 139

Type options, press Enter.
 2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
 8=Work with spooled files 13=Disconnect ...

Opt Subsystem/Job User Type CPU % Function Status
QBATCH QSYS SBS .0
QCMN QSYS SBS .0
QCTL QSYS SBS .0
 QSYSSCD QPGMR BCH .0 PGM-QEZSCNEP EVIW
QINTER QSYS SBS .0
 QPADEV0001 OPER01 INT .0 CMD-WRKACTJOB RUN
 QPADEV0002 ITSCID02 INT .0 * -CMDENT DSPW
 QPADEV0004 ITSCID02 INT .0 * -CMDENT DSPW
 QPADEV0005 OPER02 INT .0 * -CMDENT DSPW

More...

Parameters or command
====>
F3=Exit F5=Refresh F7=Find F10=Restart statistics
F11=Display elapsed data F12=Cancel F23=More options F24=More keys

```

Figure 24. WRKACTJOB display

#### Tips

- Press F14 to include all jobs such as group, prestart, and system request jobs.
- If “More...” appears on the display, page forward or backward to continue searching for a job.

4. Locate the appropriate job on the Work with Active Jobs screen, and enter 5 in the Opt (option) column.
5. If this is the job you want to work with, continue with the next step. Otherwise, go to 5.6, “Finding a job name” on page 63.
6. Type 5 in the Opt (option) column next to the active job you want to select.
7. Press the Enter key. A display appears as shown in Figure 25.

```

 Work with Job
 System: ITSOSYS1
Job: QPADEV0001 User: OPER01 Number: 003210

Select one of the following:

 1. Display job status attributes
 2. Display job definition attributes
 3. Display job run attributes, if active
 4. Work with spooled files

 10. Display job log, if active or on job queue
 11. Display call stack, if active
 12. Work with locks, if active
 13. Display library list, if active
 14. Display open files, if active
 15. Display file overrides, if active
 16. Display commitment control status, if active

More...

Selection or command
====>

```

Figure 25. Work with Job display

8. Select option 10 (Display job log, if active or on job queue), and press the Enter key.
9. Enter DSPJOBLOG to display your own job log. A display appears as shown in Figure 26.

```

 Display Job Log
 System: ITSOSYS1
Job . . : QPADEV0001 User . . : OPER01 Number . . . : 003215

6>> dspjoblog

Press Enter to continue.

F3=Exit F5=Refresh F10=Display detailed messages F12=Cancel
F17=Top F18=Bottom

```

Figure 26. Display Job Log

10. Press F10 (Display detailed messages) to see all the messages. A display appears as shown in Figure 27 on page 36.

```

 Display All Messages
 System: ITSOSYS1
Job . . . : QPADEV0001 User . . . : OPER01 Number . . . : 003215

> /* */
3 > wrkactjob
3 > sndsrvrqs *test
 Vary on completed for line QESLINE.
 Vary on completed for controller QESCTL.
 Vary on completed for device QESPAP.
4 > DSPMSG QSYSOPR
 Switched line connection failed for file QLESCMNF in QSYS on device
 IBMSRV.
 Vary off completed for device QESPAP.
 Vary off completed for controller QESCTL.
 Vary off completed for line QESLINE.
 Cannot connect to IBM service system.
 Error occurred while processing request.

More...

Press Enter to continue.

F3=Exit F5=Refresh F12=Cancel F17=Top F18=Bottom

```

Figure 27. Display All Messages

- 11.If “Bottom” appears on the display, page backward. Otherwise, if “More...” appears on the display, page forward or backward to look for the message that relates to the problem.
- 12.Move the cursor to the line with a message that you want to save.
- 13.Press the F1 (Help key) to view the additional message information.
- 14.If this message relates to the problem, continue with the next step. Otherwise, press F12 (Cancel).
- 15.Press F6 (Print) to save this message as shown in Figure 28.

```

 Additional Message Information
Message ID : CPF4291 Severity : 50
Message type : Escape
Date sent : 07/16/99 Time sent : 15:12:25

Message : Switched line connection failed for file QLESCMNF in QSYS
on device IBMSRV.
Cause : The operator has canceled the switched connection.
Recovery : Close file QLESCMNF in library QSYS and then try the
request again.

Bottom

Press Enter to continue.

F3=Exit F6=Print F9=Display message details F12=Cancel
F21=Select assistance level

```

Figure 28. Pressing F6 to create a spooled file

16. Press F12 (Cancel) to cancel, and return to the Display All Messages display.
17. To continue looking for more messages, repeat steps 11 through 17. Continue saving the additional message information for each message that relates to the problem until all the message information has been saved.

### 4.3.1 Printing the job log

Job logs provide information about what occurred in any given job. It is useful when tracking a sequence of events, messages, operator responses, and time stamps, among others.

To print a job log, follow these steps:

1. To select the job from the WRKACTJOB screen, enter 5 in the Opt column.
2. Enter the following parameters on the command line to create a spooled file copy of the job log:

```
OPTION(*JOBLOG) OUTPUT(*PRINT)
```

A spooled file, with a file name of QPJOBLOG, is created and stored on an output queue.

Refer to Chapter 5, “Job information, job logs, and spooled files” on page 51.

#### Note

Review the method for locating the printed output in 1.7, “Finding your printed output” on page 12.

### 4.3.2 Finding a job log for an inactive job

Job logs are created with a print file identifier of QPJOBLOG. These spooled files are placed on the QEZJOBLOG output queue in the QUSRSYS library by default, unless the system has been modified to place them elsewhere. Browse this output queue to locate the required job log.

#### Tips

Consult your system administrator if the default for job log spooling output queue has been changed.

System cleanup deletes job logs after a pre-determined number of days. If you cannot find the required job log, use option 1 from the CLEANUP menu to determine how long job logs remain on your system before they are deleted.

If you know the user profile name and the job name associated with the required job log, use the Work with Jobs (WRKJOB) command to locate the jobs within the system. An example is illustrated in Figure 29 and Figure 30 on page 38.

Figure 29 on page 38 shows the Select Job screen resulting from the WRKJOB command. Enter option 1 to select the Work with Job screen for that job. The job log is found in the Work With Spooled Files option (option 4) of the Work with Job screen.

```

Command Entry
ITSOSYS1
Request level: 1

Previous commands and messages:
End of requests.
> wrkjob
> WRKJOB JOB(QSYS/SCPF)
A duplicate job named 000000/QSYS/SCPF was found.
A duplicate job named 000108/QSYS/SCPF was found.
A duplicate job named 001878/QSYS/SCPF was found.
A duplicate job named 008881/QSYS/SCPF was found.
A duplicate job named 013906/QSYS/SCPF was found.
A duplicate job named 013991/QSYS/SCPF was found.
A duplicate job named 040579/QSYS/SCPF was found.
A duplicate job named 045217/QSYS/SCPF was found.
End of duplicate names.

Type command, press Enter.
====> WRKJOB JOB(QSYS/SCPF)

F3=Exit F4=Prompt F9=Retrieve F10=Include detailed messages
F11=Display full F12=Cancel F13=Information Assistant F24=More keys

```

Figure 29. WRKJOB: Finding duplicate job names

Figure 30 shows the duplicate jobs found for the SCPF jobs run under the QSYS user profile. The display lists the fully qualified job names of all the jobs found on the system.

```

Select Job
ITSOSYS1
07/09/99 17:03:27

Type option, press Enter.
1=Select

Option Job User Number Type -----Status----- Entered
System
SCPF QSYS 000000 SYS ACTIVE 07/04/99
SCPF QSYS 045217 SYS OUTQ 06/23/99
SCPF QSYS 040579 SYS OUTQ 06/07/99
SCPF QSYS 013991 SYS OUTQ 02/25/99
SCPF QSYS 013906 SYS OUTQ 02/24/99
SCPF QSYS 008881 SYS OUTQ 01/12/99
SCPF QSYS 001878 SYS OUTQ 12/22/98
SCPF QSYS 000108 SYS OUTQ 12/04/98

F3=Exit F12=Cancel
Duplicate jobs found.

```

Figure 30. WRKJOB: Inactive jobs shown as OUTQ status

The current instance of the SCPF job any AS/400e server always has the system assigned job number of 000000. This is due to the fact that SCPF is always the first OS/400 job in the system after an IPL. On power down, the job number is

reassigned to the next available system number, to avoid a conflict of duplicate job numbers during the subsequent IPL.

## 4.4 Messages for subsystem and system jobs

*Subsystems* QBASE, QCTL, QINTER, QBATCH, QSPL, and QSNADS are examples of the IBM-supplied subsystem descriptions. *System jobs* (such as QSYSARB, QCLUS, and SCPF) contain useful information in their job message queues while active. When the jobs are inactive, the information is found in their job logs.

To find and save job logs for *inactive* subsystem or system jobs, see 5.5, “Saving the job log and spooled files for a job that has ended” on page 60. Perform the following steps for an *active* subsystem or system job:

1. Enter the `WRKACTJOB` command to list all active jobs. A display appears as shown in Figure 31.

| Work with Active Jobs                                              |               |               |          |              |              | ITSOSYS1          |
|--------------------------------------------------------------------|---------------|---------------|----------|--------------|--------------|-------------------|
|                                                                    |               |               |          |              |              | 02/07/99 23:55:55 |
| CPU %:                                                             | .0            | Elapsed time: | 00:00:00 | Active jobs: | 123          |                   |
| Type options, press Enter.                                         |               |               |          |              |              |                   |
| 2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message      |               |               |          |              |              |                   |
| 8=Work with spooled files 13=Disconnect ...                        |               |               |          |              |              |                   |
| Opt                                                                | Subsystem/Job | User          | Type     | CPU %        | Function     | Status            |
|                                                                    | QZISSERV      | QSVCM         | BCH      | .0           | PGM-QZISMAIN | DEQW              |
|                                                                    | QZRCRVSD      | QUSER         | BCH      | .0           |              | SELW              |
|                                                                    | QZSCRVSD      | QUSER         | BCH      | .0           |              | SELW              |
|                                                                    | QZSOSGND      | QUSER         | BCH      | .0           |              | SELW              |
|                                                                    | QZSOSMAPD     | QUSER         | BCH      | .0           |              | SELW              |
|                                                                    | QUSRWRK       | QSYS          | SBS      | .0           |              | DEQW              |
|                                                                    | QALERT        | QSYS          | SYS      | .0           |              | DEQW              |
|                                                                    | QCMNARB01     | QSYS          | SYS      | .0           |              | EVIW              |
|                                                                    | QCMNARB02     | QSYS          | SYS      | .0           |              | EVIW              |
|                                                                    |               |               |          |              |              | More...           |
| Parameters or command                                              |               |               |          |              |              |                   |
| ====>                                                              |               |               |          |              |              |                   |
| F3=Exit F5=Refresh F7=Find F10=Restart statistics                  |               |               |          |              |              |                   |
| F11=Display elapsed data F12=Cancel F23=More options F24=More keys |               |               |          |              |              |                   |

Figure 31. `WRKACTJOB`: System and subsystem jobs

### Note

A subsystem job has a type of SBS. A system job has a type of SYS.

2. A *system job* is a job initiated by the OS/400 operating system. Such work as controlling system resources and scheduling jobs is performed by system jobs.

System jobs can be divided into the following categories:

- Start-control-program-function (SCPF)
- System arbiter

- QSYSARB
- QSYSARB2
- QSYSARB3
- QSYSARB4
- QSYSARB5

- Logical unit services (QLUS)
- Work control block table cleanup (QWCBTCLNUP)
- Performance adjustment (QPFRADJ)
- Database server (QDBSRV01..nn)
- Decompress system object (QDCPOBJ1..nn)
- Job schedule (QJOBSCD)
- System spool maintenance (QSPLMAINT)
- Alert manager (QALERT)
- LU 6.2 resync (QLUR)
- File system (QFILESYS1)
- Database cross-reference system job (QDBSRVXR and QDBSRVXR2)
- Database parallelism (QQQTEMP1 and QQQTEMP2)
- Communications system jobs (QSYSCOMM1)
- Remote file system communications (Q400FILSVR)
- Communications arbiters (QCMNARB01.....nn)

The functions of the IBM-supplied subsystems are listed in Table 7.

*Table 7. IBM-supplied subsystems*

| IBM-supplied subsystem | Function                                      |
|------------------------|-----------------------------------------------|
| QBASE                  | Default controlling subsystem                 |
| QBATCH                 | Batch job subsystem                           |
| QCMN                   | Communications subsystem                      |
| QCTL                   | Controlling subsystem                         |
| QFNC                   | Finance subsystem                             |
| QINTER                 | Interactive subsystem                         |
| QLPINSTALL             | Licensed program installation subsystem       |
| QPGMR                  | Programmers subsystem                         |
| QSERVER                | Server (file, database, and system) subsystem |
| QSNADS                 | SNA distribution services subsystem           |
| QSPL                   | Spooling subsystem                            |
| QSYSSBSD               | Backup controlling subsystem                  |
| QSYSWRK                | System job subsystem                          |
| QUSRWRK                | User subsystem                                |

3. Type 5 in the Opt column next to the subsystem or system job listed on the Work with Active Job display with which you want to work. Refer to 4.3, “Finding messages in a job log” on page 33, for details on displaying the messages, printing message details, and producing a spooled job log.



Refer to *Work Management*, SC41-5306, for information regarding the functions of the various system and subsystem jobs.

## 4.5 Messages in the system operator message queue (QSYSOPR)

There are two methods to access the system operator message queue from a 5250 display. The system operators message queue may also be accessed from the Operations Console.

1. Enter the following command to display the QSYSOPR message queue:

```
DSPMSG QSYSOPR
```

2. Use the system request function, and select option 6 (SYSREQ).

Refer to *System Operation*, SC41-4203, for information on the modes of delivery for a message queue. Messages are responded to automatically if the queue is set to \*DFT.

Information on the handling of system operator messages with the Operations Navigator interface is included in 4.9, "Viewing messages with Operations Navigator" on page 49.

The QSYSOPR message queue on a 5250 display appears when the user's assistance level is set to intermediate, as shown in Figure 32.

Display Messages

|                                                                                     |                                                                                                |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Queue . . . . . : <b>QSYSOPR</b><br>Library . . . . : QSYS<br>Severity . . . . : 90 | System: ITSOSYS1<br>Program . . . . : *DSPMSG<br>Library . . . . :<br>Delivery . . . . : *HOLD |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|

Type reply (if required), press Enter.

Adapter has inserted or left the ring on line TRNLINE.  
Adapter has inserted or left the ring on line TRNLINE.  
Adapter has inserted or left the ring on line TRNLINE.  
Adapter has inserted or left the ring on line TRNLINE.  
PM/400 subsystem Q1PGSCH error  
Device DSP01 no longer communicating.  
Device DSP02 no longer communicating.  
Device DSP03 no longer communicating.  
Device DSP04 no longer communicating.  
Cleanup has started.  
Cleanup of user messages started.  
Cleanup of OfficeVision/400 calendar items started.  
Cleanup of operator and work station messages started.

More...

F3=ExitF11=Remove a messageF12=Cancel

F13=Remove allF16=Remove all except unansweredF24=More keys

Figure 32. QSYSOPR: System operator message queue

3. Locate the message that relates to the problem.
4. Move the cursor to the line with a message that you want to view or save.
5. Press F1 (Help) to view the additional message information.
6. Press F6 (Print) to save this message.
7. Press F12 (Cancel) to return to the Display Messages display.

8. Continue to review the system operator messages and gather further messages if required.
9. Press F12 (Cancel) to return to the display from where you entered the DSPMSG QSYSOPR command.

#### 4.5.1 Printing messages from the QSYSOPR message queue

The QSYSOPR message queue is a communication vehicle between system functions and the system operator. Its function is much the same as a job log is for a job. To print messages from the QSYSOPR message queue, follow these steps:

1. Type the DSPMSG command on the command line, and use the F4 key to prompt the options.
2. Enter QSYSOPR as the message queue name and \*PRINT for the output. A display appears as shown in Figure 33.

Display Messages (DSPMSG)

Type choices, press Enter.

|                         |           |                           |
|-------------------------|-----------|---------------------------|
| Message queue . . . . . | > QSYSOPR | Name, *WRKUSR, *SYSOPR... |
| Library . . . . .       | *LIBL     | Name, *LIBL, *CURLIB      |
| Output . . . . .        | > *PRINT  | *, *PRINT, *PRTWRAP       |

Additional Parameters

|                                 |       |                          |
|---------------------------------|-------|--------------------------|
| Message type . . . . .          | *ALL  | *ALL, *INFO, *INQ, *COPY |
| Messages to display first . . . | *LAST | *LAST, *FIRST            |
| Severity code filter . . . . .  | 0     | 0-99, *MSGQ              |
| Assistance level . . . . .      | *PRV  | *PRV, *USRPRF, *BASIC... |

Bottom

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

Figure 33. Printing the QSYSOPR message queue

3. Select any other parameters as requested by your service provider.
4. Press Enter to create a spooled file. The print file identifier is QPDSPMSG.

#### Note

Review the method for locating the printed output in 1.7, “Finding your printed output” on page 12.

## 4.6 Checking the contents of the additional message information

This section outlines the information in the message displays and spooled files discussed in this chapter.

Table 8 lists the components of the message display. All of the components listed can be determined from a display of a message or from the spooled file.

Table 8. Message information details

| Message information                                          | Refer to:            |
|--------------------------------------------------------------|----------------------|
| Message identifier                                           | Figure 34 on page 43 |
| From program                                                 | Figure 34 on page 43 |
| From program instruction                                     | Figure 34 on page 43 |
| To program                                                   | Figure 34 on page 43 |
| To program instruction                                       | Figure 34 on page 43 |
| Message text                                                 | Figure 34 on page 43 |
| LIC log identifier                                           | Figure 35 on page 44 |
| Error log (PAL) identifier                                   | Figure 36 on page 44 |
| Sense code identifier                                        | Figure 37 on page 45 |
| Reference to a failing controller line, controller or device | Figure 38 on page 45 |
| Reference to a manual                                        | Figure 39 on page 46 |
| Reference to another log or message queue                    | Figure 40 on page 46 |

Pressing F6 (Print) creates a spooled file named QPMHAMI. The user data shows the message identifier for the message saved. The spooled file contains the message that was saved. If you select the option to create a spooled job log, the print file name is QPJOBLOG.

```

 Display Spooled File
File : QPMHAMI
Control
Find
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8
Additional Message Information Page 1
5769SS1 V4R4M0 990521 ITSOSYS1 03/07/99 06:30:35
Message ID : CPD4090 Severity : 10
Date sent : 03/07/99 Time sent : 05:37:52
Message type : Diagnostic
From program : QDMCOPEN
 From library : QSYS
Instruction : 1406
To program : QUIOPEN
 To library : QSYS
Instruction : 0564
Coded character set ID : 65535
Message : Printer device PRT01 not found. Output queue changed to
 QPRINT in library QGPL.
Cause : The printer device PRT01 not found. The output queue was
 changed for the spooled printer file QSYSPRT in library QSYS.
Recovery : Do one of the following before you run the program again:
 -- Change or override the printer device name for the spooled printer file
 QSYSPRT in library QSYS using either the Change Printer File (CHGPRTF)

F3=Exit F12=Cancel F19=Left F20=Right F24=More keys

```

Figure 34. Additional message information

Figure 35 through Figure 41 on page 48 illustrate that diagnostic codes, such as VLOG identifiers, error log identifiers, and sense codes, as well as references to manuals and commands that are useful for problem determination are found.

```

 Display Formatted Message Text
 System: ITSOSYS1

Message ID : CPF8102
Message file : QCPFMMSG
Library : QSYS

Message : Class &4 in library &9 damaged.
Cause : Class &4 in library &9 has &8 damage and may not be
usable. The owner of the damaged class is &6. The VLOG dump identifier is
&7.
Recovery : Do one of the following:
 -- Delete the damaged class (DLTCLS command) and then create the class
 (CRTCLS command) again, or restore it from the saved media (RSTOBJ command).
 -- If the class is IBM-supplied and is in library QSYS, restore the
 operating system and select the option to restore programs and language
 objects on the Specify Install Options display. See the Backup and Recovery
 book, SC41-5304, for the procedure for restoring the operating system.

 Bottom

Press Enter to continue.

F3=Exit F11=Display unformatted message text F12=Cancel

```

Figure 35. Reference to an LIC log

```

 Additional Message Information

Message ID : CPF6792 Severity : 70
Message type : Information
Date sent : 07/02/99 Time sent : 07:41:13

Message : Device TAP01 needs to be cleaned.
Cause : The tape drive read/write heads have become dirty and need
to be cleaned.
Recovery : Clean drive TAP01 by following recommended cleaning
procedure and retry the operation. If the problem continues, use a new tape
for this operation because the tape media itself maybe bad.
Technical description : Error Log ID X'00000000'.

 Bottom

Press Enter to continue.

F3=Exit F6=Print F9=Display message details F12=Cancel
F21=Select assistance level

```

Figure 36. Reference to an error log (PAL)

```

Additional Message Information

Message ID : CPI5906 Severity : 70
Message type : Information
Date sent : 06/15/99 Time sent : 12:01:46

Message : Local system sent SNA negative response data to controller
TESTCTL on device *N.
Cause : The remote system may have sent Systems Network
Architecture (SNA) data that does not conform to SNA protocols or the
configuration is not correct.
Recovery : If the controller is a host system, this may not be an
error.
If the controller is a host-type controller, the remote system may have
more logical units varied on than there are device descriptions configured
or varied on and attached to the controller at the local system.
If the controller is an advanced program-to-program communications (APPC)
controller or host-type controller, verify the following device description
and mode parameters on both the local system and the remote system:
-- LCLLOCNAME (local location name)
-- RMTLOCNAME (remote location name)
-- MODE (mode)
-- LCLCTLSSN (locally controlled session)
-- MAXSSN (maximum session)
Technical description : The error log identifier is *N. The
local system sent either SNA sense code 08170001 or SNA UNBIND type *N.
Sense data and UNBIND types are described in SNA Formats, GA27-3136.

```

Figure 37. Reference to an SNA sense code and a manual

```

Additional Message Information

Message ID : CPC2607 Severity : 00
Message type : Completion
Date sent : 03/07/99 Time sent : 05:50:24

Message : Vary on completed for line QESLINE.
Cause : The vary configuration (VRYCFG) command was issued
requesting that line QESLINE be varied on.
Technical description : The status of line QESLINE will be
VARY ON PENDING until line initialization is completed or line failure
occurs.

Bottom

Press Enter to continue.

F3=Exit F6=Print F9=Display message details F12=Cancel
F21=Select assistance level

```

Figure 38. Reference to a line description

```

 Display Spooled File
File : QPMHAMI
Control
Find
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8
 Additional Message Information Page 1
5769SS1 V4R4M0 990521 ITSOSYS1 03/07/99 05:42:08
Message ID : CPI591A Severity : 70
Date sent : 01/07/99 Time sent : 18:16:12
Message type : Information
From job : QSYSARB
User : QSYS
Number : 001825
Coded character set ID : 65535
Message : Controller on line TRLINE varied off or not recognized by
 local system.
Cause : A remote station attempted to establish a local area
 network connection with this system. There is no controller on the local
 system that is varied on with remote adapter address (ADPTADR parameter)
 0004ACECBC0C, source service access point (SSAP parameter) 04, and
 destination service access point (DSAP parameter) 04.
Recovery : Verify the proper controllers are varied on. The line
 does not have to be varied off to be used again. Have the remote system
 operator try the request again.
If the line is configured to allow automatic creation of APPC controller
descriptions on LAN, repeat the request again. Also refer to the APPN
Support book, SC41-5407, under the chapter Automatic Configuration and
Connection Network Support for additional information.
 If the problem continues, report the problem (ANZPRB command).
 * * * * * E N D O F L I S T I N G * * * * *

```

Figure 39. Reference to a manual

```

 Additional Message Information
Message ID : TCP1A77
Date sent : 24/06/99 Time sent : 16:23:32

Message : STRTCP completed successfully; however errors occurred.

Recovery : Use the Display Job Log (DSPJOBLOG) CL command to see the
 previously listed messages in the job log.

 Bottom

Press Enter to continue.

F1=Help F3=Exit F6=Print F9=Display message details F12=Cancel
F21=Select assistance level

```

Figure 40. Reference to another log

---

## 4.7 Printing messages

There are several methods that allow a user to locate and print spooled output. In this section, we assume that all the required spooled files have been created in the current interactive job. Follow these steps:

1. Return to a display with a command line.
2. Enter the `WRKJOB` command. On the screen that appears, select option 4 to display a list of the spooled files created during the current interactive job.
3. If there is spooled output that you do not want to print, type 3 in the Opt (options) column. Choosing option 3 places the spooled file on hold.
4. Ensure that all the spooled files named QPMHAMI that you need to print are in RDY (ready) status.
5. Move the spooled files in RDY status to an output queue with a spool writer started. Your spooled files should now be printed.

Refer to the chapter on working with printer output in *System Operation*, SC41-4203, for further information on controlling the spooled files.

### Note

When signing off from an interactive job, use the F4 (Prompt) key, and enter `*LIST` for the Job Log parameter to cause a spooled file labelled QPJOBLOG to be written with the messages from the job. This is the preferred method of capturing all the messages associated with a job.

---

## 4.8 Finding details on a specific message number

When a message number has been recorded in relation to a problem, and the F6 (Print) function has not been used to gather the message details, use the `DSPMSGD` command to display the message text on the display. Follow these steps:

1. Type `DSPMSGD` on the command line, and press F4 to prompt the parameters. A display appears like the example shown in Figure 41 on page 48.

Display Message Description (DSPMSGD)

Type choices, press Enter.

Range of message identifiers:

|                               |         |                         |
|-------------------------------|---------|-------------------------|
| Lower value . . . . .         | *FIRST  | Name, *ALL, *FIRST      |
| Upper value . . . . .         | *ONLY   | Name, *ONLY, *LAST      |
| Message file . . . . .        | QCPFMSG | Name                    |
| Library . . . . .             | *LIBL   | Name, *LIBL, *CURLIB... |
| Detail . . . . .              | *FULL   | *BASIC, *FULL           |
| Format message text . . . . . | *YES    | *YES, *NO               |
| Output . . . . .              | *       | *, *PRINT               |

Bottom

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

Figure 41. Display Message Description display

2. Enter the following parameters:

- The message number or range of messages required
- The message file

Refer to the help text for the DSPMSGD command for further details on displaying a range of messages. The default message file is QCPFMSG, which is used for the following types of messages:

- CPAxxxx
- CPCxxxx
- CPDxxxx
- CPFxxxx
- CPlxxxx
- CPXxxxx

3. Specify the correct message file for the message you are attempting to display. Some of the message files are listed in Table 9 as an example. The message files present on an AS/400e server depend on the Licensed Program Products that are installed.

Table 9. Message files

| Messages            | Message file     |
|---------------------|------------------|
| Cobol (CBL)         | QCBL/QCBLMSG     |
| ILE Cobol (LNC)     | QCBLL/QLNCMSG    |
| Client Access (IWS) | QIWS/QIWSMSG     |
| Lotus Notes (LNT)   | QNOTES/QLTNSVMSG |
| Office (OFC)        | QOFC/QZOFMSG     |
| RPG (RPG)           | QRPGR/QRPGMSG    |



| Messages     | Message file     |
|--------------|------------------|
| ILE RPG      | QRPGLE/QRPGLEMSG |
| SQL (SQL)    | QSQL/QSQL4MSG    |
| TCP/IP (TCP) | QTCP/QTCPMSGF    |

## 4.9 Viewing messages with Operations Navigator

Operations Navigator uses a Windows 95 graphical user interface to access AS/400e server messages. Messages can be viewed (and printed) from the system operator and various user message queues.

Figure 42 shows the Operations Navigator displays related to viewing messages.

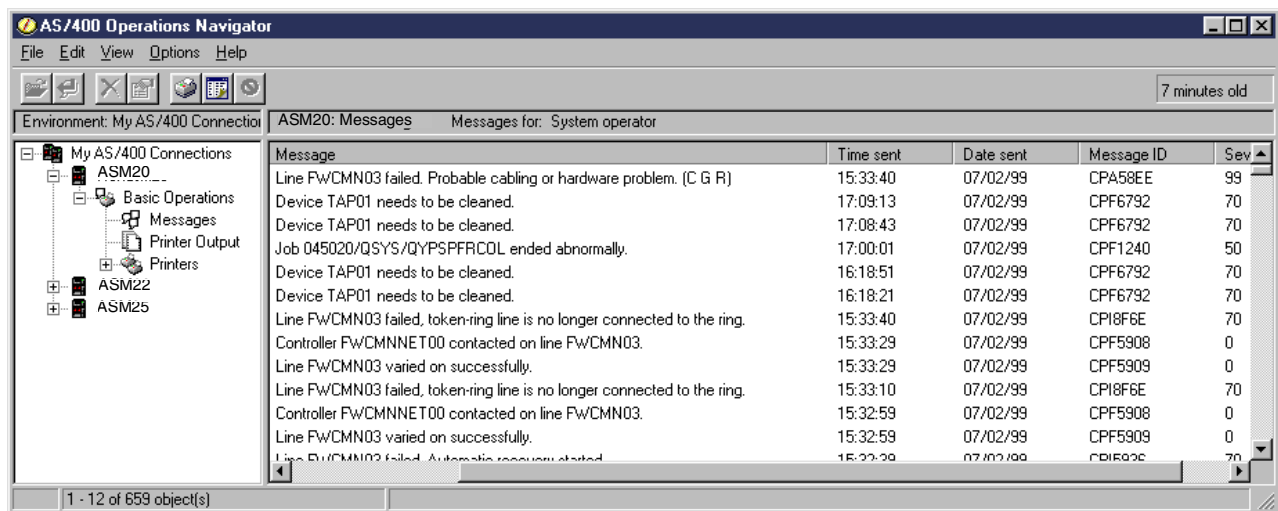


Figure 42. Operations Navigator: QSYSOPR message queue

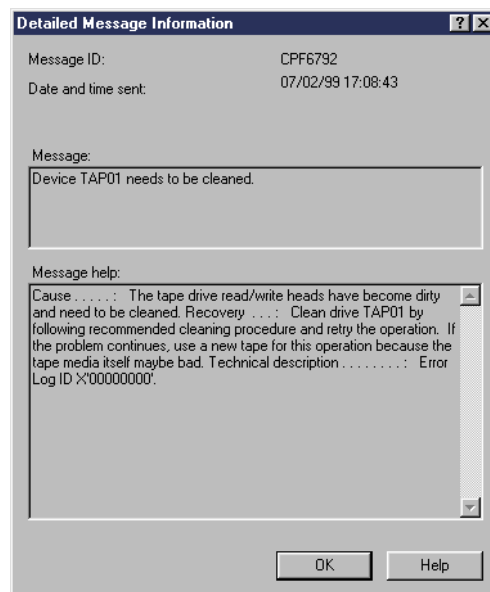


Figure 43. Operations Navigator: Message detail

Since the same level of detail is not available through Operations Navigator, we recommend that you use 5250 sessions to collect information for problem determination purposes.

---

## Chapter 5. Job information, job logs, and spooled files

A job log is one of the most important sources of information about a problem. It provides the complete picture of the steps performed in the job and the messages received by the job. The job log is the starting point for most problem determination.

This chapter explains how to collect job information, job logs, and spooled files for active and inactive user jobs. The instructions include how to find a job name, how to make sure a job log is produced for a job, and how to find spooled files for a job.

To determine whether the job log is complete, you need to understand the following terms:

- **Job information** (as used in this book): A spooled file that contains the information shown on the Work with Job screens.
- **Job log**: A spooled file that contains some or all of the messages that have been issued to the job message queue. AS/400e users filter out unwanted messages from the job log by changing the logging level for the job.
- **Message logging level**: Specified in the job description for the job.
- **Job description**: Specified in the user profile.

For further information on the relationship of the spooled output, job logging level, the job description, and the user profile, refer to *Work Management*, SC41-5306.

---

### 5.1 Getting started

Before you begin this chapter, be sure to review the information in Chapter 4, “Collecting messages” on page 29.

When faced with a problem, it is often appropriate to collect the job log for more than one job. Table 10 and Table 11 on page 52 can assist you in selecting the right job logs to collect for different problem areas.

Table 10. Information to collect by job type

| Job type                      | Information to collect                      |
|-------------------------------|---------------------------------------------|
| Active job                    | Job information<br>Job log<br>Spooled files |
| Inactive job                  | Job information<br>Job log<br>Spooled files |
| System jobs<br>Subsystem jobs | Job log<br>Spooled files                    |

Table 11. Job logs to check for different problem areas

| Problem area                                    | Job log to be checked                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------|
| Communications                                  | Communications subsystem<br>Communication server jobs<br>QLUS<br>System arbiter jobs |
| Device, job queue, or communications allocation | The subsystem                                                                        |
| IPL                                             | SCPF<br>System arbiter jobs                                                          |
| Locks                                           | The subsystem<br>QLUS<br>System arbiter jobs                                         |
| Printing                                        | QSPL<br>QBATCH                                                                       |
| Subsystem startup                               | The subsystem                                                                        |
| Vary on lines, controllers, or devices          | System arbiter jobs<br>QLUS                                                          |

**Note**

Review the method for locating the printed output in 1.7, “Finding your printed output” on page 12.

## 5.2 Setting the message logging level

The message logging level can be set so that all messages sent to the job message queues are saved in the job log. For batch jobs, a spooled file containing the job log is produced (if required) when the job ends. A job log is created for an interactive job when you sign off using the `SIGNOFF LOG(*LIST)` command.

### 5.2.1 Interactive job

To change the logging level for the current interactive job, the basic method is to use the Change Job (CHGJOB) command from the command line. Page forward to the Message Logging parameter. A display appears like the example shown in Figure 44.

Change Job (CHGJOB)

Type choices, press Enter.

**Message logging:**

|                                  |          |                               |
|----------------------------------|----------|-------------------------------|
| Level . . . . .                  | 4        | 0-4, *SAME                    |
| Severity . . . . .               | 00       | 0-99, *SAME                   |
| Text . . . . .                   | *NOLIST  | *SAME, *MSG, *SECLVL, *NOLIST |
| Log CL program commands . . . .  | *NO      | *SAME, *YES, *NO              |
| Inquiry message reply . . . . .  | *RQD     | *SAME, *RQD, *DFT, *SYSRPLY   |
| Break message handling . . . . . | *NORMAL  | *SAME, *NORMAL, *NOTIFY...    |
| Status message . . . . .         | *NORMAL  | *SAME, *USRPRF, *SYSVAL...    |
| DDM conversation . . . . .       | *KEEP    | *SAME, *KEEP, *DROP           |
| Schedule date . . . . .          | *SAME    | Date, *SAME, *CURRENT...      |
| Schedule time . . . . .          | *SAME    | Time, *SAME, *CURRENT         |
| Job date . . . . .               | 070599   | Date, *SAME                   |
| Date format . . . . .            | *MDY     | *SAME, *SYSVAL, *YMD, *MDY... |
| Date separator . . . . .         | '/'      | *SAME, *SYSVAL, *BLANK, /...  |
| Time separator . . . . .         | ':'      | *SAME, *SYSVAL, *BLANK, :...  |
| Job switches . . . . .           | 00000000 | Character value, *SAME        |

More...

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

Figure 44. CHGJOB: Message logging parameter

This method changes the logging level for the current job only.

To change the logging level on a permanent basis, or to change the logging level before a job starts, follow these steps:

1. Enter the following command to display the user profile of the current user or the user having the problem:

```
DSPUSRPRF USRPRF(user-profile)
```

Replace *user-profile* with the name of the user profile that is concerned.

2. Page forward to find the job description name and job description library. A display appears like the example shown in Figure 45 on page 54.

```

 Display User Profile - Basic

User profile : OPER01

Initial program : QCMD
 Library : *LIBL
Initial menu : MAIN
 Library : *LIBL
Limit capabilities : *NO
Text : ITSO user profile 01

Display sign-on information : *SYSVAL
Limit device sessions : *SYSVAL
Keyboard buffering : *SYSVAL
Maximum storage allowed : *NOMAX
 Storage used : 12
Highest scheduling priority : 3
Job description : QDFTJOB
 Library : QGPL

Press Enter to continue.

F3=Exit F12=Cancel
More...
```

Figure 45. Display User Profile display

In this example, QDFTJOB is the job description, and QGPL is the library for the job description.

3. Press F12 (Cancel) to cancel this display.
4. Enter the following command to work with the job description:

```
WRKJOB JOB(library/job-description-name)
```

Replace *library* with the name of the library and *job-description-name* with the name of the job description found in step 1.

5. Enter 5 in the Opt column next to the name of the job description to display the job description.
6. Page forward to find the Message logging parameter. A display appears like the example in Figure 46.

|                                   |         |                  |
|-----------------------------------|---------|------------------|
| Display Job Description           |         | System: ITSOSYS1 |
| Job description:                  | QDFTJOB | Library: QGPL    |
| <b>Message logging:</b>           |         |                  |
| Level . . . . .                   | :       | 4                |
| Severity . . . . .                | :       | 0                |
| Text . . . . .                    | :       | *NOLIST          |
| Log CL program commands . . . . . | :       | *NO              |
| Accounting code . . . . .         | :       | *USRPRF          |
| Print text . . . . .              | :       | *SYSVAL          |
|                                   |         |                  |
| Routing data . . . . .            | :       | QCMDI            |
|                                   |         |                  |
| Request data . . . . .            | :       | *NONE            |
|                                   |         |                  |
| Device recovery action . . . . .  | :       | *SYSVAL          |
| Press Enter to continue.          |         | More...          |
| F3=Exit F12=Cancel                |         |                  |

Figure 46. DSPJOB: Message logging level

7. Record all the values for Level, Severity, and Text. Save these values and restore them to their original if necessary after all the information for the problem report is collected.
8. Press Enter to return to the Work with Job Description display.
9. Type 2 in the Opt column next to the name of the job description you used in the previous steps. This requests a change to the job description.
10. Press Enter. The Change Job Description (CHGJOB) display appears.
11. Press F10 (Additional parameters) to display more parameters. A display appears like the example shown in Figure 47 on page 56.

| Change Job Description (CHGJOB)     |                           |                               |                                        |
|-------------------------------------|---------------------------|-------------------------------|----------------------------------------|
| Type choices, press Enter.          |                           |                               |                                        |
| Job description . . . . .           | > QDFTJOB                 | Name                          |                                        |
| Library . . . . .                   | > QGPL                    | Name, *LIBL, *CURLIB          |                                        |
| Job queue . . . . .                 | QBATCH                    | Name, *SAME                   |                                        |
| Library . . . . .                   | QGPL                      | Name, *LIBL, *CURLIB          |                                        |
| Job priority (on JOBQ) . . . . .    | 5                         | 1-9, *SAME                    |                                        |
| Output priority (on OUTQ) . . . . . | 5                         | 1-9, *SAME                    |                                        |
| Print device . . . . .              | *USRPRF                   | Name, *SAME, *USRPRF...       |                                        |
| Output queue . . . . .              | *USRPRF                   | Name, *SAME, *USRPRF, *DEV... |                                        |
| Library . . . . .                   |                           | Name, *LIBL, *CURLIB          |                                        |
| Text 'description' . . . . .        | 'Default job description' |                               |                                        |
| Additional Parameters               |                           |                               |                                        |
| User . . . . .                      | *RQD                      | Name, *SAME, *RQD             |                                        |
| Print text . . . . .                | *SYSVAL                   |                               |                                        |
|                                     |                           |                               | More...                                |
| F3=Exit                             | F4=Prompt                 | F5=Refresh                    | F12=Cancel F13=How to use this display |
| F24=More keys                       |                           |                               |                                        |

Figure 47. CHGJOB display

12. Page forward to find the Message logging parameter. A display appears like the example shown in Figure 48.

| Change Job Description (CHGJOB)   |           |                               |                                        |
|-----------------------------------|-----------|-------------------------------|----------------------------------------|
| Type choices, press Enter.        |           |                               |                                        |
| Accounting code . . . . .         | *USRPRF   |                               |                                        |
| Routing data . . . . .            | 'QCMDI'   |                               |                                        |
| Request data or command . . . . . | *NONE     |                               |                                        |
|                                   |           |                               |                                        |
| CL syntax check . . . . .         | *NOCHK    | 0-99, *SAME, *NOCHK           |                                        |
| Initial library list . . . . .    | *SYSVAL   | Name, *SAME, *SYSVAL, *NONE   |                                        |
| + for more values                 |           |                               |                                        |
| End severity . . . . .            | 30        | 0-99, *SAME                   |                                        |
| <b>Message logging:</b>           |           |                               |                                        |
| Level . . . . .                   | 4         | 0-4, *SAME                    |                                        |
| Severity . . . . .                | 00        | 0-99, *SAME                   |                                        |
| Text . . . . .                    | *NOLIST   | *SAME, *MSG, *SECLVL, *NOLIST |                                        |
| Log CL program commands . . . . . | *NO       | *SAME, *NO, *YES              |                                        |
|                                   |           |                               | More...                                |
| F3=Exit                           | F4=Prompt | F5=Refresh                    | F12=Cancel F13=How to use this display |
| F24=More keys                     |           |                               |                                        |

Figure 48. CHGJOB: Message logging

13. In the Level prompt, type 4 if it does not already appear there.

14. In the Severity prompt, type 00 if it is not already there.

15. In the Text prompt, type \*SECLVL if it does not already appear there.



16. Press the Enter key. A message appears showing that the job description was changed. All messages are logged for any new job using this job description.
17. New jobs that use the changed QDFTJOB job description will produce a job log with maximum information in the job log, until the original settings recorded in step 7 are restored.

## 5.2.2 Batch jobs

Batch jobs use the same parameters as discussed in the previous section for controlling the level of messages recorded in the job log. Change the Message logging parameter in the job description that is invoked when the batch job starts. New batch jobs then create a job log containing the maximum message information.

Two additional factors to consider when dealing with batch jobs are:

- Batch jobs usually do not create a job log unless the job is considered to have terminated abnormally. This is due to the Text parameter being set to \*NOLIST, causing a job log to be produced only when there is a message with a severity higher than 20 encountered in the job.
- Batch jobs can optionally override the logging level or the job description at the time the job is submitted with the SBMJOB command. Press F10 for Additional parameters and page forward. The display shown in Figure 49 appears and highlights where the Message Logging may be altered.

Submit Job (SBMJOB)

Type choices, press Enter.

|                                                                             |          |                              |
|-----------------------------------------------------------------------------|----------|------------------------------|
| System library list . . . . .                                               | *CURRENT | *CURRENT, *SYSVAL            |
| Current library . . . . .                                                   | *CURRENT | Name, *CURRENT, *USRPRF...   |
| Initial library list . . . . .                                              | *CURRENT | Name, *CURRENT, *JOB...      |
| + for more values                                                           |          |                              |
| <b>Message logging:</b>                                                     |          |                              |
| Level . . . . .                                                             | *JOB     | 0-4, *JOB                    |
| Severity . . . . .                                                          | *JOB     | 0-99, *JOB                   |
| Text . . . . .                                                              | *JOB     | *JOB, *MSG, *SECLVL, *NOLIST |
| Log CL program commands . . . . .                                           | *JOB     | *JOB, *NO, *YES              |
| Inquiry message reply . . . . .                                             | *JOB     | *JOB, *RQD, *DFT, *SYSRPLY   |
| Hold on job queue . . . . .                                                 | *JOB     | *JOB, *NO, *YES              |
| Schedule date . . . . .                                                     | *CURRENT | Date, *CURRENT, *MONTHSTR... |
| Schedule time . . . . .                                                     | *CURRENT | Time, *CURRENT               |
| Job date . . . . .                                                          | *JOB     | Date, *JOB, *SYSVAL          |
| Job switches . . . . .                                                      | *JOB     | Character value, *JOB        |
| Allow display by WRKSBMJOB . . . . .                                        | *YES     | *YES, *NO                    |
| More...                                                                     |          |                              |
| F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display |          |                              |
| F24=More keys                                                               |          |                              |

Figure 49. SBMJOB: Message logging

### Tip

Submit a batch job to a job queue that is held. The job may then be changed using the CHGJOB command before it starts running.

---

## 5.3 Message logging parameters

The messages that are logged to a job log are controlled by three parameters: level, security, and text.

### 5.3.1 Level

The level parameter consists of the following values:

- 0** No data is logged.
- 1** All messages sent to the job's external message queue with a severity level greater than or equal to the specified message severity are logged. This includes the indications of job start, job end, and job completion status.
- 2** Logging level 1 information  
Requests that are entered on a command line or commands that are logged from a CL program, which result in a high-level message with a severity code greater than or equal to the severity specified, cause the request or command and all associated messages to be logged.
- 3** Logging level 1 information  
All requests entered on a command line or commands being logged from a CL program. Requests entered on a command line or commands being logged from a CL program, which result in a high-level message with a severity code greater than or equal to the severity specified, cause all associated messages to be logged.
- 4** This value represents all requests that entered on a command line or commands that are logged from a CL program, as well as all messages with a severity code greater than or equal to the severity specified, including trace messages.

### 5.3.2 Severity

The second of the three message logging values specifies the minimum severity level that causes error messages to be logged in the job logs of jobs that use this job description. Specify a value, ranging from 00 through 99, that indicates the lowest severity level that causes an error message to be logged in the job's log. Only messages that have a severity code greater than or equal to this value are logged in the job's log. The highest (most severe) message severity is 99.

### 5.3.3 Text

The text parameter consists of the following values:

- \*MSG** Only message text is written to the job's log.
- \*SECLVL** Both the message text and message help of the error message is written to the job's log.
- \*NOLIST** No job log is produced if the job completes normally. If the job ends abnormally (if the end of job code is 20 or higher), a job log is produced. The messages appearing in the job's log contain both message text and online help information.

## 5.4 Saving the job information and spooled files for an active job

The jobs listed on the Work with Active Jobs display can be treated in the same manner when attempting to create any of the output listed below, or when locating any other spooled files that may be associated with that active job. The following sections describe the steps used to produce the spooled output for:

- A job log
- A spooled file with the job information

### 5.4.1 Saving the job log for any active job

To save the job log for an active job, follow these steps:

1. On a command line, enter the `WRKACTJOB` command.
2. Type `5` in the Opt column on the Work with Active Jobs screen to select the job.
3. Enter the parameters on the command line as shown in Figure 50 to create a job log spooled file.

Work with Active Jobs

ITSOSYS107/05/9914:25:19

CPU %: .0 Elapsed time: 00:00:00 Active jobs: 152

Type options, press Enter.  
2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message  
8=Work with spooled files 13=Disconnect ...

| Opt | Subsystem/Job | User    | Type | CPU % | Function      | Status |
|-----|---------------|---------|------|-------|---------------|--------|
|     | NEWADM        | QTMHHTP | BCI  | .0    |               | TIMW   |
|     | QINTER        | QSYS    | SBS  | .0    |               | DEQW   |
|     | +QPADEV000P   | OPER01  | INT  | .0    | CMD-WRKACTJOB | RUN    |
| 5   | QPADEV0014    | OPER02  | INT  | .0    | PGM-QCMD      | DSPW   |
|     | QSERVER       | QSYS    | SBS  | .0    |               | DEQW   |
|     | QPWFSEVSD     | QUSER   | BCH  | .0    |               | SELW   |
|     | QSERVER       | QPGMR   | ASJ  | .0    |               | EVIW   |
|     | QZDASVSD      | QUSER   | BCH  | .0    |               | SELW   |
|     | QZLSSERVER    | QPGMR   | BCH  | .0    |               | EVIW   |

Parameters or command  
==> option(\*joblog) output(\*print)  
F3=Exit F5=Refresh F7=Find F10=Restart statistics  
F11=Display elapsed data F12=Cancel F23=More options F24=More keys

More...

Figure 50. Generating a job log from the Work with Active Jobs display

A spooled file with a file name of QPJOBLOG is created.

### 5.4.2 Saving the job information for an active job

To save the job information for an active job, follow these steps:

1. To locate the active job, type `WRKACTJOB` on a command line.
2. Type `5` in the Opt column on the Work with Active Jobs screen to select the job.
3. Enter the parameters on the command line, as shown in Figure 51 on page 60, to create a job log spooled file.

```

Work with Active Jobs
ITSOSYS1
07/05/99 14:25:19
CPU %: .0 Elapsed time: 00:00:00 Active jobs: 152

Type options, press Enter.
2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
8=Work with spooled files 13=Disconnect ...

Opt Subsystem/Job User Type CPU % Function Status
NEWADM QTMHHTTP BCI .0 TIMW
QINTER QSYS SBS .0 DEQW
+QPADEV000P OPER01 INT .0 CMD-WRKACTJOB RUN
5 QPADEV0014 OPER02 INT .0 PGM-QCMD DSPW
QSERVER QSYS SBS .0 DEQW
QPFSEVSD QUSER BCH .0 SELW
QSERVER QPGMR ASJ .0 EVIW
QZDASVSD QUSER BCH .0 SELW
QZLSERVER QPGMR BCH .0 EVIW

More...

Parameters or command
====> output (*print)
F3=Exit F5=Refresh F7=Find F10=Restart statistics
F11=Display elapsed data F12=Cancel F23=More options F24=More keys

```

Figure 51. Creating a job information spooled file from Work with Active Jobs display

A spooled file with a file name of QPDSPJOB is created.

### 5.4.3 When a display is input inhibited

When commands cannot be entered due to an input inhibited condition, try one of the following alternatives to access a command line:

- Press the Reset key.
- Press the System Request key. If the System Request menu is displayed, select option 1 (Display sign-on for an alternative job). Sign on and use the WRKACTJOB command as previously discussed.
- Press the System Request key. If the System Request menu is displayed, select option 3 (Display current job). If the message text for CPX2313 has been altered to substitute WRKJOB for DSPJOB, a command line is presented at the bottom of the Work with Job screen. Use the WRKACTJOB command as previously discussed.
- Use an alternate session or another terminal.

#### Tip

Refer to the Support Line Knowledge Base for details on modifying the message description for CPX2313, to use the WRKJOB command from the System Request menu, and on accessing a command line.

## 5.5 Saving the job log and spooled files for a job that has ended

A job that is ended is also called an *inactive job*. A job log is produced for all jobs that end abnormally. An inactive job cannot be found if it does not have any spooled files. Once a job is inactive, the job message queue no longer exists. The

messages are written to the spooled job log at the end of the job. The message logging level determines the amount of detail that is preserved in the job log.

Some details about the job name must be known to locate the spooled output associated with an inactive job.

**Note**

A complete job name (qualified job name) contains a name, a user, and a number. The system assigns all the job numbers.

### 5.5.1 The qualified job name is known

When the qualified job name for a job is known, use the following command to locate the spooled files associated with a job that has ended:

```
WRKJOB JOB (number/user/job-name) OPTION (*SPLF)
```

Replace *number/user/job-name* with the number, user, and name of the inactive job. The list of spooled output associated with the job is displayed.

### 5.5.2 Part of the qualified job name is known

When only part of the job name is known for the job, use the following sections to determine where the spooled files are for a job that has ended.

#### 5.5.2.1 When the job name is known

On a command line, enter:

```
WRKJOB JOB (job-name) OPTION (*SPLF)
```

Replace *job-name* with the name of the job. A display appears like the example shown in Figure 52 on page 62.

Select Job ITSOSYS1  
 07/05/99 16:50:32

Type option, press Enter.  
1=Select

| Option | Job        | User   | Number | Type  | -----Status----- | Entered<br>System |
|--------|------------|--------|--------|-------|------------------|-------------------|
|        | QPADEV0014 | OPER01 | 044401 | INTER | OUTQ             | 06/29/99          |
|        | QPADEV0014 | OPER01 | 044349 | INTER | OUTQ             | 06/29/99          |
|        | QPADEV0014 | OPER02 | 025980 | INTER | OUTQ             | 03/23/99          |
|        | QPADEV0014 | OPER02 | 044712 | INTER | OUTQ             | 06/30/99          |
|        | QPADEV0014 | OPER03 | 024345 | INTER | OUTQ             | 03/19/99          |

Bottom

F3=Exit    F12=Cancel  
 Duplicate jobs found.

Figure 52. WRKJOB: Duplicate jobs found

Note that all the jobs listed in Figure 52 have the same value in the Job column in each case. The User and Number columns differentiate the various jobs.

Select the appropriate job by entering option 1, and view the Work with Job panel.

#### 5.5.2.2 When the user name is known

On the command line, type:

```
WRKUSRJOB USER(user)
```

Replace *user* with the user name of the job. A display appears like the example shown in Figure 53.

```

Work with User Jobs
07/05/99 16:57:34
ITSOSYS1

Type options, press Enter.
 2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
 8=Work with spooled files 13=Disconnect

Opt Job User Type -----Status----- Function
 QDFTJOB OPER01 BATCH JOBQ
 QPADEV000P OPER01 INTER ACTIVE CMD-WRKJOB
 QPADEV0014 OPER01 INTER ACTIVE CMD-WRKUSRJOB
 QPADEV0015 OPER01 INTER OUTQ

Parameters or command
====>
F3=Exit F4=Prompt F5=Refresh F9=Retrieve F11=Display schedule data
F12=Cancel F21=Select assistance level

Bottom

```

Figure 53. WRKUSRJOB display

Notice that the Job name differs for each entry in Figure 53.

Select the appropriate job by entering option 5, and view the Work with Job panel.

## 5.6 Finding a job name

To assist with finding a job name on the Work with Active jobs display, follow this process:

1. If the job is active, enter the `WRKACTJOB` command to list all active jobs on the system. A display appears like the one in Figure 54 on page 64.

```

Work with Active Jobs
ITSOSYS1
07/05/99 17:22:43
CPU %: .1 Elapsed time: 00:32:23 Active jobs: 151

Type options, press Enter.
2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
8=Work with spooled files 13=Disconnect ...

Opt Subsystem/Job User Type CPU % Function Status
NEWADM QTMHHTTP BCI .0 TIMW
QINTER QSYS SBS .0 DEQW
QPADEV000P OPER01 INT .0 MNU-MAIN DSPW
QPADEV0014 OPER01 INT .0 CMD-WRKACTJOB RUN
QSERVER QSYS SBS .0 DEQW
QPWFSESVSD QUSER BCH .0 SELW
QSERVER QPGMR ASJ .0 EVIW
QZDASRVSD QUSER BCH .0 SELW
QZLSERVER QPGMR BCH .0 EVIW

More...

Parameters or command
====>
F3=Exit F5=Refresh F7=Find F10=Restart statistics
F11=Display elapsed data F12=Cancel F23=More options F24=More keys

```

Figure 54. WRKACTJOB display

The indentation shows the jobs that are running in a subsystem monitor. Subsystem monitor and system jobs are not indented. For example, QPADEV0014 is running in subsystem QINTER.

2. Press F14 to include all jobs such as group jobs, prestart jobs, and system request jobs.
3. If “More...” appears on the display, page forward to continue searching for a job.
4. Match the job type in Table 12 with the job type listed on the Work with Active Jobs display, which is shown in Figure 54, to determine how job names are assigned.

Table 12. WRKACTJOB: Job type details

| Job type | Description                 | Job name                                       | User name                            |
|----------|-----------------------------|------------------------------------------------|--------------------------------------|
| ASJ      | Autostart                   | Specified in the subsystem Autostart job entry | Specified in the job description     |
| BAT      | Batch                       | Specified in the SBMJOB command                | Specified in user job description    |
| EVK      | Evoke                       | Communications device name                     | Specified on procedure start request |
| INT      | Interactive                 | Workstation name                               | User name entered on sign-on         |
| MRT      | Multiple requester terminal | Procedure name                                 | User who starts the job              |



| Job type | Description       | Job name                                | User name                            |
|----------|-------------------|-----------------------------------------|--------------------------------------|
| PJ       | Prestart          | Name of the program started for the job | User profile associated with the job |
| PDJ      | Print driver job  | Name of the writer                      | QSPLJOB                              |
| RDR      | Reader            | The name of the reader                  | QSPLJOB                              |
| SBS      | Subsystem monitor | Name of the subsystem                   | QSYS                                 |
| SYS      | System            | Name of the system job                  | QSYS                                 |
| WTR      | Writer            | Name of the writer                      | QSPLJOB                              |

### 5.6.1 Finding the job and user name for an autostart job

Use the following steps to find the job and user name for an autostart job:

1. On a command line, enter:

```
DSPSBSD SBSD(library/subsystem)
```

Replace *library/subsystem* with the name of the library and subsystem that ran the failing autostart job.

2. Select the Autostart job entries. A display appears as shown in Figure 55.

Display Autostart Job Entries

System: ITSOSYS1

Subsystem description: QSERVER      Status: ACTIVE

| Job     | Job Description | Library |
|---------|-----------------|---------|
| QSERVER | QPWFSEVER       | QSYS    |

Bottom

Press Enter to continue.

F3=Exit    F12=Cancel

Figure 55. Display Autostart Job Entries: Locating the job description

3. Record the name shown in the Job column. This is the job name.
4. Record the name shown in the Job Description and Library columns.
5. Press the Enter key.

6. Enter the following command on the command line:

```
DSPJOBDB JOBD(library/job-description)
```

Replace *library/job-description* with the information recorded in the previous step. A display appears as shown in Figure 56.

Display Job Description

System: ITSOSYS1

Job description: QPWFSEVER      Library: QSYS

User profile . . . . . : QPGMR

CL syntax check . . . . . : \*NOCHK

Hold on job queue . . . . . : \*NO

End severity . . . . . : 30

Job date . . . . . : \*SYSVAL

Job switches . . . . . : 00000000

Inquiry message reply . . . . . : \*RQD

Job priority (on job queue) . . . . . : 5

Job queue . . . . . : QBATCH

Library . . . . . : QGPL

Output priority (on output queue) . . . . . : 5

Printer device . . . . . : \*USRPRF

Output queue . . . . . : \*USRPRF

Library . . . . . :

More...

Press Enter to continue.

F3=Exit    F12=Cancel

Figure 56. Display Job Description: Finding the user profile

The user name is the User profile in the job description.

7. Press F3 (Exit) to exit.

The job name and the user name are now known.

### 5.6.2 Finding the job and user name for a prestart job

Use the following steps to find the job and user name for a prestart job:

1. Enter the following command on the command line:

```
DSPSBSD SBSD(library/subsystem)
```

Replace *library/subsystem* with the name of the library and subsystem that ran the failing prestart job.

2. Select Prestart job entries. A display appears like the example shown in Figure 57.

Display Prestart Job Entries

Subsystem description: QSERVER

Status: ACTIVE

System: ITSOSYS1

Type options, press Enter.  
5=Display details

| Opt | Program    | Library | User Profile |
|-----|------------|---------|--------------|
|     | QPWFSEVSO  | QSYS    | QUSER        |
|     | QPWFSEVSS  | QSYS    | QUSER        |
|     | QPWFSEVSS2 | QSYS    | QUSER        |
|     | QPWFSTP0   | QSYS    | QUSER        |
|     | QPWFSTP1   | QSYS    | QUSER        |
|     | QPWFSTP2   | QSYS    | QUSER        |
|     | QTFPJTCP   | QIWS    | QUSER        |
|     | QZDAINIT   | QIWS    | QUSER        |
|     | QZDASOINIT | QIWS    | QUSER        |
|     | QZDASSINIT | QIWS    | QUSER        |
|     | QZLSFILE   | QSYS    | QUSER        |

F3=Exit    F9=Display all detailed descriptions    F12=Cancel

Bottom

Figure 57. Display Prestart Job Entries

3. Record the name shown in the Program column. This is the job name.
4. Record the user name. The user name is the user profile.
5. Press F3 (Exit) to exit.

The job name and user name are now known.

## 5.7 Verifying the contents of the job log

Use the following steps to verify that the job log contains the information pertaining to the problem that you are reporting to your service provider:

1. View the spooled file of the job log (file name QPJOBLOG) on a display. We recommend that you use a display session with 132-column capability.
2. Verify that the job log contains a record of commands, information, and error messages that occurred while the job was running.

Figure 58 on page 68 shows an example of a job log. Table 13 identifies the areas of interest in the display for the first message in Figure 58 on page 68.

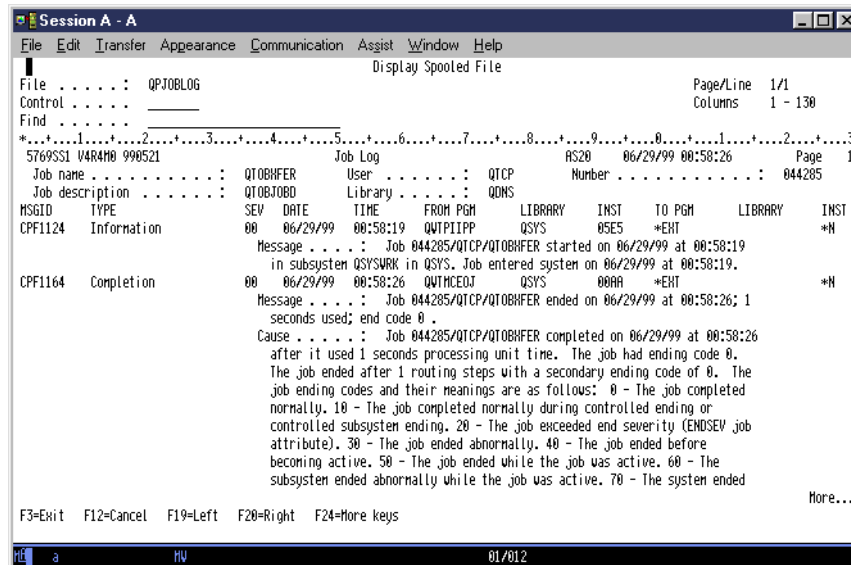


Figure 58. Display Spooled File: A spooled job log

Table 13. Verifying job log messages

| Item                                 | Value                                                 |
|--------------------------------------|-------------------------------------------------------|
| Job name                             | QTOBXFER/QTCP/044285                                  |
| Job description                      | QTOBJOBD                                              |
| Time and date the message was sent   | 00:58:19 06/29/99                                     |
| Message identifier                   | CPF1124                                               |
| Severity                             | 00                                                    |
| Type of message                      | Information                                           |
| Message text                         | Job .../.../... started on .../.../... at ...:...:... |
| Program sending the message          | QVTPIIP                                               |
| Instruction in the sending program   | 05E5                                                  |
| Program receiving the message        | *EXT                                                  |
| Instruction in the receiving program | *N                                                    |

### 5.7.1 Job logs and Operations Navigator

Operations Navigator can be used to either view or print spooled output such as job logs and job information. Operations Navigator uses the AFP Workbench Viewer to enable users to view and print AS/400e spooled output on their personal computer.

Because the information is presented in a similar form to the traditional 5250 screen view shown in this chapter, refer to Figure 58 for an example of the information displayed. For further information on using Operations Navigator to examine spooled files, such as job logs, refer to the Client Access Express publications and online documentation.

---

## Chapter 6. Collecting the history log (QHST)

The history log (QHST) provides a high-level audit trail of the activities performed on the server. It is a collection of AS/400 system messages. This log contains messages about the events within the system, including:

- Authorization violations
- Changes in device status
- Communication errors
- Copies of system operator messages
- Database information
- Hardware error notification
- IPL and install information
- Job-level information
- PTF information
- Subsystem information
- System-level information

This chapter describes how to save all or part of the history log.

---

### 6.1 Getting started

To understand the benefit and use of the history log, AS/400e users must first have knowledge of the AS/400e messages as discussed in Chapter 4, “Collecting messages” on page 29, or in the following manuals:

- *System Operation*, SC41-4203
- *Basic System Operation, Administration, and Problem Handling*, SC41-5206

Additional message information (second level help text) must be viewed from the history log. Additional message information does not appear in the spooled file, labelled QPDSPLOG, which contains the listing of the history log.

To view the additional message information for the messages in the history log, go to 6.2, “Checking the contents of messages in the history log (QHST)” on page 69.

#### Note

Review the method for locating the printed output in 1.7, “Finding your printed output” on page 12.

---

### 6.2 Checking the contents of messages in the history log (QHST)

The main user interface to working with the messages in the history log is the Display Log (DSPLOG) command. This command has a number of parameters that allow the user to filter a subset of messages to the display or to a spooled file. To check the contents of the messages in the history log, follow these steps:

1. Type `DSPLOG` on a command line. Use the F4 (Prompt) key if you want to view a subset of the history log. The command defaults position you at the first message occurring in the log for the current date. Subsequent sections in this

chapter provide details on how to extract a subset of messages from the history log.

2. Press the Enter key. A display appears like the example shown in Figure 59.

Display History Log Contents

```
Controller_RWPCTL on line TRNLIN not contacted. Probable configuration problem
C
Verify alignment on device PRT01, (I C G N R)
I
Device SCS3812 not available. (C R)
Device FRJ5219 not available. (C R)
Job 006287/QSPLJOB/PRT01 Started on 04/26/92 at 22:59:04 in subsystem QSPL IN
Writer 006287/QSPLJOB/PRT01 started.
Verify alignment on device PRT01. (I C G N R)
Verify alignment on device PRT01. (I C G N R)
G
Writer 006287/QSPLJOB/PRT01 ended normally.
Job 006287/QSPLJOB/PRT01 completed on 04/26/92 at 22:59:22. 1 seconds process
Job 006288/QSPLJOB/PRT01 started on 04/26/92 at 23:00:19 in subsystem QSPL in
Writer 006288/QSPLJOB/PRT01 started.
Verify alignment on device PRT01. (I C G N R)
Device SCS3812 not available. (C R)

More...

Press Enter to continue.

F3=Exit F10=Display all F12=Cancel
```

Figure 59. Display History Log Contents

3. If “More...” appears on the display, page forward or backward to continue searching for a message.
4. Move the cursor to a message that relates to the problem.
5. Press the F1 (Help) key to view the additional message information.
6. If this message indicates the problem, continue with the next step. Otherwise, go to step 9.
7. Check the additional message information in a message for references to an error log, a Vertical Licensed Internal Code (VLIC) log ID, or other useful information. Record details of information that will be used later to locate further problem information. To check the additional message information, go to the following section.
8. Press F6 (Print) to save additional message information.
9. Press F12 (Cancel) to return to the history log.
10. If you need to find more messages in the history log that relate to the problem, repeat steps 3 through step 9. Otherwise, continue with the next step.
11. Press F12 (Cancel) to cancel the Display History Log Contents display.

See 6.4, “Saving the history log (QHST)” on page 76, for details on how to print the history log.

### 6.2.1 Finding additional information in a message

Refer to 4.6, “Checking the contents of the additional message information” on page 42, for details on examining the messages for additional information.

## 6.3 Viewing part of the history log

When looking for particular messages in the history log, use the additional parameters of the DSPLOG command to perform the following functions:

- Find messages in QHST for a specific time period
- Find messages in QHST for specific jobs
- Find specific messages in QHST
- Find messages in QHST for the latest installation of software

Each of these options is described further in the following sections.

### 6.3.1 Finding messages in QHST for a specific period of time

Use the following steps to select messages in QHST for a specific period of time:

1. Type `DSPLOG` on a command line, and press F4 (Prompt).
2. Enter the beginning and ending time and date near the time that the problem occurred. A display appears like the example shown in Figure 60.
3. Set the Output parameter to `*PRINT` to create a spooled file with a file label of `QPDSPLOG`.

Display Log (DSPLOG)

Type choices, press Enter.

| Log . . . . .               | QHST     | QHST                   |
|-----------------------------|----------|------------------------|
| Time period for log output: |          |                        |
| Start time and date:        |          |                        |
| Beginning time . . . . .    | 08:00:00 | Time, *AVAIL           |
| Beginning date . . . . .    | 07/07/99 | Date, *CURRENT, *BEGIN |
| End time and date:          |          |                        |
| Ending time . . . . .       | 09:00:00 | Time, *AVAIL           |
| Ending date . . . . .       | 07/07/99 | Date, *CURRENT, *END   |
| Output . . . . .            | *        | *, *PRINT, *PRTWRAP    |

Bottom

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

Figure 60. *DSPLOG: Selecting messages by time period*

### Note

The first message that appears when displaying the history log is the first message that is found after the specified start time. Page forward or backward to see messages in the history log that may be outside the specified start and end time.

When displaying the history log to the screen, it is only necessary to specify a start time in the DSPLOG command. The end time is not required.

Specify an end time when creating a spooled file from the history log to limit the size of the file that is written.

## 6.3.2 Finding messages in QHST for specific jobs

Use the following steps to find messages in the history log for specific jobs:

1. Type `DSPLOG` on a command line, and press F4 (Prompt).
2. Press F10 (Additional parameters), and page forward to display additional parameters.
3. Move the cursor to the Jobs to display prompt. See the display in Figure 61.
4. Enter one or more job names. If you are entering more than one job name, use the + for more values parameter. Then, type the job names, and press the Enter key. The fully qualified job name must be used.

The output may be directed to the display or to a spooled file.

Display Log (DSPLOG)

Type choices, press Enter.

Additional Parameters

|                              |       |               |
|------------------------------|-------|---------------|
| Jobs to display . . . . .    | *NONE | Name, *NONE   |
| User . . . . .               |       | Name          |
| Number . . . . .             |       | 000000-999999 |
| + for more values            |       |               |
| Message identifier . . . . . | *ALL  | Name, *ALL    |
| + for more values            |       |               |

Bottom

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

Figure 61. Display Log: Jobs to display



**Note**

If you enter a job name without a number or user, the system will search for all jobs with the specified name.

### 6.3.3 Finding specific messages in QHST

Locating a specific message in the history log is used when searching for evidence of a problem that occurred some time ago. It is also used when you attempt to determine if the same symptom is being encountered in multiple jobs on the system.

Use the following steps to find specific messages in the history log:

1. Type `DSPLOG` on a command line, and press F4 (Prompt).
2. Press F10 (Additional parameters), and page forward to display additional parameters.
3. Move the cursor to the Message identifier prompt. See the display in Figure 62.

Display Log (DSPLOG)

Type choices, press Enter.

Additional Parameters

|                              |       |               |
|------------------------------|-------|---------------|
| Jobs to display . . . . .    | *NONE | Name, *NONE   |
| User . . . . .               |       | Name          |
| Number . . . . .             |       | 000000-999999 |
| + for more values            |       |               |
|                              |       |               |
| Message identifier . . . . . | *ALL  | Name, *ALL    |
| + for more values            |       |               |

Bottom

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

Figure 62. Display Log: Message identifier

The output may be directed to the display or to a spooled file.

### 6.3.4 Finding specific messages in QHST for a job in a specific time period

Locating specific messages that occur within a known time period can be used when you attempt to determine if more than one job is encountering the same problem.

Use the additional parameters in the DSPLOG command to define the search criteria. The following selections may be combined to find specific messages in QHST for a specific job in a specific time period.

Refer to the following sections for details on the parameters. Combine the parameters to produce the required selection:

- Section 6.3.1, “Finding messages in QHST for a specific period of time” on page 71
- Section 6.3.2, “Finding messages in QHST for specific jobs” on page 72
- Section 6.3.3, “Finding specific messages in QHST” on page 73

### 6.3.5 Finding messages in QHST for the latest installation

Following the installation of IBM-supplied software, or a cumulative PTF package, the history log may be scanned to determine the success of the operation.

Use the following steps to locate the messages that relate to the most recent installation of software or a cumulative PTFs package:

1. Enter `GO LICPGM` on the command line to display the Work with Licensed Programs display, and page forward. A display appears like the example shown in Figure 63. The help text for option 50 is shown prompted on this screen.

```

LICPGM Work with Licensed Programs System: ITSOSYS1

Select one of the following:

Secondary Languages
 20. Display installed secondary languages
 21. Install secondary languages
 22. Delete secondary languages

Redistribution
 40. Create a distribution tape
 41. Work with installation profiles

Completion Status
 50. Display log for messages
.....
: Option 50 - Help :
: :
Selecti : Select this option to display the status of the install process. :
====> : :
: Bottom : :
: F2=Extended help F3=Exit help F10=Move to top F12=Cancel :
F3=Exit : F13=Information Assistant F14=Print help :
F16=AS/ : :
:.....

```

Figure 63. Work with Licensed Programs: Display log for messages

2. Type `50` on the command line to display the log for messages. A display appears as shown in Figure 64.

Display Install History

Type choices, press Enter.

Start date . . . . .

06/23/99

MM/DD/YY

Start time . . . . .

18:12:23

HH:MM:SS

Output . . . . .

\*

\*, \*PRINT

F3=Exit

F12=Cancel

Figure 64. Display Install History

3. The date and time shown on the display indicate when the first message for the latest installation was sent to QHST.
4. The results may be displayed in one of the following ways:
  - To print the install messages in QHST, type `*PRINT` in the Output prompt, and press the Enter key. A spooled file with a file label of QPDSPLOG is produced.
  - To view the installation messages in QHST, press the Enter key. A display appears as shown in Figure 65 on page 76.

```
Display History Log Contents

Loading of PTFs started.
Loading of PTFs completed successfully.
Marking of PTFs for delayed application started.
Marking of PTFs for delayed application completed successfully.
PTFs installed successfully.
Apply PTF started.
Applying of PTFs for product 5769999 completed successfully.
Applying of PTFs for product 5769SS1 completed successfully.
Applying of PTFs for product 5769CB1 completed successfully.
Applying of PTFs for product 5769DG1 completed successfully.
Applying of PTFs for product 5769PT1 completed successfully.
Applying of PTFs for product 5769ST1 completed successfully.
Applying of PTFs completed.
*PGM objects for product 5769JS1 option *BASE release *FIRST restored.
License key information installed for 5769JS1.
*LNK objects for NLV 2924 for product 5769JS1 option *BASE release *FIRST res

Bottom

Press Enter to continue.

F3=Exit F10=Display all F12=Cancel
```

Figure 65. Display History Log Contents: Installation history

5. Press the Help key to view the additional message information.

---

## 6.4 Saving the history log (QHST)

In some environments, the history log may be saved to satisfy system audit requirements, or it may be copied to backup media simply to reduce disk utilization. As the cost of disk storage decreases, the benefits of saving the history log to media to save disk space continue to become less important.

The history log may be saved in two forms:

- As a spooled file
- As a file on tape

To save all or part of the history log (QHST) to a spooled file, set the Output parameter to \*PRINT, in conjunction with other additional parameters to produce a spooled file with a print label of QPDSPLOG.

OS/400 stores the history messages in files in library QSYS. Example files are shown in Figure 66.

```

Work with Files

Type options, press Enter.
 1=Create 3=Copy 4=Delete 5=Display physical file member
 8=Display file description 9=Save 10=Restore 13=Change description

Opt File Library Attribute Text

 QHST99158A QSYS PF 09906052100060990608175920
 QHST99159A QSYS PF 09906081759200990610001249
 QHST99161A QSYS PF 09906100012490990612174901
 QHST99163A QSYS PF 09906121749010990614130347
 QHST99165A QSYS PF 09906141303470990615085533
 QHST99166A QSYS PF 09906150855330990615220003
 QHST99166B QSYS PF 09906152200030990617141230
 QHST99168A QSYS PF 09906171412300990619175922
 QHST99170A QSYS PF 09906191759220990621180006
 QHST99172A QSYS PF 09906211800060990623180622

More...

Parameters for options 1, 3, 4, 5, 8, 9, 10 and 13 or command
====>
F3=Exit F4=Prompt F5=Refresh F9=Retrieve F11=Display names only
F12=Cancel F16=Repeat position to F17=Position to

```

Figure 66. Work with Files: QHST\*

The size of the files is determined by system value QHSTLOGSIZ. Once the existing file is full, a new file is opened. The old file may be saved or deleted.

The naming convention used for the files is QHSTyyddda, where:

- yy: The last two digits of the year
- ddd: The Julian day on which the file is created
- a: An alphabetic suffix to distinguish files created with the same date

When the Cleanup Tasks are run on the system, the history log files that are older than the date specified (as shown in Figure 67 on page 78) will be deleted to conserve disk space.

|                                                  |           |                                                |
|--------------------------------------------------|-----------|------------------------------------------------|
| Change Cleanup Options                           |           | ITSOSYS1                                       |
|                                                  |           | 08/07/99 02:04:50                              |
| Type choices below, then press Enter.            |           |                                                |
| Allow automatic cleanup . . . . .                | Y         | Y=Yes, N=No                                    |
| Time cleanup starts each day . . . . .           | 22:00:00  | 00:00:00-<br>23:59:59,<br>*SCDPWROFF,<br>*NONE |
| Number of days to keep:                          |           |                                                |
| User messages . . . . .                          | 7         | 1-366, *KEEP                                   |
| System and workstation messages . . . . .        | 4         | 1-366, *KEEP                                   |
| Job logs and other system output . . . . .       | 7         | 1-366, *KEEP                                   |
| <b>System journals and system logs . . . . .</b> | <b>30</b> | <b>1-366, *KEEP</b>                            |
| OfficeVision for AS/400 calendar items . . . . . | 30        | 1-366, *KEEP                                   |
| F1=Help    F3=Exit    F5=Refresh    F12=Cancel   |           |                                                |

Figure 67. Change Cleanup Options: System logs

When the system cleanup task has deleted history log files, the messages for that period no longer exist in the history log. If history log messages are required to be kept as part of audit requirements, or for other reasons, consider including these files as part of your backup strategy.

## 6.5 Verifying times and dates in the history log

After you produce a spooled file of the history log, verify its contents, as shown in the following series of steps, to ensure that the required information has been captured. Use the following steps to verify that the beginning and ending messages in the Output (\*PRINT) option have been used:

1. Enter the `WRKJOB` command on the command entry line, and enter option 4. A display appears like the example shown in Figure 68.

Work with Job Spooled Files

Job: QPADEV000P

User: OPER01

Number: 045854

Type options, press Enter.

1=Send

2=Change

3=Hold

4=Delete

5=Display

6=Release

7=Messages

8=Attributes

9=Work with printing status

| Opt | File            | Device or Queue | User Data | Status | Total Pages | Current Page | Copies |
|-----|-----------------|-----------------|-----------|--------|-------------|--------------|--------|
|     | QPDSPNET        | QPRINT          | DSPNETA   | RDY    | 1           |              | 1      |
|     | QSYSPRT         | QPRINT          |           | RDY    | 50          |              | 1      |
|     | <b>QPDSPLOG</b> | QPRINT          |           | RDY    | 6           |              | 1      |

Parameters for options 1, 2, 3 or command

====>

F3=Exit

F10=View 3

F11=View 2

F12=Cancel

F22=Printers

F24=More keys

Bottom

Figure 68. QPDSPLOG

2. Type 5 in the Opt column next to the file QPDSPLOG to display the contents. Figure 65 on page 76 shows an example of a history log (QHST).
3. Look for the date and time in the first message that appears in the file.
4. Page forward to the last message in the file.
5. Look at the date and time in the last message that appears in the file.
6. Once you have determined that the spooled file includes the messages that relate to the problem being reported, forward this information to your service provider, along with any other relevant information. Refer to 7.3, “Reporting the problem to your service provider electronically” on page 88, for further details.





---

## Chapter 7. System problem log and Save APAR Data

The system problem log is one of the problem management tools provided by the AS/400e server. In the problem log, detailed information about a specific problem is recorded. For example, you can see:

- The product type and serial number of the device that had the problem
- The date and time of the problem
- The part that failed and the problem status

Problems that are detected by the system are logged into the problem log with a status of \*OPENED.

User-detected problems are entered into the problem log with the Analyze Problem (ANZPRB) command. In the process of creating a new entry, the system guides you in providing more relevant information on the problem. This interface allows you to analyze the problem and report it to your service provider electronically when necessary.

The service provider who receives the problem determines whether the request is related to hardware or software and takes the appropriate action, as described here:

- **Software service:** A search is performed against the database of program temporary fixes (PTFs) by using the symptom string created during problem analysis. If a match is found and a PTF is available, the service provider transmits the PTF to you electronically.

The PTF you receive electronically is placed in the QGPL library as a save file. The file name is the PTF number, preceded by a Q. If the problem is not resolved, use the Save APAR Data (SAVAPARDTA) command to collect related information to an APAR library. Forward this APAR library to your service provider, as described in 7.4, "Using Save APAR Data (SAVAPARDTA) to collect data" on 91.

- **Hardware service:** The same process is followed for hardware service as is described for software service above. If a resolution PTF match is not found, your service provider will call you to assist in further problem definition.

Saving APAR data (SAVAPARDTA) is often necessary for problem isolation. It is usually performed after analyzing the problem, when the recommended remedy actions do not resolve the problem.

Use the Save APAR Data display or command, which allows you to collect data of different types and from several sources without entering multiple commands to capture information. This information is stored in an APAR library, which you then save onto removable media. The media is then sent to your service provider for further analysis.

When you save APAR data, the following functions are performed:

- Creates an entry in the problem log if one does not exist.
- Creates an APAR library with a unique name derived from the problem number.
- Creates an output queue named QSCAPAROQ in the APAR library.

- Saves the problem log entry and the associated spooled files, product activity log, and LIC log entries.
- Displays a list of sources for additional information.
- Collects the data as an object or spooled file.
- Saves the data in your APAR library.

The WRKPRB, ANZPRB, and SAVAPARDTA commands are shipped with public \*EXCLUDE authority. The QPGMR, QSYSOPR, QSRV, and QSRVBAS user profiles have private authorities to use the commands. If necessary, see your security officer to obtain the necessary authority to use these commands.

To save APAR data, it is helpful to know whether there is a problem log entry associated with your problem. If you used the ANZPRB command, a problem log entry does exist. The system also creates problem log entries for certain hardware and software errors. Both types of errors have associated problem log entries.

#### Note

Software errors detected by the system are logged only if the system value QSWERRLOG is set to \*LOG.

## 7.1 Analyzing problems detected by the system

This section outlines the steps to analyze a problem where an entry exists in the problem log:

1. Type `WRKPRB` on any command line, and press Enter. A display appears as shown in Figure 69.

Work with Problems

System: ITSOSYS1  
Problem ID

Position to . . . . .

Type options, press Enter.

2=Change    4=Delete    5=Display details    6=Print details  
8=Work with problem    9=Work with alerts    12=Enter text

| Opt | Problem ID | Status   | Problem Description                                   |
|-----|------------|----------|-------------------------------------------------------|
| 8   | 9918755448 | OPENED   | Controller SCP on line TVB not contacted. Call failed |
|     | 9918755314 | PREPARED | Fix request                                           |
|     | 9918751401 | READY    | Call to controller SCP on line TVB failed. Time-out   |
|     | 9918740381 | OPENED   | Call to controller SCP on line TVB failed. Time-out   |
|     | 9918360517 | OPENED   | Call to controller SCP on line TVB failed. Time-out   |
|     | 9918353607 | PREPARED | Fix request                                           |
|     | 9918254466 | READY    | User detected a software problem on this AS/400.      |
|     | 9918254404 | OPENED   | Save APAR Data Problem                                |
|     | 9918254394 | PREPARED | Fix request                                           |
|     | 9918254364 | PREPARED | Fix request                                           |

More...

F3=Exit    F5=Refresh    F6=Print list    F11=Display dates and times

F12=Cancel    F16=Report prepared problems    F24=More keys

Figure 69. Work with Problems display

2. Enter option 8 next to the problem with which you want to work. Press Enter, and a display appears as shown in Figure 70.

Work with Problem

System: ITSOSYS1

Problem ID . . . . . : 9918755448

Origin . . . . . : ITSOSYS1

Current status . . . . . : OPENED

Problem . . . . . : Controller on line not contacted. Call failed. (C R)

Select one of the following:.

1. Analyze problem

20. Close problem

30. Save APAR data to APAR library

Selection

1

F3=Exit F12=Cancel

Bottom

Figure 70. Work with Problem display

3. Select option 1 to analyze the problem.
4. Depending on the nature of the problem, you are prompted to run various tests to determine the cause of the problem.
5. After the analysis, the possible causes are displayed with recommended recovery action. Follow the recommendations before you report the problem to your service provider.
6. If the analysis does not resolve the problem, you are directed to report the problem to your service provider.

This ends the procedure in analyzing the problem detected by the system.

---

## 7.2 Creating a new entry in the problem log

This section outlines the steps to create a new entry in the problem log. Follow these steps to create a problem entry for a user-detected problem:

1. Type `ANZPRB` on any command line, and press Enter. A display appears like the example shown in Figure 71 on page 84.

```

 Select Type of System
 System: ITSOSYS1

Select one of the following:

System with the problem is
 1. This AS/400 or attached devices
 2. Another AS/400
 3. Another type of system, not an AS/400

Selection or command
====>

F3=Exit F4=Prompt F9=Retrieve F12=Cancel

```

Figure 71. Select Type of System menu

2. Select the option that most closely corresponds to the problem you encountered. In this example, we select option 1. The display shown in Figure 72 appears.

```

 Analyze a Problem
 System: ITSOSYS1

Select one of the following:

Analyze a Problem
 1. Job or program problem (application or system)
 2. System performance problem
 3. Hardware problem
 4. Communications/LAN hardware problem

Describe a Problem
 5. Problem occurred during IPL of this AS/400
 6. Job or program problem (application or system)

Selection or command
====>

F3=Exit F4=Prompt F9=Retrieve F12=Cancel

```

Figure 72. Analyze a Problem menu

3. Select option 6 to describe the problem encountered. A display appears like the example shown in Figure 73.

|                                                    |         |                |                                                |                  |
|----------------------------------------------------|---------|----------------|------------------------------------------------|------------------|
|                                                    |         | Select Product |                                                | System: ITSOSYS1 |
| Position to . . . . .                              |         | Product        |                                                |                  |
| Type option, press Enter.                          |         |                |                                                |                  |
| 1=Select                                           |         |                |                                                |                  |
|                                                    | Product |                |                                                |                  |
| Opt                                                | Product | Option         | Description                                    |                  |
|                                                    | 5769999 | *BASE          | AS/400 Licensed Internal Code                  |                  |
|                                                    | 5769SS1 | *BASE          | Operating System/400                           |                  |
|                                                    | 0CVTRPG | *BASE          | CVTILERPG - RPG to ILE RPG IV conversion utili |                  |
|                                                    | 0TOOL00 | *BASE          | STT Tools (*BASE)                              |                  |
|                                                    | 1MGTC01 | *BASE          | A product for MGICT.                           |                  |
|                                                    | 1MGTC02 | *BASE          | A product for MGICT.                           |                  |
|                                                    | 1MGTC03 | *BASE          | A product for MGICT.                           |                  |
|                                                    | 1MGTC04 | *BASE          | A product for MGICT.                           |                  |
|                                                    | 1MGTC05 | *BASE          | A product for MGICT.                           |                  |
|                                                    | 1MGTC06 | *BASE          | A product for MGICT.                           |                  |
|                                                    | 1MGTC07 | *BASE          | A product for MGICT.                           |                  |
|                                                    |         |                |                                                | More...          |
| F3=Exit F5=Refresh F11=Display releases F12=Cancel |         |                |                                                |                  |
| F19=Display trademarks                             |         |                |                                                |                  |
| Already at top of area.                            |         |                |                                                |                  |

Figure 73. Select Product display

4. Scroll up or page down to see more products. In this example, we selected 5769TC1 AS/400 TCP/IP Connectivity Utilities/400. A display appears like the example shown in Figure 74.

|                           |                                      |                                          |  |                  |
|---------------------------|--------------------------------------|------------------------------------------|--|------------------|
|                           |                                      | Select Product Function                  |  | System: ITSOSYS1 |
| Product . . . . .         |                                      | AS/400 TCP/IP Connectivity Utilities/400 |  |                  |
| Option . . . . .          |                                      | AS/400 TCP/IP Connectivity Utilities/400 |  |                  |
| Type option, press Enter. |                                      |                                          |  |                  |
| 1=Select                  |                                      |                                          |  |                  |
|                           | Product                              |                                          |  |                  |
| Opt                       | function                             |                                          |  |                  |
|                           | Telnet (Remote terminal logon)       |                                          |  |                  |
|                           | File Transfer Protocol (FTP)         |                                          |  |                  |
|                           | Simple Mail Transfer Protocol (SMTP) |                                          |  |                  |
|                           | Line Printer Requester (LPR)         |                                          |  |                  |
|                           | Line Printer Daemon (LPD)            |                                          |  |                  |
|                           | Customer written application         |                                          |  |                  |
|                           | Configuration                        |                                          |  |                  |
| 1                         | Activation or deactivation           |                                          |  |                  |
|                           | Workstation Gateway (WSG)            |                                          |  |                  |
|                           | Post Office Protocol (POP)           |                                          |  |                  |
|                           |                                      |                                          |  | More...          |
| F3=Exit F12=Cancel        |                                      |                                          |  |                  |

Figure 74. Select Product Function display

5. Enter 1 next to the Activation or deactivation option. A display appears as shown in Figure 75 on page 86.

System: ITSOSYS1

### Specify Message Information

Do the following, then return here.

- o Press F14 to view the messages associated with your job.
- o Press the function key to display detailed messages.
- o Find the first escape message in the list of messages after the failing command by doing the following for each message:
  - Put the cursor on the message.
  - Press the Help key.
  - Check the Message type field for "ESCAPE."

More...

Type choices, press Enter. If there are no messages related to the problem, just press Enter.

|                        |          |      |
|------------------------|----------|------|
| Message . . . . .      | TCP1B06  | ID   |
| Code . . . . .         |          | Code |
| From program . . . . . | QTOCTCPI | Name |
| To program . . . . .   | QTOCTCPI | Name |

F3=Exit    F12=Cancel    F14=Display job log    F15=Work with active jobs

Figure 75. Specify Message Information display

6. Type the appropriate message ID, code (if present), the From program, and the To program information from the screen. Press Enter. A display appears as shown in Figure 76.

#### Note

Code information is an identifier used by service personnel to help resolve problems. Some examples of code information are a reason code, error code, or completion code. The code does not appear on every message display.

### Enter Problem Description

System: ITSOSYS1

Type description, press Enter.

Problem description . . .    User detected a software problem on this AS/400.

F3=Exit    F5=Refresh    F12=Cancel

Figure 76. Enter Problem Description display

7. Type a meaningful description for the problem occurrence, and press Enter. A display appears as shown in Figure 77.

Save Problem Data

System: ITSOSYS1

If you have APAR data to be saved, you may want to save this data now.  
This data may be requested if you report the problem and a PTF cannot be found.

Type choice, press Enter.

Save APAR data . . . . . Y=Yes, N=No

F3=Exit F12=Cancel

Figure 77. Save Problem Data display

8. If you have APAR data to be saved, you may want to save this data now. Refer to 7.4, “Using Save APAR Data (SAVAPARDTA) to collect data” on 91, for more details. In this example, we specify N and press Enter. A display appears as shown in Figure 78.

Report Problem

System: ITSOSYS1

The problem has been logged.

Select one of the following:

1. Prepare service request

Selection

F3=Exit **F13=Add notes** F12=Cancel

Figure 78. Report Problem display

9. On this display, press F13 to add notes to describe the problem further. After you press F13, a display appears as shown in Figure 79 on page 88.

```

 Select Text Type
 System: ITSOSYS1

Select one of the following:

 Problem Definition
 1. Problem description text
 2. Problem diagnostic text

 Query Data
 10. Query status text

 99. Private system text

 Bottom

Selection

F3=Exit F12=Cancel

```

Figure 79. Select Text Type menu

10. Select option 1 to describe your problem. Press Enter, and a display appears as shown in Figure 80.

```

 Update Description Text
 System: ITSOSYS1

Problem ID : 9919547794
Origin : ITSOSYS1
Current status : READY
Problem : User detected a software problem on this AS/400.

Type text, press Enter.

 Bottom

F3=Exit F6=Insert line F12=Cancel F14=Delete line F17=Top
F18=Bottom F20=Right

```

Figure 80. Update Description Text display

11. Describe your problem on the lines provided.

This ends the procedure for creating a new entry in the problem log.

## 7.3 Reporting the problem to your service provider electronically

This section outlines the steps to electronically report problems logged in the problem log to your service provider. To use this procedure to report your problem, your electronic customer support modem needs to be available and powered on.



Follow the steps shown here:

1. Type `WRKPRB` on any command line, and press Enter. A display appears as shown in Figure 69 on page 82.
2. Enter option 8 next to the problem with which you want to work. Press Enter, and a display appears as shown in Figure 70 on page 83.
3. Select option 2 to report the problem to your service provider.

**Note**

Only problems with a status of *Prepared* can be sent to your service provider. If the problem has a status such as *Opened* or *Ready*, enter option 1 to analyze and prepare the problem.

4. Press Enter. A display appears as shown in Figure 81.

Verify Contact Information

System: ITSOSYS1

Type changes, press Enter.

Company . . . . .

Contact . . . . .

Mailing address:

Street address . . . . .

City/State . . . . .

Country . . . . .

Zip code . . . . .

Telephone numbers:

Primary . . . . .

Alternative . . . . .

Fax telephone numbers:

Primary . . . . .

Alternative . . . . .

National language version 2924 F4 for list

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel  
(C) COPYRIGHT IBM CORP. 1980, 1998.

Figure 81. Verify Contact Information display

5. Verify the information stated in the display. Modify any incorrect fields by typing over the current information, and press Enter. A display appears as shown in Figure 82 on page 90.

Select Problem Severity

System: ITSOSYS1

Problem ID . . . . . : 9916666223

Current status . . . . . : PREPARED

Problem . . . . . : \*Attention\* Contact your hardware service provider now.

Select one of the following:

1. High - Requires immediate solution

2. Medium - Restricts function

3. Low - Limits function

4. None - Operates with full function

Selection

F3=Exit F12=Cancel

Figure 82. Select Problem Severity display

6. Select the severity level that closely describes the impact of this problem to your business environment.
7. Press Enter. A display appears as shown in Figure 83.

Select Service Provider

System: ITSOSYS1

Position to . . . . . Control point

Network ID . . . . .

Type option, press Enter.

1=Select

| Opt | Control Point | Network ID | Description         |
|-----|---------------|------------|---------------------|
|     | *IBMSRV       |            | IBM Service Support |

F5=Refresh F12=Cancel

(C) COPYRIGHT IBM CORP. 1980, 1998.

Bottom

Figure 83. Select Service Provider display

8. Type 1 in the Opt column to select your service provider.  
It shows IBM as the service provider. Multiple service providers can be established depending on your environment or support structure.
9. Press Enter, and a display appears as shown in Figure 84.

Select Reporting Option

System: ITSOSYS1

Problem ID . . . . . : 9916666223  
Current status . . . . . : PREPARED  
Problem . . . . . : \*Attention\* Contact your hardware service provider now.

Select one of the following:

1. **Send service request now**  
2. Do not send service request  
3. Report service request by voice

Selection

1

F3=Exit F12=Cancel

Figure 84. Select Reporting Option display

10. Select option 1 to send your send request.

11. For a successful transmission, you should see the message:

Problem reporting complete. Service number is XXXXX.

The status of the problem also changes from PREPARED to SENT.

This ends the procedure to report your problem electronically.

## 7.4 Using Save APAR Data (SAVAPARDTA) to collect data

Using the Save APAR Data displays or command allows you to collect data from several sources without having to enter multiple commands.

The Save APAR Data function performs these tasks:

- Creates an entry for the problem in the problem log if one does not exist.
- Creates an APAR library with a unique name derived from the problem number.
- Creates an output queue QSCAPAROQ in your APAR library.
- Saves the problem log entry and the associated spooled files, error log, and VLIC log.
- Displays a selection list of data sources.
- Collects the data as an object or spooled file.
- Saves the data in your APAR library.

APAR data can be saved from a Save APAR Data display or by using the Save APAR Data (SAVAPARDTA) command. The Save APAR Data display appears when you use the problem log, the Analyze a Problem (ANZPRE) command, or F14 from the QSYSOPR message queue.

Use Table 14 to find a path to the Save APAR Data display.

Table 14. Display or command selection

| Starting from   | Command           | Option or F key | On this display    | Reference                                                                  |
|-----------------|-------------------|-----------------|--------------------|----------------------------------------------------------------------------|
| Problem log     | WRKPRB            | 8               | Work with problems |                                                                            |
|                 |                   | 30              | Work with problem  | Section 7.4.2, "Saving APAR data from an existing problem log entry" on 93 |
| Analyze problem | ANZPRB            | Y               | Save Problem Data  | Section 7.4.1, "Saving APAR data from the ANZPRB command display" on 92    |
| F14             | DSPMSG<br>QSYSOPR | 8               | Work with problems |                                                                            |
|                 |                   | 30              | Work with problem  | Section 7.4.2, "Saving APAR data from an existing problem log entry" on 93 |
| Command line    | SAVAPARDTA        | Enter           | Save APAR Data     | Section 7.4.3, "Saving APAR data using the SAVAPARDTA command" on 93       |

#### 7.4.1 Saving APAR data from the ANZPRB command display

If you use the ANZPRB command for problem isolation, the display shown in Figure 85 appears at the end of the analysis to allow you to save additional APAR data unless a PTF has been found for your problem.

Save Problem Data

System: ITSOSYS1

If you have APAR data to be saved, you may want to save this data now.  
This data may be requested if you report the problem and a PTF cannot be found.

Type choice, press Enter.

Save APAR data . . . . . Y=Yes, N=No

F3=Exit F12=Cancel  
No PTFs found that match symptom for problem 9919048578.

Figure 85. Save Problem Data display

To save APAR data, follow these steps:

1. Type `x` Press Enter to display the selection list.
2. Proceed to 7.5, "Selecting APAR data to collect" on 94.

### 7.4.2 Saving APAR data from an existing problem log entry

To collect APAR data, follow these steps:

1. Enter `WRKPRB` on a command line. A display appears as shown in Figure 69 on page 82.
2. Search for the problem description that matches your problem.
3. Type option `8` next to the problem ID, and press Enter. A display appears as shown in Figure 70 on page 83.
4. Select option `30` to (Save APAR data to APAR library). The problem log entry is always saved in the APAR library.
5. The following data is saved if it is available:
  - Any spooled files associated with the entry
  - Any Product Activity Log record associated with the entry
  - Any LIC log associated with the Product Activity Log ID

#### Note

All machine detected problems have an associated error log entry. Machine detected software problems will also have a VLIC log associated with the problem.

6. The `Problem data automatically saved` message appears at the bottom of the display.
7. Bring your cursor down to the message text, and press F1 to see what is saved.

### 7.4.3 Saving APAR data using the SAVAPARDTA command

To collect APAR data using the SAVAPARDTA command, follow these steps:

1. Type `SAVAPARDTA` on any command line, and press F4. A display appears like the example shown in Figure 86 on page 94.

```

Save APAR Data (SAVAPAR.DTA)

Type choices, press Enter.

Problem identifier Character value, *NEW

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

```

Figure 86. Save APAR Data display

2. If there is no entry for the problem in the problem log, type `*NEW` in the Problem identifier prompt, and press Enter. Otherwise, type the number of the problem identifier.

## 7.5 Selecting APAR data to collect

The Save APAR Data selection list allows you to select one or more data sources to save APAR data. Some of the selections run an Operating System/400 (OS/400) command. See Appendix A, “Quick reference to data collection commands” on page 309, to find the command that is run. Your service provider will help you determine which data to select. In general, follow these steps:

1. From the Save APAR Data menu (refer to Figure 87), page down or scroll forward to see the rest of the list.
2. Type 1 (Select) in the Opt column next to the data source you need.  
  
More than one selection is allowed. Some of the selections will display a prompt screen. Other selections collect data without a prompt. Once data for a selection is collected, the prompt appears again, or collection for the next selection starts.
3. Press F12 to exit from the prompt screen once a message appears at the bottom of the display indicating the data collection is complete. Repeat steps 2 and 3 until you have saved all the data you need.
4. If you do not need to collect any other information, press Enter, and proceed with sending the service request.

|                                          |                                                                                                                                                                                                                                                                                      |                  |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Save APAR Data                           |                                                                                                                                                                                                                                                                                      | System: ITSOSYS1 |
| Problem ID: 9919048578                   | APAR Library: QSC9048578                                                                                                                                                                                                                                                             |                  |
| Type options, press Enter.               |                                                                                                                                                                                                                                                                                      |                  |
| 1=Select                                 |                                                                                                                                                                                                                                                                                      |                  |
| Opt                                      | APAR Data<br>History log<br>Program temporary fixes<br>System values<br>Job information<br>System job information<br>Active jobs<br>Object (library/object)<br>Object (path name)<br>System object<br>Hardware resources<br>Software resources<br>Spooled file<br>Document or folder | More...          |
| F3=Exit    F9=Command line    F12=Cancel |                                                                                                                                                                                                                                                                                      |                  |

Figure 87. Save APAR Data display (Part 1 of 2)

5. Page forward to see the rest of the list.

|                                          |                                                                                                                                                                                                                           |                  |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Save APAR Data                           |                                                                                                                                                                                                                           | System: ITSOSYS1 |
| Problem ID: 9210754989                   | APAR Library: QSC0754989                                                                                                                                                                                                  |                  |
| Type options, press Enter.               |                                                                                                                                                                                                                           |                  |
| 1=Select                                 |                                                                                                                                                                                                                           |                  |
| Opt                                      | Error log entry by ID<br>APAR Data<br>Error log entries by time range<br>VLIC log entry by ID<br>VLIC log entries by time range<br>Problem log entry by ID<br>Problem log entries by time range<br>Internal configuration | Bottom           |
| F3=Exit    F9=Command line    F12=Cancel |                                                                                                                                                                                                                           |                  |

Figure 88. Save APAR Data display (Part 2 of 2)

6. Type 1 (Select) in the Opt column next to the data source you need.

More than one selection is allowed. Some of the selections will display a prompt screen, while others collect data without a prompt. Once data for a selection has been collected, the prompt appears again, or collection for the next selection starts.

7. Press F12 to exit from the prompt screen once a message appears at the bottom of the display that indicates the data collection is complete.

### 7.5.1 More information on the Save APAR Data selections

Use Table 15 to determine the commands that are run automatically for a selection from the Save APAR Data display. Use the selection list, instead of the command, to save the output in the APAR library.

#### Note

Some selections show a prompt display to enter specific data. Sometimes the defaults on the prompt screen will collect the data you need. Some selections will not display a prompt screen and will use the command defaults. The table provides this information.

Table 15. Automatic selection commands

| Selection               | Command used                                        | Prompt for                    | Default         | Information saved                                                         | Reference                                                                 |
|-------------------------|-----------------------------------------------------|-------------------------------|-----------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| History log             | DSPLOG                                              | Time range                    | The current day | History log for the time range specified                                  | See 6.4, "Saving the history log (QHST)" on 76.                           |
| Program temporary fixes | DSPPTF                                              | None                          | *ALL            | All the program temporary fixes installed on the system.                  | See 23.2.2, "Collecting a list of program temporary fixes (PTFs)" on 286. |
| System values           | WRKSYSVAL                                           | None                          | *ALL            | All the system values                                                     | See 2.1, "Print System Information (PRTSYSINF)" on 17.                    |
| Job information         | DSPJOB                                              | Job Name                      | Current job     | All job information, job log                                              | See Chapter 5, "Job information, job logs, and spooled files" on page 51. |
| System job information  | DSPJOB                                              | List of system jobs to select | None            | All job information, job log                                              | See 7.5.1.3, "Saving system job information" on 100.                      |
| Active jobs             | WRKACTJOB                                           | None                          |                 | List of the active jobs in the system, performance and status information |                                                                           |
| Object (configuration)  | DSPNWID or DSPLIND or DSPCTLD or DSPDEVD and DMPOBJ | Object name, type             | None            | Display and dump of object                                                | See 7.5.1.5, "Saving a system object" on 102.                             |



| Selection                       | Command used                  | Prompt for                 | Default                | Information saved                                             | Reference                                                     |
|---------------------------------|-------------------------------|----------------------------|------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| Object (library)                | SAVLIB                        | Object name, type          | None                   | Save of library                                               | See 7.5.1.4, "Saving objects" on 101.                         |
| Object (other types)            | SAVOBJ or CRTDUPOBJ or DMPOBJ | Object name, type          | None                   | object                                                        | See 7.5.1.4, "Saving objects" on 101.                         |
| System object                   | DMPYSOJB                      | Object name, type          | Current process (JOB)  | Object dump information                                       | See 7.5.1.5, "Saving a system object" on 102.                 |
| Hardware resources              | DSPHWRSC                      | None                       | *CMN, *LWS, *PRC, *STG | Hardware configuration and resource information of the system |                                                               |
| Software resources              | DSPSFWRSC                     | None                       | None                   | Software resource information of the system.                  |                                                               |
| Spooled file                    | Internal                      | Spooled file attributes    | None                   | Spooled file                                                  | See 7.5.1.6, "Saving a spooled file" on 103.                  |
| Document or folder              | SAVDLO                        | Name of document or folder | None                   | Document or folder                                            | See 7.5.1.7, "Saving documents or folders" on 105.            |
| Error log entry by ID           | PRTERLOG                      | Error log ID               | None                   | Error log ID with hex data                                    | See 7.5.1.8, "Saving an error log entry by ID" on 106.        |
| Error log entries by time range | PRTERLOG                      | Time and date range        | Current day            | Error log entries with hex data                               | See 7.5.1.9, "Saving error log entries by time range" on 106. |
| VLIC log entry by ID            | PRTINTDTA                     | VLIC log ID                | None                   | VLIC log with dump data                                       | See 7.5.1.10, "Saving a VLIC log entry by ID" on 108.         |
| VLIC log entries by time range  | PRTINTDTA                     | Date and time range        | Current day            | VLIC log entries with dump data                               | See 7.5.1.11, "Saving VLIC log entries by time range" on 108. |
| Problem log entry by ID         | DSPPRB                        | Problem log ID             | None                   | Problem log entry                                             | See 7.5.1.12, "Saving a problem log entry by ID" on 110.      |

| Selection                         | Command used | Prompt for          | Default     | Information saved                                               | Reference                                                                                                                                                |
|-----------------------------------|--------------|---------------------|-------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Problem log entries by time range | DSPPRB       | Date and time range | Current day | Problem log entries                                             | See 7.5.1.13, "Saving problem log entries by time range" on 110.                                                                                         |
| Internal configuration            | PRTINDTA     | None                | *INTCFG     | VMC link map, VMC alter log resource configuration record (RCR) | See 18.1, "Using PRTINDTA to collect one entry in the LIC log" on 239, and 18.2, "Using PRTINDTA to collect LIC log entries for a specific time" on 240. |

### 7.5.1.1 Saving the history log (QHST)

This selection saves all messages in the history log within a specific time range. The display shown in Figure 89 appears.

Save History Log

System: ITSOSYS1

Type choices, press Enter.

Time period for log output:

|                          |          |                |
|--------------------------|----------|----------------|
| Beginning time . . . . . | *AVAIL   | Time, *AVAIL   |
| Beginning date . . . . . | *CURRENT | Date, *CURRENT |
| Ending time . . . . .    | *AVAIL   | Time, *AVAIL   |
| Ending date . . . . .    | *CURRENT | Date, *CURRENT |

F3=Exit    F9=Command line    F12=Cancel

Figure 89. Save History Log display (Part 1 of 2)

To save the history log for the current day, press the Enter key. Otherwise, enter the beginning and ending time and date near the time the problem occurred. The time the problem occurred should be within the beginning and ending time range. For example, if the problem occurred at about 3:00 p.m. on 01 June 1992, the display would appear like the example shown in Figure 90.

Save History Log

System: ITSOSYS1

Type choices, press Enter.

Time period for log output:

|                          |          |                |
|--------------------------|----------|----------------|
| Beginning time . . . . . | 14:00:00 | Time, *AVAIL   |
| Beginning date . . . . . | 06/01/92 | Date, *CURRENT |
| Ending time . . . . .    | 16:00:00 | Time, *AVAIL   |
| Ending date . . . . .    | 06/01/92 | Date, *CURRENT |

F3=Exit
F9=Command line
F12=Cancel

Figure 90. Save History Log display (Part 2 of 2)

The first message that will be saved is the first one found after the specified beginning time.

### 7.5.1.2 Saving job information

This selection collects job information and the job log for a job. The job can be your current sign-on session, another user's job, or a subsystem or system job. The display shown in Figure 91 appears.

Save Job Information

System: ITSOSYS1

Type choices, press Enter.

|                    |   |               |
|--------------------|---|---------------|
| Job name . . . . . | * | Name, *       |
| User . . . . .     |   | Name          |
| Number . . . . .   |   | 000000-999999 |

F3=Exit
F9=Command line
F12=Cancel

Figure 91. Save Job Information display

To collect job information and a job log, perform one of the following tasks:

- To collect job information and the job log for your current job (sign-on session), press the Enter key.
- To collect job information and the job log for another job, enter the job name. If you do not know the name of the job, go to 5.6, “Finding a job name” on 63, for help in finding the job name.

### 7.5.1.3 Saving system job information

This selection collects job information and the job log for a system job. The display shown in Figure 92 appears.

System: ITSOSYS1

Save System Job Information

Type options, press Enter.  
1= Select

| Opt | System Job | Description                      |
|-----|------------|----------------------------------|
|     | SCPF       | Start Control Program Function   |
|     | QALERT     | Alert Manager                    |
|     | QDBSRV     | Database Services                |
|     | QDCPOBJ    | Decompress Object Processor      |
|     | QJOBSCD    | Job Schedule Manager             |
|     | QLUS       | Logical Unit Services            |
|     | QPFRAJ     | Performance Adjust Manager       |
|     | QSPLMAINT  | Spool Object Maintenance         |
|     | QSYSARB    | System Arbiter                   |
|     | QWCBTCLNUP | Work Control Block Table Cleanup |

F3=Exit    F9=Command line    F12=Cancel

Figure 92. Save System Job Information display

To collect job information and a job log, complete one of the following tasks:

- To collect job information and the job log for one of the system jobs listed, type 1 next to each of the system jobs needed.
- To collect the SCPF job log for the *last* IPL, complete the following tasks:
  - a. Press F12 to return to the Save APAR Data display.
  - b. Type 1 in the Opt column next to Job information to select it.
  - c. Type the following job information:

|                    |        |              |
|--------------------|--------|--------------|
| Job name . . . . . | SCPF   | Name, *      |
| User . . . . .     | QSYS   | Name         |
| Number . . . . .   | 000000 | 000000-99999 |

The job log will be saved with the other data collected.

#### 7.5.1.4 Saving objects

This selection saves the object specified. The display shown in Figure 93 appears.

Save Object

System: ITSOSYS1

Type choices, press Enter.

Object . . . . .

Library . . . . .

Object type . . . . .

Name

Name

\*type

F3=Exit

F9=Command line

F12=Cancel

Figure 93. Save Object display

1. Type the name of the object in the Object prompt.
2. Type the library containing the object in the Library prompt.
3. Type the object type in the Object type prompt. If you do not know the object type for the object, see *OS/400 Diagnostics Aids*, LY44-5907.

The information saved about an object depends on the type of object, for example:

- **Configuration object**

Configuration objects will be dumped by the Dump Object (DMPOBJ) command and displayed by the Display Line Description (DSPLIND), Display Network Interface Description (DSPNWID), Display Controller Description (DSPCTLD), or Display Device Description (DSPDEVD) command. The spooled files created by the commands are saved in the APAR library.

- **Library object**

Library objects will be saved by the Save Library (SAVLIB) command into a save file in the APAR library.

- **Other object types**

Other object types will be saved by the Save Object (SAVOBJ) command into a save file in the APAR library. If the save operation fails, the object will be copied by the Create Duplicate Object (CRTDUPOBJ) command into the APAR library. If this copy operation fails, the object will be dumped by the Dump Object (DMPOBJ) command, and the spooled file will be created by the command saved in the APAR library.

### 7.5.1.5 Saving a system object

The selection to save a System Object allows you to specify the internal system object you want saved by the Dump System Object (DMPSYSOBJ) command. The spooled file created by the DMPSYSOBJ command is saved in the APAR library (Figure 94).

Save System Object

System: ITSOSYS1

Type choices, press Enter.

|                                   |       |                                                                                                          |
|-----------------------------------|-------|----------------------------------------------------------------------------------------------------------|
| Object . . . . .                  | *PCS  | Name, *PCS, *MCHCTX, *ALL                                                                                |
| Context or Library . . . . .      | *NONE | Name, *NONE, *MCHCTX                                                                                     |
| Internal object type . . . . .    | *ALL  | *ALL, 01, 02, 04, 07, 08<br>09, 0A, 0B, 0C, 0D, 0E,<br>0F, 10, 11, 12, 13,,14,<br>15, 18, 19, 1A, 1B, 1C |
| Internal object subtype . . . . . | *ALL  | *ALL, Hexadecimal value                                                                                  |

F3=Exit    F9=Command line    F12=Cancel

Figure 94. Save System Object display

Choose one of the following tasks to dump an object:

- To dump the process control space of your job, press the Enter key.
- To dump the machine context, type `*MCHCTX` in the Object prompt, and press the Enter key.
- To dump the QTEMP library for your job, type `QTEMP` for the Object prompt, `04` for the Internal object type, and `01` for the Internal object subtype. Then press the Enter key.
- To dump any other object, perform these tasks:
  - a. Enter the object in the Object prompt.

Type the object name, the generic name of a group of objects, or `*ALL` to dump all the objects in a context or library.
  - b. Type the context, library, or `*MCHCTX` in the Context or Library prompt.
  - c. Type the internal object type in the Internal object type prompt.

See *OS/400 Diagnostics Aids*, LY44-5907, to determine the internal object type and subtype.

Type `*ALL` to save all internal object types in the context, and do not enter an internal object subtype.
  - d. Type the internal object subtype in the Internal object subtype prompt.

Type `*ALL` to save all internal object subtypes in the context.

### 7.5.1.6 Saving a spooled file

This selection finds a spooled file and saves it in the APAR library associated with your problem ID. The display shown in Figure 95 appears.

Save Spooled File

System: ITSOSYS1

Type choices, press Enter.

|                               |       |                      |
|-------------------------------|-------|----------------------|
| Spooled file . . . . .        |       | Name                 |
| Job name . . . . .            | *     | Name, *              |
| User . . . . .                |       | Name                 |
| Number . . . . .              |       | 000000-999999        |
| Spooled file number . . . . . | *LAST | 1-9999, *ONLY, *LAST |
| Text . . . . .                |       |                      |

F3=Exit    F9=Command line    F12=Cancel

Figure 95. Save Spooled File display

To find these spooled file attributes, complete the following steps:

1. Refer to 5.2, “Setting the message logging level” on 52, and 5.3, “Message logging parameters” on 58, to find the spooled files for a job.

#### Note

Press the F9 key for a command line so you can enter commands from this display.

For example, if you entered the WRKOUTQ command, the display shown in Figure 96 on page 104 would appear.

```

Work with Output Queue

Queue: IBMOUTQ Library: IBMLIB Status: RLS

Type options, press Enter.
 1=Send 2=Change 3=Hold 4=Delete 5=Display 6=Release 7=Messages
 8=Attributes 9=Work with printer status

Opt File User User Data Sts Pages Copies Form Type Pty
 8 QPCSMPT WNELSON WAN6X665 HLD 2346 1 *STD 5
 _ QPTAPDMP WNELSON HLD 5 1 *STD 5
 _ QPJOBLOG WNELSON QJSCCPY HLD 1 1 *STD 5
 _ QPJOBLOG WNELSON DSP11 SAV 2 1 *STD 5
 _ QPDCLINE WNELSON HLD 4 1 *STD 5
 _ QPDCCITL WNELSON HLD 3 1 *STD 5
 _ QPDCDEV WNELSON HLD 1 1 *STD 5
 _ QPSRVIRC WNELSON HLD 1 1 *STD 5
 _ QPSRVIRC WNELSON HLD 5 1 *STD 5
 _ QPJOBLOG WNELSON VRTDSP2 HLD 1 1 *STD 5
 More...

Parameters for options 1, 2, 3 or command
=====
F3=Exit F11=View 2 F12=Cancel F22=Printers F24=More keys

```

Figure 96. Work with Output Queue display

- From the Work with Output Queue or Work with All Spooled Files display, type option 8 next to the spooled file to display the spooled file attributes.
- Press the Enter key. For example, the display shown in Figure 97 appears.

```

Work with Spooled File Attributes

Job : DSP03 File : QPCSMPT
User : WNELSON File number . . . : 4
Number : 001941

Status : HELD
Output queue : WNELSON
 Library : WNELSON
Form type : *STD
Output priority : 5
Copies left to produce : 1
Total copies : 1
Maximum records : *NOMAX
Number of separators : 0
File becomes available : *FILEEND
Hold file before written : *YES
Save file after written : *NO
Device type : PRINTER
 More...

Press Enter to continue.

F3=Exit F5=Refresh F12=Cancel F13=Change

```

Figure 97. Work with Spooled File Attributes display

- Record the job, user, number, file, and file number from the header of the Work with Spooled File Attributes display.
- Type these values on the Save Spooled File display.



6. Enter text to describe what is in the spooled file.

#### 7.5.1.7 Saving documents or folders

This selection saves documents and folders in a save file created for you. The display shown in Figure 98 appears.

Save Document or Folder

System: ITSOSYS1

Type choices, press Enter.

Document or Folder . . . . .

Folder . . . . .

Name, \*ALL

Name

F3=Exit    F9=Command line    F12=Cancel

Figure 98. Save Document or Folder display

To save a document, follow these steps:

1. Enter the name of the document library object in the Document or Folder prompt.
2. Enter the name of the folder that contains the document in the Folder prompt.
3. Press the Enter key.

To save a folder, complete these steps:

1. Enter \*ALL in the Document or Folder prompt.
2. Enter the user-assigned name of the folder in which the documents to be saved are located in the Folder prompt.

The folder object and all successively nested documents and subfolders are saved.

3. Press the Enter key.

#### Note

Individual objects in use when this selection is made cannot be saved. To ensure all document library objects are saved, run this command when no office activity is occurring on the system.

### 7.5.1.8 Saving an error log entry by ID

This selection saves a specific error log with the hex data. The display shown in Figure 99 appears.

```

Save Error Log Entry by ID
System: ITSOSYS1

Type choices, press Enter.

Error log identifier Hexadecimal value

F3=Exit F9=Command line F12=Cancel
```

Figure 99. Save Error Log Entry by ID display

Type the error log identifier in the Error log identifier prompt.

#### Note

The error log ID is usually found in a message related to the problem. See Figure 36 on page 44 for an example of how to find an error log ID in a message.

### 7.5.1.9 Saving error log entries by time range

This selection saves error logs with hex data within the specific time range. The display shown in Figure 100 appears.

Save Error Log Entries by Time Range

System: ITSOSYS1

Type choices, press Enter.

Time period for log output:

|                          |          |                |
|--------------------------|----------|----------------|
| Beginning time . . . . . | *AVAIL   | Time, *AVAIL   |
| Beginning date . . . . . | *CURRENT | Date, *CURRENT |
| Ending time . . . . .    | *AVAIL   | Time, *AVAIL   |
| Ending date . . . . .    | *CURRENT | Date, *CURRENT |

F3=Exit    F9=Command line    F12=Cancel

Figure 100. Save Error Log Entries by Time Range display

To save all the error logs for the current day, press the Enter key. Otherwise, enter the beginning and ending time and date near the time at which the problem occurred. The time at which the problem occurred should be within the beginning and ending time range. For example, if the problem occurred at about 3:00 p.m. on 01 June 1999, the display appears as shown in Figure 101.

Save Error Log Entries by Time Range

System: ITSOSYS1

Type choices, press Enter.

Time period for log output:

|                          |          |                |
|--------------------------|----------|----------------|
| Beginning time . . . . . | 14:00:00 | Time, *AVAIL   |
| Beginning date . . . . . | 06/01/99 | Date, *CURRENT |
| Ending time . . . . .    | 16:00:00 | Time, *AVAIL   |
| Ending date . . . . .    | 06/01/99 | Date, *CURRENT |

F3=Exit    F9=Command line    F12=Cancel

Figure 101. Save Error Log Entries by Time Range display

The first error log entry that will be saved is the first one found after the specified beginning time.

#### 7.5.1.10 Saving a VLIC log entry by ID

This selection saves a specific VLIC log with the associated dump data. The display shown in Figure 102 appears.

Save VLIC Log Entry by ID

System: ITSOSYS1

Type choices, press Enter.

VLIC log identifier . . . . .

Hexadecimal value

F3=Exit   F9=Command line   F12=Cancel

Figure 102. Save VLIC Log Entry by ID display

Type the VLIC log identifier in the VLIC log identifier field.

#### Note

The VLIC log ID is usually found in a message related to the problem. See Figure 35 on page 44, or 4.5, “Messages in the system operator message queue (QSYSOPR)” on 41, or 4.6, “Checking the contents of the additional message information” on 42, for an example of how to find a dump identifier in a message.

#### 7.5.1.11 Saving VLIC log entries by time range

This selection saves VLIC logs with the associated dump data within the specific time range. The display shown in Figure 103 appears.

Save VLIC Log Entries by Time Range

System: ITSOSYS1

Type choices, press Enter.

Time period for log output:

|                          |          |                |
|--------------------------|----------|----------------|
| Beginning time . . . . . | *AVAIL   | Time, *AVAIL   |
| Beginning date . . . . . | *CURRENT | Date, *CURRENT |
| Ending time . . . . .    | *AVAIL   | Time, *AVAIL   |
| Ending date . . . . .    | *CURRENT | Date, *CURRENT |

F3=Exit    F9=Command line    F12=Cancel

Figure 103. Save VLIC Log Entries by Time Range display

To save all the VLIC logs for the current day, press Enter. Otherwise, enter the beginning and ending time and date near the time the problem occurred. The time the problem occurred should be within the beginning and ending time range. For example, if the problem occurred at about 3:00 p.m. on 01 June 1999, the display appears as shown in Figure 104.

Save VLIC Log Entries by Time Range

System: ITSOSYS1

Type choices, press Enter.

Time period for log output:

|                          |          |                |
|--------------------------|----------|----------------|
| Beginning time . . . . . | 14:00:00 | Time, *AVAIL   |
| Beginning date . . . . . | 06/01/99 | Date, *CURRENT |
| Ending time . . . . .    | 16:00:00 | Time, *AVAIL   |
| Ending date . . . . .    | 06/01/99 | Date, *CURRENT |

F3=Exit    F9=Command line    F12=Cancel

Figure 104. Save VLIC Log Entries by Time Range display

The first VLIC log entry that will be saved is the first one found after the specified beginning time.

#### 7.5.1.12 Saving a problem log entry by ID

This selection saves a specific problem log entry.

##### Note

The problem log entry specified on the Save APAR Data selection display is automatically saved. The display shown in Figure 105 appears.

Save Problem Log Entry by ID

System: ITSOSYS1

Type choices, press Enter.

Problem identifier . . . . .

Hexadecimal value

Origin:

Network identifier . . . . .

\*NETATR

\*NETATR

Control point name . . . . .

\*NETATR

\*NETATR

F3=Exit

F9=Command line

F12=Cancel

Figure 105. Save Problem Log Entry by ID display

To save a problem log entry by ID, follow these steps:

1. Type the problem identifier of the problem log entry to be saved in the Problem identifier prompt.
2. Type the name of the system on which the problem originated in the Origin prompt.
  - If the problem originated on this system, press Enter.
  - or
  - Enter the network ID of the system or \*NETATR if the system has the same network ID as the one defined for this system.
  - Enter the control point name of the system or \*NETATR if the system has the same control point name as the one defined for this system.

#### 7.5.1.13 Saving problem log entries by time range

This selection saves problem log entries within the specific time range. The display shown in Figure 106 appears.

Save Problem Log Entries by Time Range

System: ITSOSYS1

Type choices, press Enter.

Time period for problem output:

|                          |          |                |
|--------------------------|----------|----------------|
| Beginning time . . . . . | *AVAIL   | Time, *AVAIL   |
| Beginning date . . . . . | *CURRENT | Date, *CURRENT |
| Ending time . . . . .    | *AVAIL   | Time, *AVAIL   |
| Ending date . . . . .    | *CURRENT | Date, *CURRENT |

F3=Exit    F9=Command line    F12=Cancel

Figure 106. Save Problem Log Entries by Time Range display

To save all the problem log entries for the current day, press Enter. Otherwise, enter the beginning and ending time and date for the problem log entries needed. For example, to collect problem log entries that were created between 2:00 p.m. and 4:00 p.m. on 01 June 1999, the display would appear as shown in Figure 107.

Save Problem Log Entries by Time Range

System: ITSOSYS1

Type choices, press Enter.

Time period for problem output:

|                          |          |                |
|--------------------------|----------|----------------|
| Beginning time . . . . . | 14:00:00 | Time, *AVAIL   |
| Beginning date . . . . . | 06/01/99 | Date, *CURRENT |
| Ending time . . . . .    | 16:00:00 | Time, *AVAIL   |
| Ending date . . . . .    | 06/01/99 | Date, *CURRENT |

F3=Exit    F9=Command line    F12=Cancel

Figure 107. Save Problem Log Entries by Time Range display

The first problem log entry that will be saved is the first one found after the specified beginning time.

### 7.5.2 Viewing the APAR data that is collected

Spooled files are automatically copied to user spaces in the APAR library. These user spaces are saved when you save the APAR library.

To view the collected spooled files and verify you have collected the correct data, enter the following command from any command line:

```
WRKOUTQ OUTQ (QSCxxxxxxx/QSCAPARQQ)
```

QSCxxxxxxx is the name of the APAR library.

### 7.5.3 Finding the APAR library

The APAR data is saved in a uniquely named APAR library. The library is named by replacing the first three numbers of the problem ID with “QSC”. For example, if the problem ID is 9926202722, the APAR library is QSC6202722.

To find the problem entry created and the APAR library, complete these steps:

1. Enter the `WRKPRB` command. A display appears as shown in Figure 69 on page 82.
2. Search for the problem description that matches your problem. You can also locate the problem by date and time of the occurrence.
3. Type `5` next to the problem ID to display the problem. The display shown in Figure 108 appears.

Display Problem Details

System: ITSOSYS1

Problem ID . . . . . : 9918533672

Origin . . . . . : ITSOSYS1

Current status . . . . . : READY

Problem . . . . . : \*Attention\* Resource failed.

Problem message ID . . . . . : CPI8009

Problem type . . . . . : Machine detected

Problem category . . . . . : \*REPORT

Date and time detected . . . . . : 07/04/99 09:48:27

System reference code . . . . . :

More...

Press Enter to continue.

F3=Exit F5=Display possible causes F6=Display problem history

F11=Display APAR library F12=Cancel F20=Display submitted change requests

Figure 108. Display Problem Details display

4. Press `F11` to display the APAR library. A display appears like the example shown in Figure 109.



Display Library

Library . . . . . : QSC8533672
Type . . . . . : PROD
Create authority . . : \*SYSVAL

Number of objects . . : 5
ASP of library . . . : 1

Type options, press Enter.

5=Display full attributes    8=Display service attributes

| Opt | Object     | Type    | Attribute | Size  | Text                  |
|-----|------------|---------|-----------|-------|-----------------------|
|     | QSCAPAROQ  | *OUTQ   |           | 24576 |                       |
|     | QSCAPARMST | *USRSPC |           | 8192  |                       |
|     | QSCERI000A | *USRSPC |           | 8192  | PRTERRLOG TYPE(*ERRLO |
|     | QSCERI000D | *USRSPC |           | 12288 | PRTERRLOG TYPE(*ERRLO |
|     | QSCPROBLEM | *USRSPC |           | 8192  | Problem 9918533672 IT |

Bottom

F3=Exit    F12=Cancel    F17=Top    F18=Bottom  
(C) COPYRIGHT IBM CORP. 1980, 1999.

Figure 109. Display Library display

- These are the objects contained in the library associated with this problem log entry. Spooled files are saved in objects that are type \*USRSPC. Other objects are saved as a copy or duplicate of the object that was collected.

The contents of the user space cannot be displayed until the data is restored by a service provider. See 7.8, “Restoring APAR data using the RSTAPARDTA command” on 117.

#### 7.5.4 Viewing the list of data after it is saved

Once the save APAR data function is complete, all the data is saved in an APAR library. The library contains objects and user spaces for spooled files. To view the list of saved data, follow these steps:

- If you are at the Display Problem Details display, press F11 to display the APAR library. Otherwise, go to 7.5.3, “Finding the APAR library” on 112. The display shown in Figure 110 on page 114 appears.

| Display Library                                           |            |            |                         |       |       |                    |
|-----------------------------------------------------------|------------|------------|-------------------------|-------|-------|--------------------|
| Library . . . . .                                         | :          | QSC3531042 | Number of objects . . : | 19    |       |                    |
| Type . . . . .                                            | :          | PROD       | ASP of library . . . :  | 1     |       |                    |
| Create authority . . .                                    | :          | *SYSVAL    |                         |       |       |                    |
| Type options, press Enter.                                |            |            |                         |       |       |                    |
| 5=Display full attributes    8=Display service attributes |            |            |                         |       |       |                    |
| Opt                                                       | Object     | Type       | Attribute               | Freed | Size  | Text               |
|                                                           | QSCAPAROQ  | *OUTQ      |                         | NO    | 8704  |                    |
|                                                           | QSCAPARMST | *USRSPC    |                         | NO    | 4608  |                    |
|                                                           | QSCASF000A | *USRSPC    |                         | NO    | 4608  | Problem 9213531042 |
|                                                           | QSCASF000D | *USRSPC    |                         | NO    | 4608  | Problem 9213531042 |
|                                                           | QSCASF001A | *USRSPC    |                         | NO    | 4608  | Problem 9213531042 |
|                                                           | QSCASF001D | *USRSPC    |                         | NO    | 13824 | Problem 9213531042 |
|                                                           | QSCASF002A | *USRSPC    |                         | NO    | 4608  | Problem 9213531042 |
|                                                           | QSCASF002D | *USRSPC    |                         | NO    | 16896 | Problem 9213531042 |
|                                                           | QSCASF003A | *USRSPC    |                         | NO    | 4608  | Problem 9213531042 |
|                                                           | QSCASF003D | *USRSPC    |                         | NO    | 16896 | Problem 9213531042 |
|                                                           | QSCASF004A | *USRSPC    |                         | NO    | 4608  | Problem 9213531042 |
|                                                           |            |            |                         |       |       | More...            |
| F3=Exit    F12=Cancel    F17=Top    F18=Bottom            |            |            |                         |       |       |                    |
| (C) COPYRIGHT IBM CORP. 1980, 1992.                       |            |            |                         |       |       |                    |

Figure 110. Display Library display

These are the objects contained in the library associated with this problem log entry. Spooled files are saved in objects that are type \*USRSPC. Other objects are saved as a copy or duplicate of the object that was collected. The contents of the user space cannot be displayed until the data is restored by a service provider. See 7.8, “Restoring APAR data using the RSTAPARDTA command” on 117.

2. To display the spooled files, go to 7.5.2, “Viewing the APAR data that is collected” on 112.

## 7.6 Using other APAR data options in the problem log

To work with other APAR data options from a problem log entry, go to 7.4.2, “Saving APAR data from an existing problem log entry” on 93, if you are not at the Work with Problem display. Then continue here. For example, the display shown in Figure 111 appears.

| Work with Problem                  |                                                    | System: ITSOSYS1 |
|------------------------------------|----------------------------------------------------|------------------|
| Problem ID . . . . .               | : 9205239455                                       |                  |
| Origin . . . . .                   | : RPC.RCHAS110                                     |                  |
| Current status . . . . .           | : READY                                            |                  |
| Problem . . . . .                  | : User detected a software problem on this AS/400. |                  |
| Select one of the following:.      |                                                    |                  |
| 1. Analyze problem                 |                                                    |                  |
| 2. Report problem                  |                                                    |                  |
| 20. Close problem                  |                                                    |                  |
| 30. Save APAR data to APAR library |                                                    |                  |
| 31. Display APAR library           |                                                    |                  |
| 32. Save APAR library              |                                                    |                  |
| 33. Delete APAR data               |                                                    |                  |
| Selection                          |                                                    | Bottom           |
| F3=Exit F12=Cancel                 |                                                    |                  |

Figure 111. Work with Problem menu

When you work with a problem log entry on the Work with Problem display, you can choose one of the following options to work with the APAR data:

- **Save APAR data to APAR library**

This option invokes the Save APAR Data (SAVAPARDTA) command. See 7.5, “Selecting APAR data to collect” on 94.

This option appears if:

- The user is authorized to the SAVAPARDTA command.
- This is not a PTF order.
- The problem originated on this system.
- The problem was not created by the RSTAPARDTA command.

No other options for APAR data are displayed if no APAR data has been collected for the problem.

- **Display APAR library**

This option invokes the Display Library (DSPLIB) command to display a list of all objects saved in the APAR library.

This option appears if:

- APAR data has been collected.
- There is an APAR library associated with the problem.

- **Save APAR library**

This option invokes the Save Library (SAVLIB) command to save APAR data to tape, diskette, or a save file.

This option appears if:

- The user is authorized to the SAVLIB command.
- APAR data has been collected.
- There is an APAR library associated with the problem.

• **Delete APAR library**

This option invokes the Delete APAR Data (DLTAPARDTA) command to clear the APAR output queue, delete objects in the library, and then delete the APAR library associated with this problem.

This option appears if:

- The user is authorized to the DLTAPARDTA command.
- APAR data has been collected.
- There is an APAR library associated with the problem.

Refer to 7.5, “Selecting APAR data to collect” on 94, 7.5.4, “Viewing the list of data after it is saved” on 113, and the following section for more information.

---

## 7.7 Deleting APAR data using the DLTAPARDTA command

To delete APAR data from the problem log, go to 7.6, “Using other APAR data options in the problem log” on 114. Otherwise, enter the `DLTAPARDTA` command on a command line, and press F4. The display shown in Figure 112 appears.

Delete APAR Data (DLTAPARDTA)

Type choices, press Enter.

Problem identifier . . . . .

Character value

F3=Exit

F4=Prompt

F5=Refresh

F10=Additional parameters

F12=Cancel

F13=How to use this display

F24=More keys

Bottom

Figure 112. Delete APAR Data display (Part 1 of 2)

If the problem originated on this system, enter the problem ID in the Problem identifier prompt, and press the Enter key. Otherwise, press F10 for Additional Parameters, and enter the network identifier and control point name for the system where the problem originated. The display shown in Figure 113 appears.

Delete APAR Data (DLTAPARDTA)

Type choices, press Enter.

Problem identifier . . . . .

Character value

Additional Parameters

Origin:

Network identifier . . . . .

\*NETATR

Name, \*NETATR

Control point name . . . . .

\*NETATR

Name, \*NETATR

F3=Exit
F4=Prompt
F5=Refresh
F12=Cancel
F13=How to use this display

Bottom

F24=More keys

Figure 113. Delete APAR Data display (Part 2 of 2)

To find the origin for the problem, follow these steps:

1. Enter the `WRKPRB` command.
2. Find the problem ID.
3. Type `5` next to the problem ID to display details.

The origin is at the top of the Display Problem Details display that appears.

**Note**

If the origin of the problem is, for example, `IBM.ITSOSYS1`, the network identifier is `IBM` and the control point name is `ITSOSYS1`.

When you delete APAR data, you clear the spooled files from the QSCAPAROQ in the APAR library, delete the QSCAPAROQ output queue, and then delete the APAR library. The problem log entry history shows that the APAR data was deleted and the reference to the APAR library is removed.

## 7.8 Restoring APAR data using the RSTAPARDTA command

**Note**

The RSTAPARDTA command is available with System Manager/400 only (product number 5769-SM1).

The RSTAPARDTA command provides a way to access APAR data once the APAR data is restored onto the system with the Restore Library (RSTLIB) command.

To restore APAR data, perform these steps:

1. Use the `RSTLIB` command to restore the APAR library onto the service provider's system.
2. Wait for the message indicating the restore is complete.
3. Type `RSTAPARDTA` on a command line, and press F4.
4. Type the library that you entered on the `RSTLIB` command in the Restore to library prompt.
5. Wait for the message indicating the restore is complete.

This ends the procedure to restore the APAR data using the `RSTAPARDTA` command.

The `RSTAPARDTA` command creates a problem log entry with the same ID as the problem log entry saved.

All spooled files saved using the `SAVAPARDTA` command are spooled onto the QSCAPAROQ output queue in the restored library. All objects saved as APAR data are in the restored library.

---

## Chapter 8. Power problems

This chapter discusses the detection and handling of power problems. Power problems can be divided into two areas: critical and redundant. Total power loss of the entire system or a frame (tower) is a *critical loss*. An internal power supply failure is regarded as a *redundant loss*. Most AS/400e servers today have more redundancy built into the hardware using redundant power supplies, with uninterruptible power supplies provided externally.

---

### 8.1 Detecting power problems

AS/400e servers have an internal and external System Power Control Network (SPCN). The AS/400e server monitors the power connections and reports back any detected failures to the system operator's message queue or posts a system reference code (SRC) on the front control panel of the system unit or the system expansion unit.

When an uninterruptible power supply (UPS) is installed, a signal cable from the UPS to the AS/400e server allows the server to monitor the power signal interface and provide messages in the history log (QHST).

#### 8.1.1 Messages

The system operators message queue (QSYSOPR) receives messages, some of which allow problem analysis procedures to run against them. Messages with an asterisk (\*) at the start of the message allow problem analysis. The operator executes problem analysis by selecting F14 with the cursor aligned within the text of the message on the screen.

When you press the F1 key, a screen appears like the example shown in Figure 114.

Display Formatted Message Text

System: ITSOSYS1

Message ID . . . . . : CPPA139  
Message file . . . . . : QCPFMSG  
Library . . . . . : QSYS

Message . . . . . : Regulator fault  
Cause . . . . . : A regulator has detected a fault. Fault tolerance may  
allow continued system operation. The failing unit is located in frame 2  
and is connected to SPCN port 3 . The Unit Reference Code for this problem  
is 10006718 and the Error Log ID is 9920147250.  
Recovery . . . . . : Press F14 to run Problem Analysis.

Bottom

Press Enter to continue.  
F3=Exit F11=Display unformatted message text F12=Cancel

Figure 114. Display Formatted Message Text

### 8.1.2 SRC

System reference codes (SRC) are posted on the front panel of the system unit or system expansion unit. They are also captured in the Product Activity Log. The digits of the SRC indicate the source of the error, that is:

- SRC codes of 0000 XXXX include SPCN and non-SPCN control panel reference codes.
- SRC codes of 1XXX XXXX are System Power Control Network (SPCN) reference codes.

---

## 8.2 Problem determination

To perform problem determination on power failures, refer to the chapter on handling and reporting system problems in *AS/400 Basic Operations, Administration and Problem Handling*, SC41-5206.

You can also refer to the power loss recovery chapter in *OS/400 Backup and Recovery*, SC41-5304.

### Note

Know where the power source is for the system unit and system expansion units. For example, know where the power distribution supply box or the main power outlet in the wall is for the system and expansion units.

---

## 8.3 Uninterruptible power supplies

Use an uninterruptible power supply to provide an alternative power source in the event of utility power loss to a system. The UPS has to be sized correctly for the system configuration to allow a controlled power down.

If the UPS is not sized correctly, for example, it is too small to keep the system powered for a sufficient length of time, the system and jobs end abnormally. Abnormal terminations increase the chances for object damage. The subsequent IPL will be an abnormal IPL, which is longer than a normal IPL.

### Note

The ability to control the power down of the system prevents probable loss of access paths or files open for updates and transactions in process.

### 8.3.1 Planning and setup

Planning information for UPS is contained in *AS/400 Physical Planning Reference*, SA41-5109, and also in the UPS manufacturer's documentation. Some of the UPS manufacturer Web sites are:

- <http://www.oem.exide.com/ibm-ups/>
- <http://www.bestpower.com>
- <http://www.apcc.com/>



### 8.3.2 Messages

When utility power is lost and the UPS is providing AC power, the AS/400e server logs messages in the QHST message queue. Likewise, when utility power is restored, it logs messages again.

Table 16 lists the messages logged to QHST when utility power alters.

Table 16. UPS-related messages in the history log

| Message ID | Message text                                          |
|------------|-------------------------------------------------------|
| CPF1816    | System utility power failed at &1                     |
| CPF1817    | System power restored at &1                           |
| CPF1819    | System ending. Power failure message not monitored    |
| CPI0961    | Uninterruptible power supply (UPS) no longer attached |
| CPI0962    | Uninterruptible power supply (UPS) is now attached    |
| CPI0963    | System on auxiliary power                             |
| CPI0964    | Weak battery condition exists                         |
| CPI0965    | Failure of battery backup feature in system unit      |
| CPI0966    | Failure of battery backup feature in expansion unit   |
| CPI0973    | Weak battery condition no longer exists               |
| CPI0974    | UPS has been bypassed                                 |
| CPI0975    | UPS no longer bypassed                                |
| CPI0976    | Notification of message &1; failed                    |
| CPI0981    | Automatic IPL disabled                                |
| CPI0994    | System power is restored                              |

Send UPS messages to a separate message queue by changing the system value UPS message queue (QUPSMMSGQ) to a message queue of your choice. By default, all UPS messages are sent to message queue QSYSOPR in library QSYS.

Additional information about the messages in Table 16 is available in *OS/400 Backup and Recovery*, SC41-5304.

### 8.3.3 Problem determination

Each UPS has its unique set of problem determination, as well as maintenance requirements. Contact your service provider or UPS manufacturer documentation for problem determination information and assistance.

### 8.3.4 Availability functions

Other functions to consider for system availability when standby power is accessible include:

- System Managed Access Path Protection (SMAPP)
- Journaling files and access paths

- Commitment control
- RISC AS/400e with Continuous Power Main Storage

Refer to *OS/400 Backup and Recovery*, SC41-5304, and *The System Administrator's Companion to AS/400 Backup and Recovery*, SG24-2161, for further information.

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## 8.4 Additional information

For more information about power and uninterruptible power supplies, refer to the following manuals:

- *OS/400 Backup and Recovery*, SC41-5304
- *AS/400 Physical Planning Reference*, SA41-5109
- *AS/400 Basic System Operation, Administration, and Problem Handling*, SC41-5206
- UPS manufacturer documentation, which is available on the Web at these sites:
  - <http://www.oem.exide.com/ibm-ups/>
  - <http://www.bestpower.com/as400/>
  - <http://www.apcc.com/>

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## Part 2. Service provider and advanced operator service aids

Behind the scenes of the support role of the AS/400e system management team is the service provider. When the AS/400e system operator completes the initial problem resolution phases, they work with their account service provider. More advanced tools for more skilled technicians are described in this part.

Part 2 of this document describes the tools intended primarily for use in advanced problem determination. These include tools used by the system operator for more advanced problems and tools used by the specialist representing the account.

The topics covered in this part include:

- Initial Program Load
- Main Storage Dump
- Job traces
- Communications problem determination
- Dumping a job
- Dumping an object
- Collecting an IOP dump
- Tracing and collecting information on the Licensed Internal Code
- Using SST and DST
- Collecting the Problem Activity Log (PAL)
- Information on the service director



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## Chapter 9. Initial program load (IPL)

An initial program load (IPL) has three distinct phases. Each phase is subdivided into stages that perform specific functions. These phases, which are explained further in this chapter, are:

- Service processor
- Licensed Internal Code (LIC)
- Operating system (OS/400)

---

### 9.1 Service processor

The service processor is responsible for initiating the IPL by communicating with the control panel. The service processor hardware is then tested, the code is loaded into the service processor random access memory (RAM), and the processor code is loaded.

The functions performed by the service processor during the IPL are:

- Hardware diagnostics or basic assurance tests (BATs) are run.
- The load source input/output processor (IOP or MFIO) is IPLed.
- LIC code required to IPL the service processor is acquired from the load source unit. The load source can be disk, tape, or CD-ROM.
- The service processor runs diagnostics to the processor.
- The service processor loads the LIC, and then starts the CPU.

For more information about the service processor phase, see *AS/400 Licensed Internal Code Diagnostic Aids - Volume 1*, LY44-5900.

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### 9.2 Licensed Internal Code

Licensed Internal Code is responsible for the following IPL steps:

1. Main storage initialization
2. Tasking
3. Bus initialization
4. Confirmation of I/O device attachment
5. Resource management tasks
6. Events
7. Dedicated Service Tools (DST)

Further details about Licensed Internal Code is found in *AS/400 Licensed Internal Code Diagnostic Aids - Volume 1*, LY44-5900.

---

### 9.3 Operating system

OS/400 is the third phase of the IPL. OS/400 commences the system functionality. This third phase produces the sign-on screen. Then the user has access to the applications and the Licensed Program Products.

The IPL status system reference codes that are displayed on the control panel are discussed in the following section.

## 9.4 System reference codes on the front panel

Symptoms of a system problem are mainly noticed by the users. For example, the display screen has an input inhibit cross symbol after pressing the Enter key. To determine the problem, observe whether the system reference codes are on the control (front) panel. SRCs display the status of the IPL or indicate a machine problem.

### 9.4.1 IPL status

The codes shown in Figure 115 are the generic status IPL System Reference Codes for each of the three phases of the IPL. C1xx xxxx through C5xx xxxx relate to system processor activities. C6xx xxxx through C9xx xxxx indicate LIC activities. And C9xx xxxx through the “next IPL” status indicator (for example 01A or 01B) are OS/400-related activities.

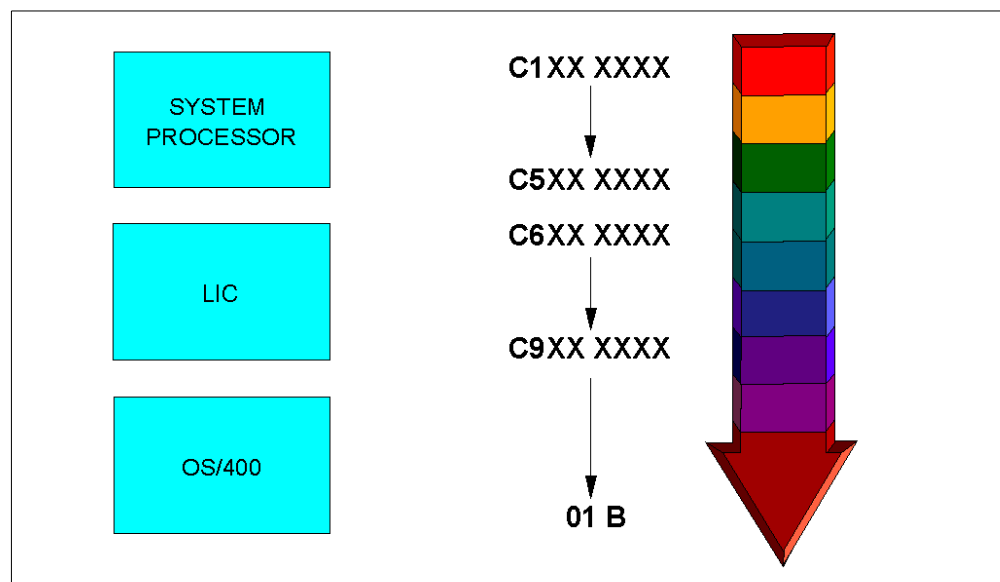


Figure 115. IPL status codes

The chapter on system reference code (SRC) information in *Service Functions*, SY44-5902, includes a list of the functions performed in each phase.

### 9.4.2 Machine problems

When a machine problem occurs that is associated with a system reference code, a yellow system attention light is lit on the front panel. The display shown in Figure 116 lists the system reference codes that relate to the area of the problem.

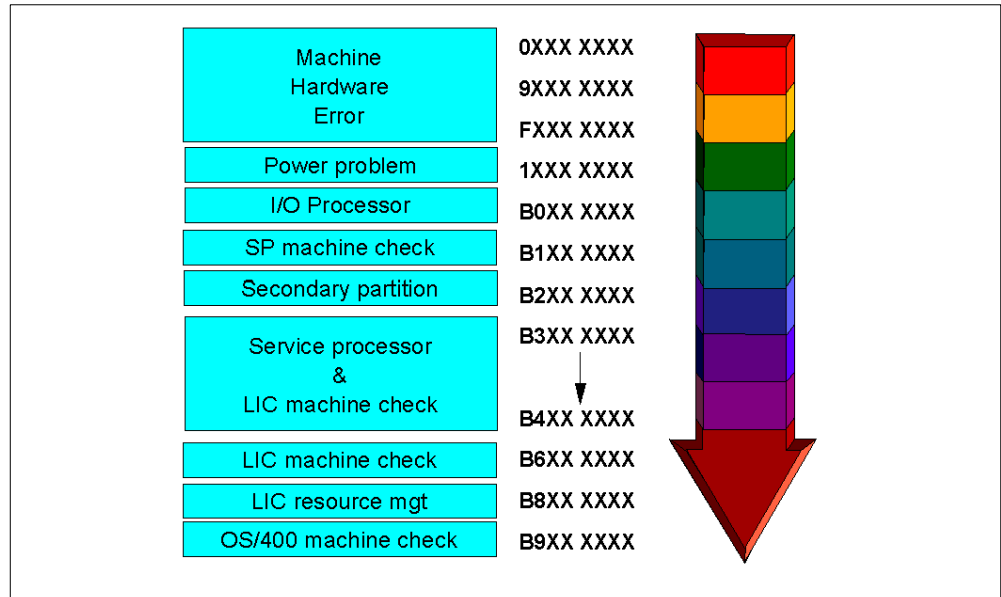


Figure 116. Machine problems display

#### Important

When any of these SRCs appear on the control panel, the system will have stopped operating. The information gathered in the SRC leads to the failing condition. At this point, fill out a Problem Summary Form before you call your service provider. The form can be found in *AS/400 Basic System Operation, Administration and Problem Handling*, SC41-5206, and the *Problem Analysis, Repair and Parts* manual for your system (form number varies by model).

### 9.4.3 Operator intervention

The system reference codes shown in Figure 117 indicate that an action is required. For example, the correct CD has to be inserted, or the system requires a service action performed before the IPL can be completed.

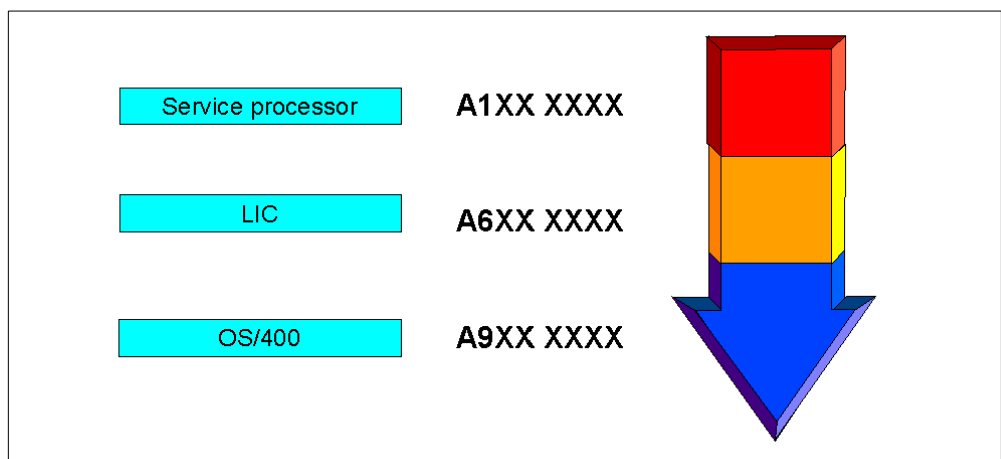


Figure 117. Operator intervention SRC display

In other words, an A1xx xxxx, A6xx xxxx, or A9xx xxxx code indicates that action is required.

#### 9.4.4 General system status

The DXXX XXXX system reference codes on the control panel display functions that are performed when the system console screen is not available. Some of these codes are shown in Figure 118.

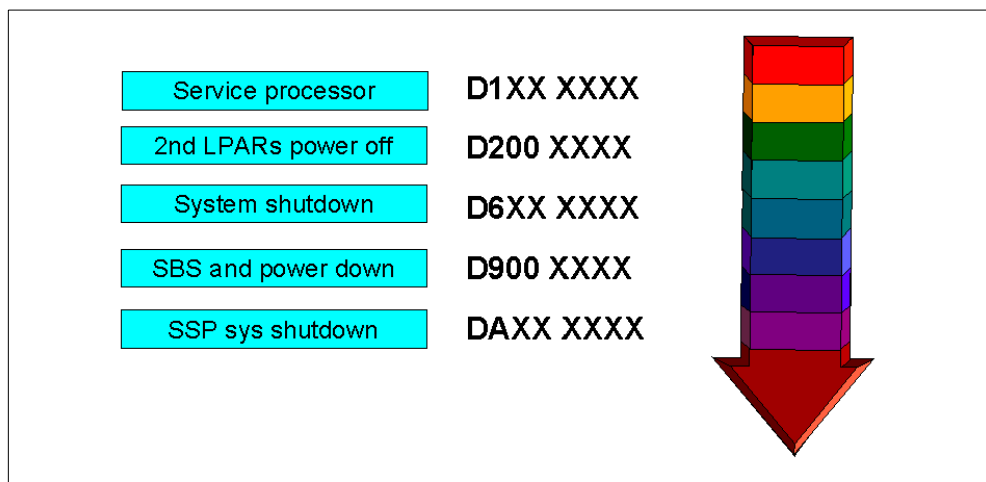


Figure 118. General system status

These system reference codes are located in *Service Functions*, SY44-5902.

---

## 9.5 IPL options

There are many combinations of IPL options, types, modes, and speeds from which you can choose:

- There are three options when you select an IPL: type, mode, or speed.
- There are four IPL types (A, B, C, or D) depending on the copy of LIC you intend to use or the functions that are required to be performed.
- There are four modes of IPL: manual, normal, secure, and auto.
- There are three speeds to choose from: fast, slow, or system defined.

Figure 119 outlines the type, mode, and speed options.



## Control panel functions

- Types, modes and speeds
  - Type
    - A = IPL from disk using copy A of the LIC
    - B = IPL from disk using copy B of the LIC
    - C = Reserved
    - D = Alternate IPL device
  - Mode
    - Manual
    - Normal
    - Secure
    - Auto
  - Speed
    - Fast
    - Slow
    - System defined

Figure 119. IPL options

In addition to the IPL options selected from the control panel, you can change the attributes when you prompt (F4 key) the PWRDWNSYS command. The screen shown in Figure 120 displays the CHGIPLA parameters that you can change.

Change IPL Attributes (CHGIPLA)

Type choices, press Enter.

|                                   |           |                               |
|-----------------------------------|-----------|-------------------------------|
| Restart type . . . . .            | *SYS      | *SAME, *SYS, *FULL            |
| Keylock position . . . . .        | *NORMAL   | *SAME, *NORMAL, *AUTO...      |
| Hardware diagnostics . . . . .    | *MIN      | *SAME, *MIN, *ALL             |
| Compress job tables . . . . .     | *NONE     | *SAME, *NONE, *NORMAL...      |
| Check job tables . . . . .        | *ABNORMAL | *SAME, *ABNORMAL, *ALL, *SYNC |
| Rebuild product directory . . .   | *NONE     | *SAME, *NONE, *NORMAL...      |
| Mail Server Framework recovery    | *NONE     | *SAME, *NONE, *ABNORMAL       |
| Display status . . . . .          | *ALL      | *SAME, *SYS, *NONE...         |
| Clear job queues . . . . .        | *NO       | *SAME, *YES, *NO              |
| Clear output queues . . . . .     | *NO       | *SAME, *YES, *NO              |
| Clear incomplete joblogs . . . .  | *NO       | *SAME, *YES, *NO              |
| Start print writers . . . . .     | *YES      | *SAME, *YES, *NO              |
| Start to restricted state . . . . | *NO       | *SAME, *YES, *NO              |

Bottom

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

Figure 120. Change IPL Attributes (CHGIPLA)

More information on the IPL attributes is found in *CL Reference*, SC41-5722.

## 9.6 IPL sequence

To diagnose problems that occur during IPL, it is useful to know the sequence of events. The sequence of events during an IPL is shown in Figure 121 on page 130.

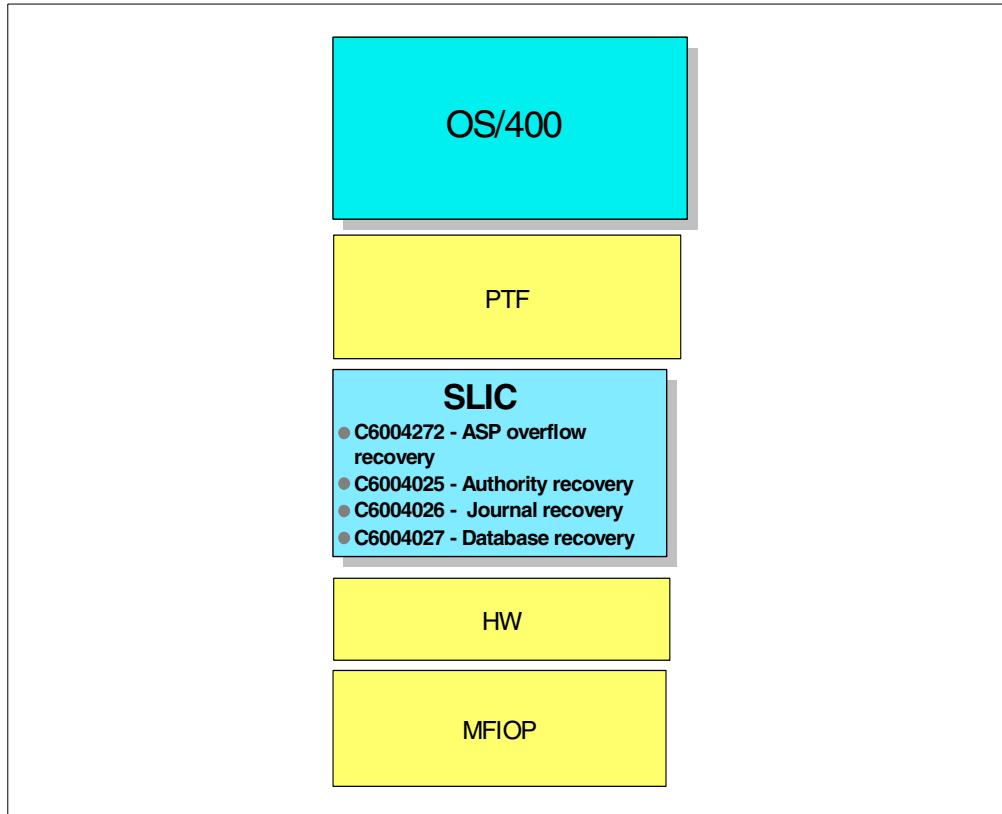


Figure 121. IPL sequence of events

Service reference codes (SRCs) are displayed on the control panel to indicate the function in process. The sequence of codes is shown in Figure 122.

## OS/400

- C9002825 - Convert the Work Control Block Table (WCBT)
  - ✓ Reduce the size of the WCBT
- C9002830 - Validate system values, check for duplicate device descriptions
  - ✓ Eliminate unnecessary device descriptions
- C9002920 - Library cleanup
  - ✓ Control the number of libraries
  - ✓ Eliminate temporary job structures
- C9002965 - Software management services initialization
  - ✓ Control the number of libraries and licensed program products
- C9002970 - Database, journal and commit functions
  - ✓ Control the number of journals that specify MNGSRC(\*SYSTEM)
  - ✓ Avoid using system request to cancel out of jobs when they are in database operations
- C9002990 - IPL performance tuning of machine and base pools
  - ✓ Eliminate unnecessary device, controller, line and network interface descriptions
- C90029A0 - Prepare the system control block structure
  - ✓ Control the number of libraries
  - ✓ Manage the QUPSMMSGQ and QINACTMSGQ to clear unneeded messages
  - ✓ Reduce the size of the WCBT
- C90029B0 - Spool initialization
  - ✓ Delete unnecessary spooled files
- C90029C0 - Work Control Block Table initialization
  - ✓ Reduce the size of the WCBT
- C9002A95 - Cleanup of Work Control Block Table during an abnormal IPL
  - ✓ Reduce the size of the WCBT
- C9002AA0 - Cleanup for database, journaling, and commitment control
  - ✓ Manage the number of journals created by specifying DLTRCV(\*YES)
  - ✓ Control the number of files, members, and access paths
  - ✓ Manage the use of commitment control and two phase commit operations
- C9002AB0 - Miscellaneous cleanup including access paths
  - ✓ Manage the number of files created with \*IMMED or \*DLY access path maintenance that specify a recovery value of \*IPL
- C9002B30 - Initialize and start QLUS
  - ✓ Eliminate unnecessary device descriptions
  - ✓ Use APPN rather than APPC
- C9002B40 - Device configuration
  - ✓ Eliminate unnecessary device descriptions
  - ✓ Limit the number of device descriptions that specify \*YES for online at IPL
- C9002C20 - QSNADS object recovery
  - ✓ Reduce the number of SNADS objects (mail)
- C9002C40 - Work Control Block Table cleanup for a normal IPL
  - ✓ Reduce the size of the WCBT
- C9002C50 - Recovery of office objects
  - ✓ Reduce the number of documents and folders (DLOs)

Figure 122. SRC codes of an IPL

Further information on the IPL process can be found in *The System Administrator's Guide to AS/400 Backup and Recovery*, SG24-2161.

### Tip

To evaluate the IPL timings of your system, there is a tool that tracks IPL times. To evaluate IPL timings on your system, on a command line, enter:

```
CALL QWCCRTEC
```

QWCCRTEC produces a QPSRVDMP spooled file. A sample of the report is shown in Figure 123 and Figure 124 on page 132.

|                      |                   |             |                          |                   |                                                                     |
|----------------------|-------------------|-------------|--------------------------|-------------------|---------------------------------------------------------------------|
| 5769SS1 V4R3M0       | 980729            | AS/400 DUMP | 507838/NAGATA/QPADEV0014 | 11/23/98 16:04:07 | PAGE 1                                                              |
| - V04R03M00 - xxxxxx |                   |             |                          |                   |                                                                     |
| OBJECT TYPE-         | SPACE             |             |                          | *QTSP             |                                                                     |
| NAME-                | QWCSRCDATAOUTPUT  | TYPE-       | 19                       | SUBTYPE-          | EF                                                                  |
| CREATION-            | 11/23/98 16:04:07 | SIZE-       | 0000004000               |                   |                                                                     |
| ATTRIBUTES-          | 0000              | ADDRESS-    | DF4A78E6AA               | 000000            |                                                                     |
| SPACE ATTRIBUTES-    |                   |             |                          |                   |                                                                     |
| 000000               | 00FFFF00          | 00000074    | 19EFD8E6                 | C3E2D9C3          | C4C1E3C1 D6E4E3D7 E4E34040 40404040 * È QWCSRCDATAOUTPUT *          |
| 000020               | 40404040          | 40404040    | 40020000                 | 00000000          | 00003F00 00010000 00000000 00000000 *                               |
| 000040               | 00000000          | 00000000    | 00000000                 | 00000000          | 00000000 00000000 00000000 00000000 *                               |
| 000060               | 00000000          | 00000000    | 00000000                 | 00000000          | 00FFFF00 *                                                          |
| SPACE-               |                   |             |                          |                   |                                                                     |
| 000000               | E7D7C640          | D7E6D9C4    | E6D54040                 | 404040F1          | F161F2F3 61F9F840 F0F37AF5 F27AF2F3 *XPF PWRDWN 11/23/98 03:52:23*  |
| 000020               | 0000C4F9          | F0F000F2    | F7F4F000                 | 000000F1          | F161F2F3 61F9F840 F0F37AF5 F27AF2F3 * D900 2740 11/23/98 03:52:23*  |
| 000040               | 0000C4F9          | F0F000F2    | F7F5F000                 | 000000F1          | F161F2F3 61F9F840 F0F37AF5 F27AF2F4 * D900 2750 11/23/98 03:52:24*  |
| 000060               | 0000C4F9          | F0F000F2    | F7F7F000                 | 000000F1          | F161F2F3 61F9F840 F0F37AF5 F27AF2F4 * D900 2770 11/23/98 03:52:24*  |
| 000080               | 0000C4F9          | F0F000F2    | F7F8F000                 | 000000F1          | F161F2F3 61F9F840 F0F37AF5 F27AF2F4 * D900 2780 11/23/98 03:52:24*  |
| 0000A0               | 0000C4F9          | F0F000F2    | F7F9F000                 | 000000F1          | F161F2F3 61F9F840 F0F37AF5 F27AF2F4 * D900 2790 11/23/98 03:52:24*  |
| 0000C0               | 0000C4F9          | F0F000F2    | F7C3F000                 | 000000F1          | F161F2F3 61F9F840 F0F37AF5 F27AF2F4 * D900 27C0 11/23/98 03:52:24*  |
| 0000E0               | C5958440          | D7E6D9C4    | E6D54040                 | 404040F1          | F161F2F3 61F9F840 F0F37AF5 F27AF2F5 *End PWRDWN 11/23/98 03:52:25*  |
| 000100               | E7D7C640          | C9D7D340    | 40404040                 | 404040F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * XPF IPL 11/23/98 04:00:19*    |
| 000120               | 0000C3F9          | F0F000F2    | F8F1F000                 | 000000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * C900 2810 11/23/98 04:00:19*  |
| 000140               | 0000C3F9          | F0F000F2    | F8F2F000                 | 000000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * C900 2820 11/23/98 04:00:19*  |
| 000160               | 00000000          | F1F000F3    | F000F0F0                 | F1F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * 10 20 0010 11/23/98 04:00:19* |
| 000180               | 00000000          | F1F000F3    | F000F0F0                 | F2F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * 10 20 0020 11/23/98 04:00:19* |
| 0001A0               | 00000000          | F1F000F3    | F000F0F0                 | F1F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * 10 30 0010 11/23/98 04:00:19* |
| 0001C0               | 00000000          | F1F000F3    | F000F0F0                 | F2F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * 10 30 0020 11/23/98 04:00:19* |
| 0001E0               | 00000000          | F1F000F3    | F000F0F0                 | F3F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * 10 30 0030 11/23/98 04:00:19* |
| 000200               | 00000000          | F1F000F3    | F000F0F0                 | F4F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * 10 30 0040 11/23/98 04:00:19* |
| 000220               | 00000000          | F1F000F3    | F000F0F0                 | F5F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF1F9 * 10 30 0050 11/23/98 04:00:19* |
| 000240               | 00000000          | F1F000F3    | C100F0F0                 | F1F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0010 11/23/98 04:00:20* |
| 000260               | 0000C3F9          | F0F000F2    | F8F3F000                 | 000000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * C900 2830 11/23/98 04:00:20*  |
| 000280               | 00000000          | F1F000F3    | C100F0F0                 | F1F800F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0018 11/23/98 04:00:20* |
| 0002A0               | 00000000          | F1F000F3    | C100F0F0                 | F2F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0020 11/23/98 04:00:20* |
| 0002C0               | 00000000          | F1F000F3    | C100F0F0                 | F3F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0030 11/23/98 04:00:20* |
| 0002E0               | 00000000          | F1F000F3    | C100F0F0                 | F3F500F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0035 11/23/98 04:00:20* |
| 000300               | 00000000          | F1F000F3    | C100F0F0                 | F5F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0050 11/23/98 04:00:20* |
| 000320               | 00000000          | F1F000F3    | C100F0F0                 | F6F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0060 11/23/98 04:00:20* |
| 000340               | 00000000          | F1F000F3    | C100F0F0                 | F7F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0070 11/23/98 04:00:20* |
| 000360               | 00000000          | F1F000F3    | C100F0F0                 | F8F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0080 11/23/98 04:00:20* |
| 000380               | 00000000          | F1F000F3    | C100F0F0                 | F8F200F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0082 11/23/98 04:00:20* |
| 0003A0               | 00000000          | F1F000F3    | C100F0F0                 | F9F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0090 11/23/98 04:00:20* |
| 0003C0               | 00000000          | F1F000F3    | C100F0F0                 | F9F800F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 0098 11/23/98 04:00:20* |
| 0003E0               | 00000000          | F1F000F3    | C100F0F0                 | C1F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 00A0 11/23/98 04:00:20* |
| 000400               | 00000000          | F1F000F3    | C100F0F0                 | C1F400F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 00A4 11/23/98 04:00:20* |
| 000420               | 00000000          | F1F000F3    | C100F0F0                 | C1F800F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 00A8 11/23/98 04:00:20* |
| 000440               | 00000000          | F1F000F3    | C100F0F0                 | C1C100F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F0 * 10 3A 00AA 11/23/98 04:00:20* |
| 000460               | 00000000          | F1F000F3    | C100F0F0                 | C1C300F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F1 * 10 3A 00AC 11/23/98 04:00:21* |
| 000480               | 00000000          | F1F000F3    | C100F0F0                 | C2F000F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F1 * 10 3A 00B0 11/23/98 04:00:21* |
| 0004A0               | 00000000          | F1F000F3    | C100F0F0                 | C2F400F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F1 * 10 3A 00B4 11/23/98 04:00:21* |
| 0004C0               | 00000000          | F1F000F3    | C100F0F0                 | C2F800F1          | F161F2F3 61F9F840 F0F47AF0 F07AF2F1 * 10 3A 00B8 11/23/98 04:00:21* |

Figure 123. IPL Timing report (Part 1 of 2)

|                                                                                                           |                   |             |                          |                   |                                                                    |
|-----------------------------------------------------------------------------------------------------------|-------------------|-------------|--------------------------|-------------------|--------------------------------------------------------------------|
| Display Spooled File                                                                                      |                   |             |                          |                   |                                                                    |
| File . . . . .                                                                                            | QPSRVIMP          |             |                          | Page/Line         | 1/1                                                                |
| Control . . . . .                                                                                         |                   |             |                          | Columns           | 1 - 130                                                            |
| Find . . . . .                                                                                            |                   |             |                          |                   |                                                                    |
| *...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8...+...9...+...0...+...1...+...2...+...3 |                   |             |                          |                   |                                                                    |
| 5769SS1 V4R4M0                                                                                            | 990521            | AS/400 DUMP | 199785/SUSAN2/QPADEV000M | 08/21/00 12:45:42 | PAGE 1                                                             |
|                                                                                                           |                   |             |                          |                   | PAGE 2                                                             |
| OBJECT TYPE-                                                                                              | SPACE             |             |                          | *QTSP             |                                                                    |
| NAME-                                                                                                     | QWCSRCDATAOUTPUT  | TYPE-       | 19                       | SUBTYPE-          | EF                                                                 |
| CREATION-                                                                                                 | 08/21/00 12:45:43 | SIZE-       | 0000005000               |                   |                                                                    |
| ATTRIBUTES-                                                                                               | 0000              | ADDRESS-    | E79DFCA4F8               | 000000            |                                                                    |
| SPACE ATTRIBUTES-                                                                                         |                   |             |                          |                   |                                                                    |
| 000000                                                                                                    | 00FFFF00          | 00000074    | 19EFD8E6                 | C3E2D9C3          | C4C1E3C1 D6E4E3D7 E4E34040 40404040 * 0 È QWCSRCDATAOUTPUT *       |
| 000020                                                                                                    | 40404040          | 40404040    | 40020000                 | 00000000          | 00004000 00100000 00000000 00000000 *                              |
| 000040                                                                                                    | 00000000          | 00000000    | 00000000                 | 00000000          | 00000000 00000000 00000000 00000000 *                              |
| 000060                                                                                                    | 00000000          | 00000000    | 00000000                 | 00000000          | 00FFFF00 *                                                         |
| SPACE-                                                                                                    |                   |             |                          |                   |                                                                    |
| 000000                                                                                                    | E7D7C640          | D7E6D9C4    | E6D54040                 | 404040F0          | F761F2F4 61F0F040 F1F17AF1 F47AF2F9 *XPF PWRDWN 07/24/00 11:14:29* |
| 000020                                                                                                    | 0000C4F9          | F0F000F2    | F7F4F000                 | 000000F0          | F761F2F4 61F0F040 F1F17AF1 F47AF2F9 * D900 2740 07/24/00 11:14:29* |
| 000040                                                                                                    | 0000C4F9          | F0F000F2    | F7F5F000                 | 000000F0          | F761F2F4 61F0F040 F1F17AF1 F57AF0F9 * D900 2750 07/24/00 11:15:09* |
| 000060                                                                                                    | 0000C4F9          | F0F000F2    | F7F7F000                 | 000000F0          | F761F2F4 61F0F040 F1F17AF1 F57AF0F9 * D900 2770 07/24/00 11:15:09* |
| 000080                                                                                                    | 0000C4F9          | F0F000F2    | F7F8F000                 | 000000F0          | F761F2F4 61F0F040 F1F17AF1 F57AF0F9 * D900 2780 07/24/00 11:15:09* |
| 0000A0                                                                                                    | 0000C4F9          | F0F000F2    | F7F9F000                 | 000000F0          | F761F2F4 61F0F040 F1F17AF1 F57AF1F0 * D900 2790 07/24/00 11:15:10* |
| 0000C0                                                                                                    | 0000C4F9          | F0F000F2    | F7C3F000                 | 000000F0          | F761F2F4 61F0F040 F1F17AF1 F57AF1F0 * D900 27C0 07/24/00 11:15:10* |
| F3=Exit F12=Cancel F19=Left F20=Right F24=More keys                                                       |                   |             |                          |                   |                                                                    |

Figure 124. QWCCRTEC IPL Timing report (Part 2 of 2)

---

## 9.7 IPL on logically partitioned systems

The IPL sequence of secondary partitions is the same as the primary partition, except for the first phase, the Service Processor phase. When the primary partition begins the IPL, the service processor checks all the hardware and verifies that the components are operational. Therefore, the IPL time for secondary partitions systems is significantly reduced in comparison to other stand-alone systems of the same configuration and performance.



---

## Chapter 10. Main storage dumps

A *main storage dump* (MSD) records the status of the AS/400e server at the time the dump is taken. The MSD contains:

- System data, which consists of:
  - Node Address Communication Area (NACA)
  - Processor Address Communication Area (PACA) array
  - Machine Initialization Status Record (MISR)
  - Source/Sink Active Device List (SSADL)
  - Task Process Chain Summary
- System processor data, which consists of:
  - General Purpose and Special Registers
  - Data and Instruction Cache
  - Data and Instruction Cache Directory
  - Translation Lookaside Buffers
- Service process data (MFIOP), which consists of:
  - Service Processor Communication Area
  - Processor Information Table
  - System Debug Area
  - IPL LID Directory
  - System Vital Product Data
  - System and Diagnostic SRC Trace
  - Service Processor Log Buffer
  - MFIOP Error Log

Together, this information helps the service provider to determine the cause of the system failure.

There are two types of main storage dumps:

- **Automatic:** This is done by the service processor as the result of a system failure.
- **Manual:** This is done by pressing F22 on the control panel when the system waits, loops, or appears to have an operating system failure. You can also perform a manual dump on a secondary partition by selecting option 22 from the Work with Partition Status display.

### Attention

Failure to collect the main storage dump when necessary can prolong problem resolution. This happens because some information that is useful for diagnosis is not available through other tools. Taking a main storage dump causes the system to stop. Use this procedure as directed by your service provider.

If you want to:

- Perform a MSD manually, go to 10.2, “Performing a system main storage dump manually” on page 137, or 10.3, “Performing a manual MSD on a secondary logical partition” on page 137.

- Copy a current MSD, go to 10.4, “Copying a current main storage dump” on page 140.
- Copy a MSD from disk to tape, go to 10.5, “Copying a main storage dump from ASP (disk) to tape” on page 145.

If you do not have service authority, contact the security officer or system administrator. Service authority is necessary to use DST or SST. See Chapter 19, “Using System Service Tools (SST)” on page 253, and Chapter 20, “Using Dedicated Service Tools (DST)” on page 259, for more information.

## 10.1 Automatic main storage dump

After a failure that causes the system to perform a main storage dump, the Main Storage Dump Occurred display appears as shown in Figure 125.

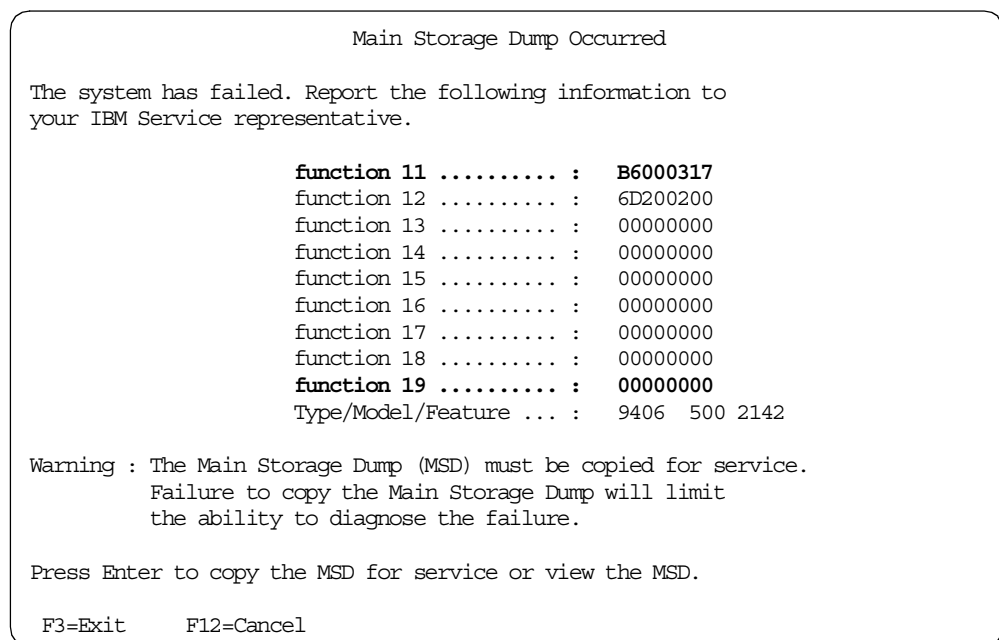


Figure 125. Main Storage Dump Occurred

Figure 125 shows the failing reference code (from function 11 to function 19). These codes are useful for problem determination. Interpretation of the codes is found in Appendix C “System and Unit Reference Code Information” of *AS/400 Licensed Internal Code Diagnostic Aids Volume 1*, LY44-5900.

### Important

When you press F3 to exit or F12 to cancel at this stage, a large portion of the MSD that resides in main storage becomes lost. This limits the ability to diagnose the failure.

Press Enter to copy the MSD for service.

For more information, refer to 10.4, “Copying a current main storage dump” on page 140.



---

## 10.2 Performing a system main storage dump manually

Use this procedure on the primary partition or on a system without logical partitions. For systems with logical partitions, refer to 10.3, “Performing a manual MSD on a secondary logical partition” on page 137.

Perform the following procedure to perform a manual MSD:

1. Select the Manual mode on the control panel.

For more information on how to set the system to manual mode, refer to Chapter 5, “Control Panel Functions” in *Service Functions*, SY44-5902.

2. Use the up arrow or down arrow buttons to display Function 22. Press Enter to perform a Main Storage Dump.
3. An attention Service Reference Code (SRC) A1xx 3022 is displayed, which indicates that Function 22 has been selected. Reselect Function 22, press Enter on the control panel, and wait for the dump to complete.

If another SRC is displayed, contact your service provider.

4. When the dump is complete, a display similar to the example in Figure 125 is shown on the console. The difference is the Service Reference Codes (Function 11 to Function 19) are displayed. Expect to see A1xx300x for Function 11, which indicates the MSD completed successfully.

For more information on MSD status, refer to Chapter 10 “System dumps” in *AS/400 Licensed Internal Code Diagnostic Aids Volume 1*, LY44-5900.

5. Press Enter to copy the MSD for service.

Refer to 10.4, “Copying a current main storage dump” on page 140.

### Attention

If you perform an MSD on the system, all activities end abnormally. You will not have access to the machine for a relatively long period of time. Perform an MSD only at the direction of your service provider.

For a system with logical partitions, performing MSD on the primary partition causes all active secondary partitions to abnormally terminate its activities. During the copying of the MSD at the primary partition console, shut down the secondary partition because exiting the MSD manager causes the secondary partition to abnormally end again if it is active.

---

## 10.3 Performing a manual MSD on a secondary logical partition

Follow this procedure on a secondary logical partition machine to perform a manual MSD:

1. From a workstation of the *primary partition*, enter the Start System Service Tools (STRSST) command from any command line. A display appears as shown in Figure 126 on page 138.

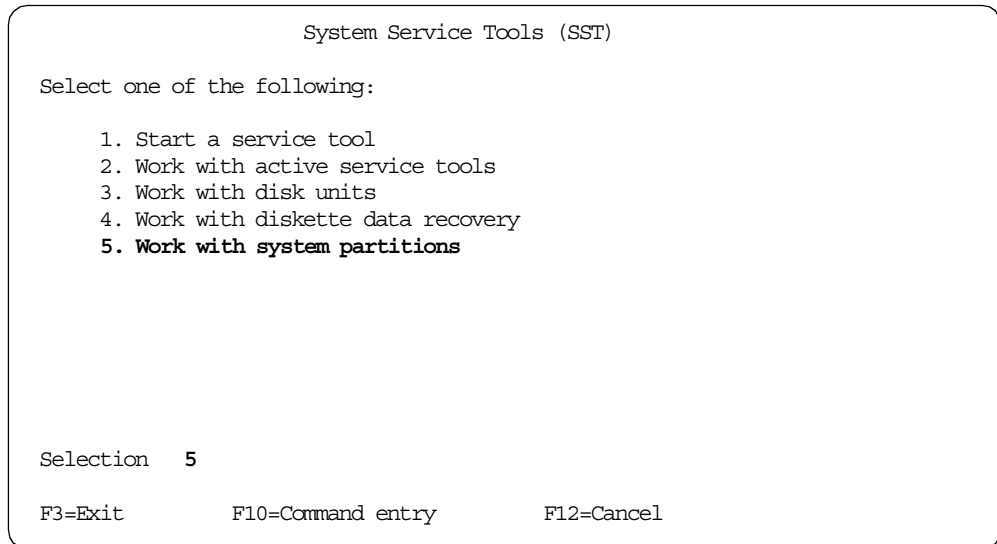


Figure 126. System Service Tools menu

#### Note

If you do not see this display, it may be due to an authority problem. Service authority is required on the user profile. See your security officer if necessary.

2. Select option 5 to work with system partitions. Press Enter. A display appears like the example shown in Figure 127.

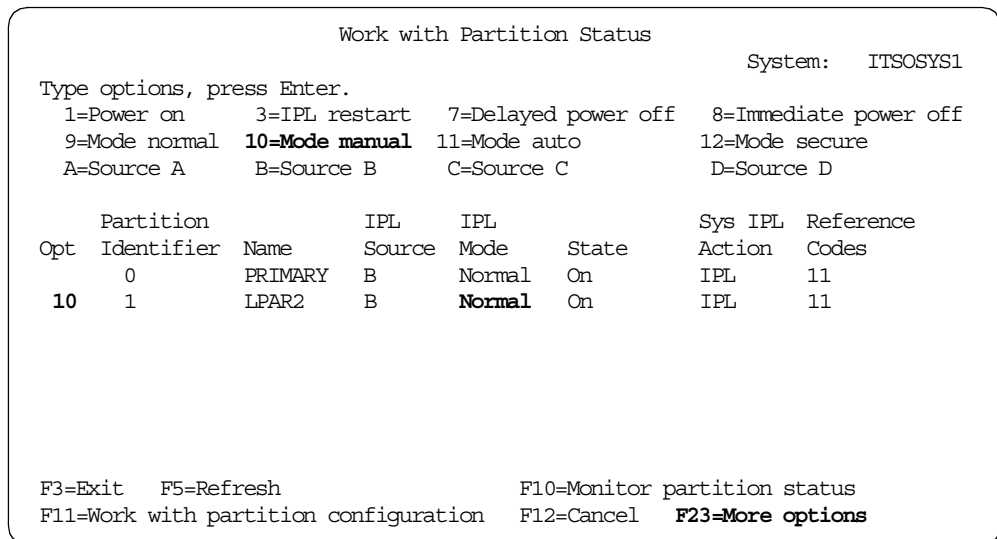


Figure 127. Work with Partition Status menu

3. If the desired partition is not in *manual* mode, select option 10 to place it in manual mode.
4. Press F23 for more options. The display changes as shown in Figure 128.

```

Work with Partition Status
System: ITSOSYS1

Type options, press Enter.
13=IPL partition on system IPL 14=Hold partition on system IPL
20=Display system type/model 21=Force Dedicated Service Tools
22=Force Main Storage Dump 34=Force CPM or MSD IPL retry

 Partition IPL IPL Sys IPL Reference
Opt Identifier Name Source Mode State Action Codes
 22 1 LPAR2 B Manual On IPL 11

F3=Exit F5=Refresh F10=Monitor partition status
F11=Work with partition configuration F12=Cancel F23=More options

```

Figure 128. Work with Partition Status menu with more options

5. Select option 22 to force an MSD for the secondary partition. A Confirm Force Main Storage Dump display appears as shown in Figure 129.

```

Confirm Force Main Storage Dump
System: ITSOSYS1

Force Main Storage Dump (MSD) of partition LPAR2
was requested.

Press F10 to confirm your choice to force a MSD.
Partition processing will be ended and the partition
will be IPLed.
Press F12 to return to change your choice.

F10=Force MSD F12=Cancel

```

Figure 129. Confirm Force Main Storage Dump menu

6. Press F10 to force a main storage dump.
7. The Force MSD successfully message appears at the bottom of the display.
8. The secondary partition performs an IPL. Then a Main Storage Dump Occurred display (refer to Figure 125 on page 136) appears on the console of the secondary partition. The difference is that the Service Reference Codes

(Function 11 to Function 19) are displayed. Expect to see A1xx300x for Function 11, which indicates the MSD completed successfully.

For more information on MSD status, refer to Chapter 10, “System Dumps” in *AS/400 Licensed Internal Code Diagnostic Aids Volume 1*, LY44-5900.

#### Important

Do not exit or cancel out of this procedure. If you press F3 to exit or F12 to cancel at this stage, a large portion of the MSD that resides in the main storage will become lost. This limits the ability to diagnose the failure.

9. Press Enter to copy the MSD for service.

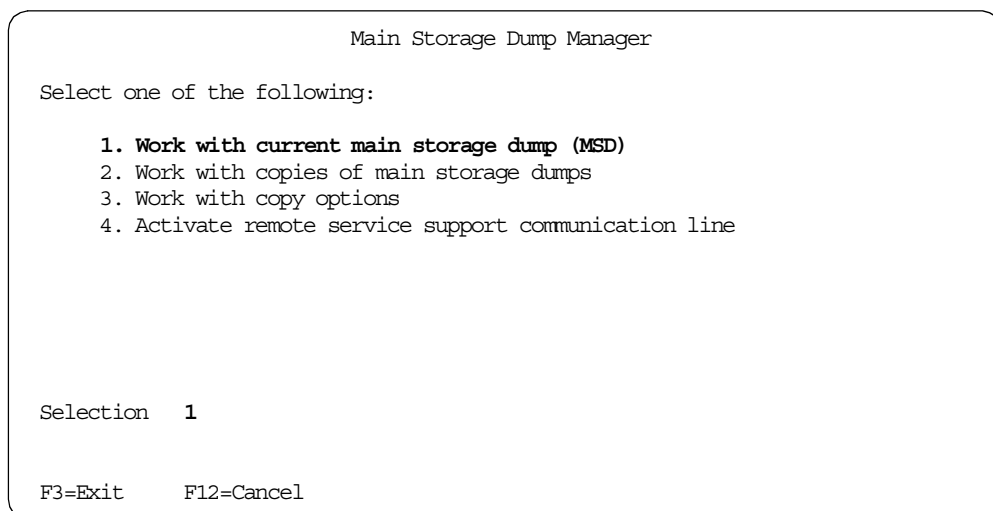
Refer to 10.4, “Copying a current main storage dump” on page 140.

## 10.4 Copying a current main storage dump

This procedure copies a main storage dump (MSD) to a predefined storage area on the system. This preserves the complete MSD from being lost prior to the next IPL.

Follow these steps to copy the current MSD to a predefined storage area:

1. From the Main Storage Dump Occurred display as shown in Figure 125 on page 136, press Enter to copy the MSD for further analysis. The Main Storage Dump Manager menu appears as shown in Figure 130.

A screenshot of the 'Main Storage Dump Manager' menu. The title 'Main Storage Dump Manager' is at the top. Below it, the text 'Select one of the following:' is displayed. A numbered list follows: '1. Work with current main storage dump (MSD)', '2. Work with copies of main storage dumps', '3. Work with copy options', and '4. Activate remote service support communication line'. Below the list, 'Selection 1' is shown. At the bottom, 'F3=Exit' and 'F12=Cancel' are listed.

```

Main Storage Dump Manager

Select one of the following:

 1. Work with current main storage dump (MSD)
 2. Work with copies of main storage dumps
 3. Work with copy options
 4. Activate remote service support communication line

Selection 1

F3=Exit F12=Cancel

```

Figure 130. Main Storage Dump Manager menu

2. Select option 1 (Work with current main storage dump (MSD)). Press Enter. The Work with Current Main Storage Dump menu appears as shown in Figure 131.

Work with Current Main Storage Dump

Select one of the following:

1. Display/Print

2. Copy to media

3. Copy to ASP

Selection

F3=Exit      F11=Display copy status      F12=Cancel

Figure 131. Work with Current Main Storage Dump menu

3. Select option 2 to copy to tape media or option 3 to copy to a predetermined area on disk storage.

For option 2, proceed to 10.4.1, “Copying the current MSD to tape” on page 141.

For option 3, proceed to 10.4.2, “Copying the current MSD to ASP” on page 143.

#### Note

We recommend that you copy the MSD to the hard disk if you have sufficient disk storage. This process is much faster. Therefore, the system can be available earlier. You can then copy it to tape from storage using the Main Storage Manager in SST. Refer to 10.5, “Copying a main storage dump from ASP (disk) to tape” on page 145.

### 10.4.1 Copying the current MSD to tape

To copy the current main storage dump to tape, follow these steps:

1. For option 2, the Copy Main Storage Dump to Media display appears as shown in Figure 132 on page 142.

```

 Copy Main Storage Dump to Media

Type choices, press Enter.

From:
 Dump description : Current Main Storage Dump

To:
 Output device : Tape
 Volume ID : MSDTAP
 File sequence number . . . : 0001

F3=Exit F12=Cancel

```

Figure 132. Copy Main Storage Dump to Media display

2. Leave the default setting for Output device as Tape, for Volume ID as MSDTAP, and for File sequence number as 0001. Press Enter to continue. The Select Tape Unit display appears as shown in Figure 133.

```

 Select Tape Unit

Type choice, press Enter.

Tape unit TAP01 Name, F4 for list

F3=Exit F4=Prompt F12=Cancel

```

Figure 133. Select Tape Unit display

3. Insert a removable media onto the tape drive, and set the drive to *Ready* status.
4. Type the tape drive identifier for the Tape unit prompt (for example, TAP01). Press Enter. The Copy Main Storage Dump to Media Status display appears as shown in Figure 134.

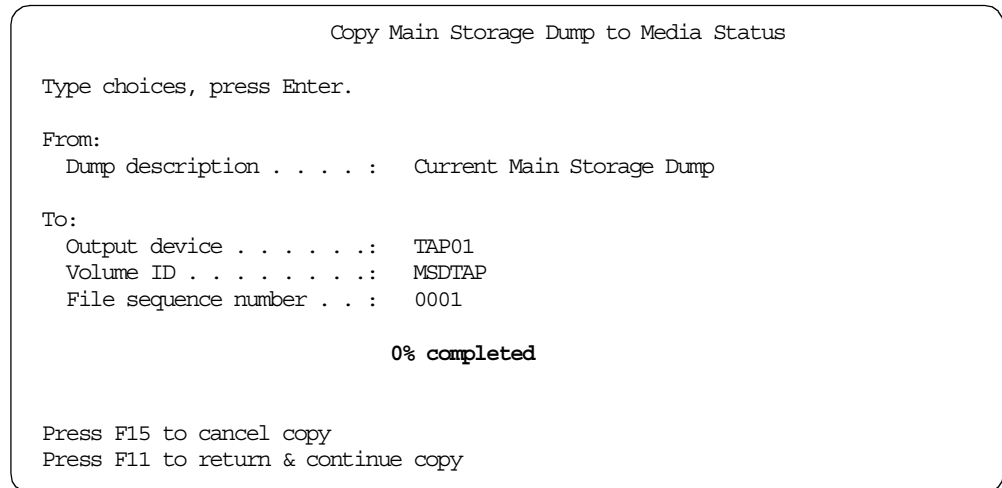


Figure 134. Copy Main Storage Dump to Media Status display

5. The message Copy will start after storage management recovery completed may appear at the bottom of the display. This depends on whether the storage management recovery completed before you arrive at this display.

**Note**

The Copy will start after storage management recovery completed message is likely to appear on a secondary partition system when you perform an MSD on a partition. Wait until the message Storage management recovery completed appears, and then the copying will proceed.

6. The status of the copy process is shown by the “0% completed” counter.
7. When the copy procedure is successfully completed, process the tape as directed by your service provider. Otherwise, copy the main storage dump to ASP (disk), or contact your service provider.
8. Exit the Main Storage Dump Manager by pressing F3 three times. The system automatically performs an IPL.

This ends the procedure for copying an MSD to media.

### 10.4.2 Copying the current MSD to ASP

To copy the current main storage dump to an auxiliary storage pool, follow these steps:

1. Select option 3 to copy MSD to ASP. Then, the Copy Main Storage Dump to ASP display appears as shown in Figure 135 on page 144.

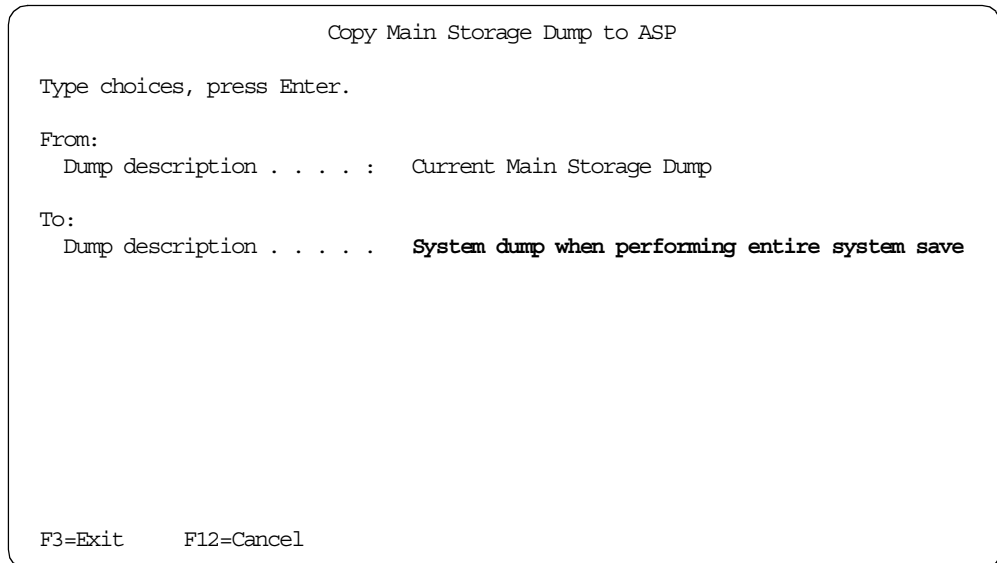


Figure 135. Copy Main Storage Dump to ASP display

2. Type a meaningful dump description to describe the symptoms of the problem, for example:  
System dump when performing entire system save.
3. Press Enter to start copying the dump. The Copy Main Storage Dump to ASP status display appears as shown in Figure 136.

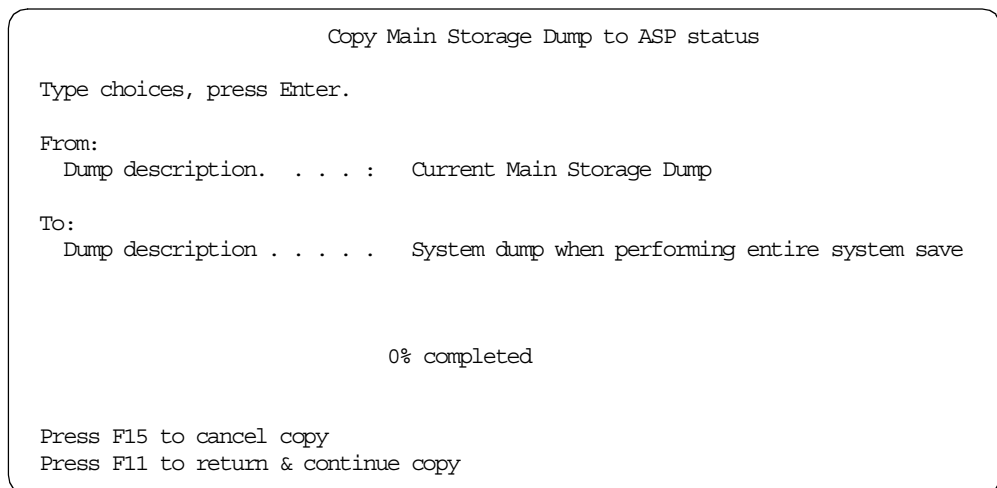


Figure 136. Copy Main Storage Dump to ASP status display

The Copy will start after storage management recovery completed message may appear at the bottom of the display. This depends on whether the storage management recovery completes before you arrive at this display.



#### Note

The Copy will start after storage management recovery completed message may appear on a secondary partition system when you perform an MSD on a partition. Wait until the Storage management recovery completed message appears, and then the copying will proceed.

4. The copying proceeds. The 0% completed counter shows the status of the amount that has been copied.
5. After the dump is copied, a message appears that indicates success or failure of the copy.
6. If the copy procedure is successfully completed, press F3 three times to exit the Main Storage Dump Manager. The system automatically performs an IPL. Otherwise, copy MSD to media or contact your service provider.

This ends the procedure for copying MSD to ASP (disk).

## 10.5 Copying a main storage dump from ASP (disk) to tape

This procedure copies a main storage dump from ASP (disk) to a tape media. This can be done from the Dedicated Service Tools (DST) or the System Service Tools (SST). For this example, we perform the procedure from SST:

1. Run Start System Service Tools (`STRSST`) on the command line. A menu appears like the example shown in Figure 137.

```
System Service Tools (SST)

Select one of the following:

1. Start a service tool
2. Work with active service tools
3. Work with disk units
4. Work with diskette data recovery
5. Work with system partitions

Selection 1

F3=Exit F10=Command entry F12=Cancel
```

Figure 137. System Service Tools menu

#### Note

If you do not see this display, it may be due to an authority problem. Service authority is required on the user profile. See your security officer.

2. Enter option 1 to start a service tool. Press Enter. A menu appears like the one shown in Figure 138.

Start a Service Tool

Warning: Incorrect use of this service tool can cause damage to data in this system. Contact your service representative for assistance.

Select one of the following:

1. Product activity log

2. Trace Licensed Internal Code

3. Work with communications trace

4. Display/Alter/Dump

5. Licensed Internal Code log

6. **Main storage dump manager**

7. Hardware service manager

Selection 6

F3=Exit

F12=Cancel

F16=SST menu

Figure 138. Start a Service Tool menu

3. Type option 6 (Main storage dump manager). Press Enter. A menu appears like the one shown in Figure 139.

Main Storage Dump Manager

Select one of the following:

1. Work with current main storage dump (MSD) residue

2. **Work with copies of main storage dumps**

3. Work with copy options

Selection 2

F3=Exit

F12=Cancel

Figure 139. Main Storage Dump Manager menu

4. Type option 2 to work with copies of main storage dumps. Press Enter. A display appears like the example shown in Figure 140.

```

Work with Copies of Main Storage Dumps

Type option, press Enter.
 4=Delete 5=Display/Print 7=Rename 8=Copy to media

Opt ID Date Level System Description
 8 1 03/15/99 V4R1M0 ITSOSYS1 unknown failure
 2 03/19/99 V4R1M0 ITSOSYS1 system wait

F3=Exit F9=Copy from media F11=Display copy status F12=Cancel

```

Figure 140. Work with Copies of Main Storage Dumps display

5. Type option 8 to copy the desired MSD to tape media. The display shown in Figure 141 appears.

You can differentiate the dumps by their date of occurrence and the description that you entered earlier during the copying to ASP process.

```

Copy Main Storage Dump to Media

Type choices, press Enter.

From:
 Dump description : unknown failure

To:
 Output device : Tape
 Volume ID : MSDTAP
 File sequence number . . . : 0001

F3=Exit F12=Cancel

```

Figure 141. Copy Main Storage Dump to Media display

6. Press Enter to proceed. The Select Tape Unit display appears as shown in Figure 142 on page 148.

```

 Select Tape Unit

Type choice, press Enter.

Tape unit TAP01 Name, F4 for list

F3=Exit F4=Prompt F12=Cancel

```

Figure 142. Select Tape Unit display

7. Insert a removable media onto the tape drive. Set the tape drive to *Ready* status.
8. Type the tape drive identifier for the Tape unit prompt, and press Enter (for example, TAP01). The Copy Main Storage Dump to Media Status display appears as shown in Figure 143.

```

 Copy Main Storage Dump to Media Status

Type choices, press Enter.

From:
 Dump description : System Wait

To:
 Output device : TAP01
 Volume ID : MSDTAP
 File sequence number . . : 0001

 0% completed

Press F15 to cancel copy
Press F11 to return & continue copy

```

Figure 143. Copy Main Storage Dump to Media Status display

9. The status of the copy process is shown by the “0% completed” counter.
10. When the copy procedure is successfully completed, process the tape as directed by your service provider.

This ends the procedure for copying the main storage dump from the ASP (disk).

---

## Chapter 11. Tracing jobs

### Note

Before you read this chapter, review the method for locating the printed output in 1.7, “Finding your printed output” on page 12.

A job trace collects and formats the following data:

- Calls and returns from the licensed programs and application programs
- Messages that occur during a job
- Data generated by trace points in the licensed program

Always start a trace before an error occurs, and then end it after the error occurs.

**Note:** A job trace may affect that job's performance.

Each entry in the trace has an associated time stamp.

Tracing a job is sometimes necessary to provide a detailed view of the flow of a job. The information that is collected in a job trace is typically used by programmers and the IBM service and development teams.

Job traces and job logs are used as complementary tools to analyze a problem. Obtain these two spooled files concurrently.

The job trace function is documented in *OS/400 Diagnostic Aids*, LY44-5907. Refer to this manual for details about:

- When to run a job trace
- How to run a job trace
- The format of the spooled output

---

### 11.1 Tracing your own job

To run a trace on an interactive job at your session, perform the following steps:

1. Enter `TRCJOB` on the command line, and press F4 to prompt the command.

We recommend that you set the Maximum storage (MAXSTG) parameter to 16000 unless your service provider directs you to do differently.

A display appears like the example shown in Figure 144 on page 150.

Trace Job (TRCJOB)

Type choices, press Enter.

|                                         |              |                          |
|-----------------------------------------|--------------|--------------------------|
| Trace option setting . . . . .          | > *ON        | *ON, *OFF, *END          |
| Trace type . . . . .                    | *ALL         | *ALL, *FLOW, *DATA       |
| <b>Maximum storage to use . . . . .</b> | <b>16000</b> | <b>1-65536 K</b>         |
| Trace full . . . . .                    | *WRAP        | *WRAP, *STOPTRC          |
| Program to call before trace . .        | *NONE        | Name, *NONE              |
| Library . . . . .                       |              | Name, *LIBL, *CURLIB     |
| Select procedures to trace:             |              |                          |
| Program . . . . .                       | *ALL         | Name, *ALL, *NONE        |
| Library . . . . .                       |              | Name, *LIBL, *CURLIB     |
| Type . . . . .                          |              | *PGM, *SRVPGM            |
|                                         |              | + for more values        |
| Thread ID to include . . . . .          | *ALL         | Thread ID, *ALL, *SELECT |
|                                         |              | + for more values        |

Bottom

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

Figure 144. TRCJOB command

2. Enter the commands, or run the program that creates the error.
3. End the trace after the error occurs. Go to 11.4, “Ending a job trace” on page 152, to learn how to end the trace and save the job log for the traced job.

## 11.2 Tracing a user, system, or subsystem job

There will be times when your service representative asks you to run a job trace for other user jobs or for system jobs.

To trace a job within the system that is not your current interactive job, use the STRSRVJOB command first to start a service operation. This enables commands that perform service functions to be executed on the specified target job. Follow these steps.

1. Use the WRKACTJOB command to locate the fully qualified job name of the job to trace.
2. Type 5 in the option column to display the job. Note the three-part (fully qualified) job name.
3. Type STRSRVJOB on the command line, and press F4 to prompt the command. A display appears like the one shown in Figure 145.

Start Service Job (STRSRVJOB)

Type choices, press Enter.

|                    |               |
|--------------------|---------------|
| Job name . . . . . | Name          |
| User . . . . .     | Name          |
| Number . . . . .   | 000000-999999 |

Additional Parameters

Duplicate job option . . . . . \*SELECT      \*SELECT, \*MSG

Bottom

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

Figure 145. STRSRVJOB command

4. Start the job trace with the TRCJOB command as described in 11.1, “Tracing your own job” on page 149.
5. Enter the commands, or run the programs to create the error.

Go to 11.4, “Ending a job trace” on page 152, to learn how to end the trace.

## 11.3 Tracing more than one job at a time

The STRSRVJOB and TRCJOB commands allow you to trace only one job at a time. In some cases, it may be necessary to collect a job trace on more than one job at the same time.

To facilitate tracing multiple jobs, refer to Table 17. Consult your service provider regarding the installation of the correct version of the QSPTLIB tool on your AS/400e server.

Table 17. QSPTLIB APAR numbers for Version 4

| Release | APAR number |
|---------|-------------|
| R410    | SA73117     |
| R420    | SA73120     |
| R430    | SA81470     |
| R440    | SA83160     |
| R450    | SA90580     |

If you require the QSPTLIB tool for a release not listed in Table 17, contact your service provider.

#### Note

Although the APAR mentioned appears to be a PTF, in fact, it provides a support tool library (named QSPTLIB) containing many useful tools.

The Start tracing jobs option of the QSPTLIB tool facilitates tracing up to 30 jobs concurrently. Select the Work with Traces menu to initiate the job traces.

---

## 11.4 Ending a job trace

A job trace automatically stops, and the trace data is saved when a job ends or the system is powered down. If the TRCFULL(\*STOPTRC) parameter is used on the TRCJOB command, the job trace ends when the buffer fills.

To stop the trace and create a spooled file (named QPSRVTRC) that contains the trace data, follow these steps:

1. Enter the `TRCJOB *OFF` command.

The spooled file QPSRVTRC containing the trace data is produced. This may take some time for a long trace.

2. If you entered the Start Service Job (STRSRVJOB) command, enter the `ENDSRVJOB` command to end the service function.

3. Produce a spooled job log to accompany the job trace. This step is very important to validate the contents of the job trace.

Refer to Chapter 5, “Job information, job logs, and spooled files” on page 51, to produce job logs.

4. Continue with the steps in the following section to verify that the trace contains the error that you intended to capture.

#### Note

Place the output of a job trace in a spooled file by using the `*PRINT` option.

Use the `*OUTFILE` option of the TRCJOB command *only* if your service provider requests you to do so. The output is not formatted using this option.

---

## 11.5 Verifying the trace contains the error

Ensure that you have captured the job log and the job trace for the job (or jobs) that are related to the current problem. Follow these steps:

1. Look for the spooled file QPSRVTRC.
2. Type 5 in the Opt column next to the file QPSRVTRC that contains the trace.
3. Press the Enter key. The display shown in Figure 146 appears.

**Note:** An Operations Navigator panel is used in this example. A traditional 5250 panel looks much the same.



Session C - C

File Edit Transfer Appearance Communication Assist Window Help

Display Spooled File

File . . . . . : QPSRVTRC Page/Line 1/3  
Control . . . . . Columns 1 - 130  
Find . . . . .

\*...+1...+2...+3...+4...+5...+6...+7...+8...+9...+0...+1...+2...+3

5769SS1 V4R4M0 990521 AS/400 TRACE JOB INFORMATION 07/09/99 10:01:08 PAGE 1

TRACE TYPE - \*ALL MAX STORAGE- 04096 EXIT PROGRAM- \*NONE  
RECORD COUNT- 000074 START TIME - 10:01:01 START DATE - 07/09/99 JOB- 046116 /KEVIN /QPADEV0014

| TIME         | THREAD   | SEQNBR | FUNCTION | PROGRAM  | LIBRARY | ENTRY | EXIT | CALL | LVL | CPU   | TIME | DB | NON-DB | PAGES | NUMBER | WAITS |
|--------------|----------|--------|----------|----------|---------|-------|------|------|-----|-------|------|----|--------|-------|--------|-------|
| 10:01:01.049 | 00000021 | 000001 | RETURN   | QCMD     | QSYS    | 0180  | 015E | 02   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.051 | 00000021 | 000002 | CALL     | QMHRCVPM | QSYS    | 0001  | 04C1 | 03   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.051 | 00000021 | 000003 | CALL     | QMHGSD   | QSYS    | 0001  | 00AC | 04   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.052 | 00000021 | 000004 | CALL     | QMIVPMGR | QSYS    | 0001  | 0006 | 05   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.052 | 00000021 | 000005 | RETURN   | QMHGSD   | QSYS    | 00AD  | 00C7 | 04   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.052 | 00000021 | 000006 | CALL     | QMIVPMGR | QSYS    | 0001  | 0006 | 05   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.052 | 00000021 | 000007 | RETURN   | QMHGSD   | QSYS    | 00C8  | 05E9 | 04   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.053 | 00000021 | 000008 | CALL     | QMLIST   | QSYS    | 0001  | 001C | 05   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.053 | 00000021 | 000009 | RETURN   | QMHGSD   | QSYS    | 05EA  | 0130 | 04   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.053 | 00000021 | 000010 | CALL     | QMLIST   | QSYS    | 0001  | 001C | 05   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.053 | 00000021 | 000011 | RETURN   | QMHGSD   | QSYS    | 0131  | 0630 | 04   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.053 | 00000021 | 000012 | CALL     | QMIVPMGR | QSYS    | 0001  | 0006 | 05   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.054 | 00000021 | 000013 | RETURN   | QMHGSD   | QSYS    | 0631  | 063E | 04   |     | 0.000 |      | 0  | 0      | 0     |        |       |
| 10:01:01.054 | 00000021 | 000014 | CALL     | QMIVPMGR | QSYS    | 0001  | 0262 | 05   |     | 0.000 |      | 0  | 0      | 0     |        |       |

F3=Exit F12=Cancel F19=Left F20=Right F24=More keys

More...

Figure 146. Job trace: Spooled output

4. Locate the TIME column on the left side of the screen as shown in Figure 146.
5. Make sure that the trace started before and ended after the time at which the error occurred, by comparing the times posted in the job log with those in the job trace.

#### Note

If the TRCFULL parameter is left at the default of \*WRAP, the trace over-writes the oldest entries in the trace table when the table becomes full. To avoid this situation, use the \*STOPTRC parameter.

6. To collect more information about the problem, go to the appropriate chapter for that problem in this book.
7. Collect all the information relating to the problem you are reporting to your service provider, and forward the documentation for analysis.

Refer to 7.3, “Reporting the problem to your service provider electronically” on page 88.

## 11.6 Early tracing

There are cases where it is necessary to trace a job that is not yet active in the system. Because the job is not yet active in the system, it is not possible to use the WRKACTJOB command to determine the qualified job name. A batch job that is submitted as part of an application is an example of this scenario.

There is a function within the QSPTLIB tool menu that is referred to as *Early Tracing*. This tool allows a trace to be requested for a job that is not yet active in the system. The job name and the user profile name that the job will run under

must be known ahead of time, because these are required parameters for this function.

Early tracing is invoked by the following steps:

1. Select option 12 (Early Tracing) from the QSPTLIB Work with Traces menu.
2. Enter the Job name.
3. Enter the User name.

This menu allows up to 50 jobs to be specified for early tracing.

When the job trace is specified in this manner, the next job to enter the system that matches the parameters entered in the steps above will be traced.

**Note**

On V3R1 systems and later, enter `CALL QWCCRTEC` on a command line to initiate an early trace function.

## 11.7 Other traces

Traces of other specific functions that are run at a job level on the AS/400e server are also documented in *OS/400 Diagnostic Aids*, LY44-5907. Refer to this manual for information on collecting these less common traces.

Table 18 lists the traces in this category.

Table 18. Additional traces

| Trace                                     | Command |
|-------------------------------------------|---------|
| Intersystem Communications Function (ICF) | TRCICF  |
| CPI Communications                        | TRCCPIC |
| Cryptographic Services                    | TRCCS   |

---

## Chapter 12. Communications problem determination

The purpose of this chapter is to provide:

- An overview of problem determination on an AS/400e server where network communications is involved
- An approach to AS/400e problem determination for communications-related problems

There are many possible approaches to problem determination when communications between systems are involved.

The method suggested here is only one of the possible approaches. The most appropriate steps in any situation depend on the protocol and the topology of the network concerned.

---

### 12.1 Introduction to communications problem determination

Once you understand the concept of a layered communications model and how it relates to the AS/400e servers, you will be able to select the most appropriate problem determination tool.

#### 12.1.1 The communications model

The communications model shown in Figure 147 is a generic, or hybrid, model. It shows the relationship of the layers as data is sent from the application to the communications link, and similarly, the inbound flow from the link to the application.

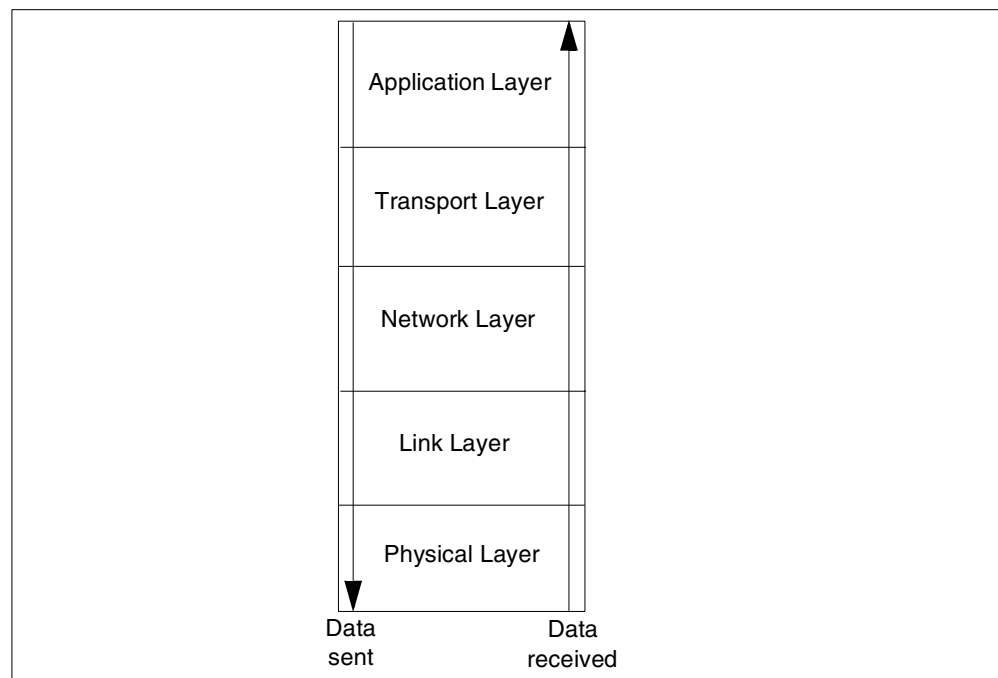


Figure 147. Layered communications model

As the data is passed down the layered model (or stack), the system adds the appropriate packaging around the data as it passes through each layer. This

packaging is sometimes referred to as *encapsulation*. When the encapsulated data is presented to the partner in the conversation (system or application), the data is passed up through the layers. The packaging is removed at each layer before being presented to the layer above it in the model.

The model (shown in Figure 147 on page 155) is representative of all communications architectures and protocols. The functions of the five layers in the model are summarized in Table 19.

Table 19. Communications model: Layer functions

| Layer             | Function                                                                                                            |
|-------------------|---------------------------------------------------------------------------------------------------------------------|
| Application layer | This depends on the application. An example of a communications application is display station pass through (DSPT). |
| Transport layer   | The primary function of this layer is to add reliability.                                                           |
| Network layer     | This layer provides logical switching or routing.                                                                   |
| Link layer        | This layer is where the protocol is implemented, for example: SDLC, X.25, and IP.                                   |
| Physical layer    | This refers to the hardware adapters, interfaces, and cables.                                                       |

---

## 12.2 Communications problem determination

This section presents a collection of ideas and procedures that relate to problem determination in communications networks, where an AS/400e server may participate as a communications partner.

Use the following tools to enable your service provider to gather sufficient information about your communications environment and to perform problem determination.

### 12.2.1 A network diagram

One of the most important tools that you can use in the problem determination process, where communications is concerned, is a network diagram. There is no IBM system tool to produce a network diagram as part of the configuration process. Therefore, this very important piece of documentation is often overlooked.

Keep the network diagram simple, but be sure to include all of the information that relates to the following areas:

- System names
- System addresses
- Methods of connection
- Link types
- Link speeds
- Protocols
- Routes

An example of a simple network diagram is shown in Figure 148.

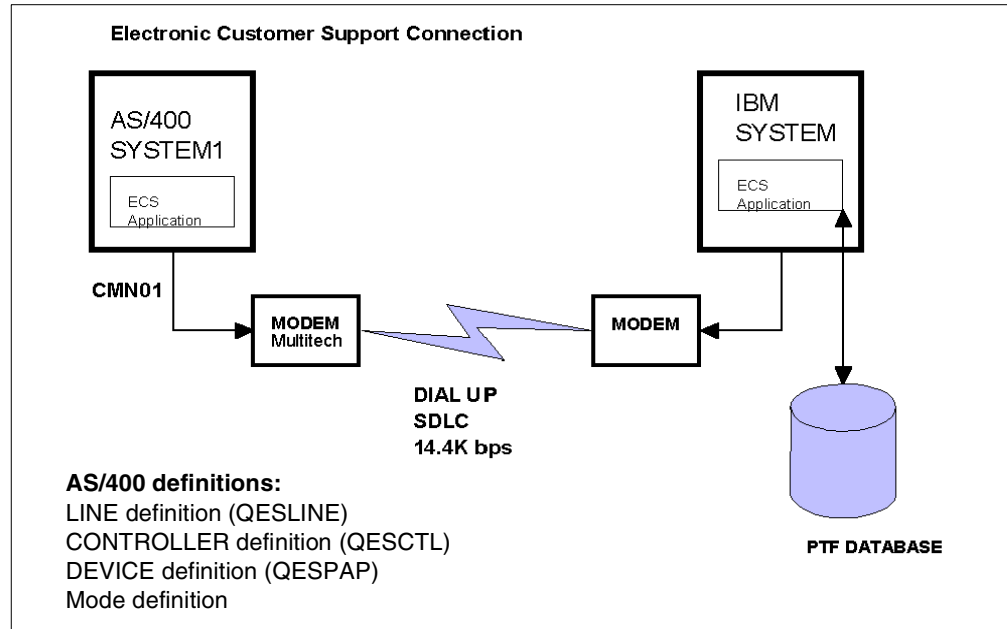


Figure 148. Example of a simple network diagram

### 12.2.2 Configuration objects

AS/400 configuration services provide a set of facilities for controlling and maintaining configuration information in the AS/400e server. An understanding of the communications objects defined in the following sections provides valuable knowledge to those performing problem determination in a network.

The AS/400e architecture hierarchy of communications objects is shown in Figure 149.

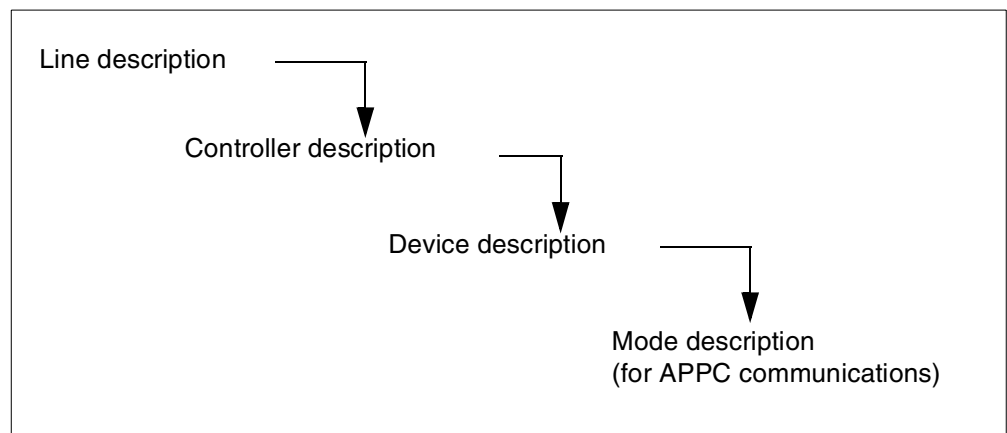


Figure 149. AS/400e architecture hierarchy of communications objects

The Work with Configuration Status display represents this hierarchy by showing the dependent object indented below its parent object.

#### **12.2.2.1 Line description**

The line description is a definition of the way in which a communications port is to be used. The line description selects the particular data link protocol and the physical and logical parameters that condition the protocol's behavior.

Several line descriptions can be defined for any one hardware resource, but only one definition can be active at any one time.

#### **12.2.2.2 Controller description**

The controller description describes the characteristics of the remote system or remote workstation controller. A controller description is required for each adjacent system or remote controller that communicates with the AS/400e server.

#### **12.2.2.3 Device description**

The device description defines the characteristics of the physical or logical devices with which the AS/400e server communicates. A device description is required for each device connected to a controller.

#### **12.2.2.4 Mode description**

The mode description defines the number of sessions (or conversations) that can be conducted simultaneously over a connection between two systems. The mode description is used in Systems Network Architecture (SNA) connections.

#### **12.2.2.5 Interface definition**

An interface must be defined in TCP/IP communications to allocate the network address to the physical resource that will use the protocol. It must also define the addressing structure used for the network in which the AS/400e server participates.

#### **12.2.2.6 Network interface definition**

A network interface definition is similar to a line description. It defines the connection to a network where proprietary communications protocols are used. An example of this would be setting up a Windows NT server on an Integrated PC Server.

### **12.2.3 Retrieving the configuration source**

The Retrieve Configuration Source (RTVCFGSRC) command captures the parameters required to create the communications object, into a source physical file. When compiled into a CL program and run as an application, the configuration objects in question may be re-created as required.

The information gathered by using the RTVCFGSRC command is very useful in problem determination. It provides another mechanism to document the AS/400e system configuration objects and the parameters used to generate them. There is no easy method to guarantee that the information stored on the system is used in the system. That is to say, the existence of a definition does not guarantee that it is needed on the system. System administrators need to control the existence or accuracy of this information manually.

The display in Figure 150 shows the RTVCFGSRC command parameters.

Retrieve Configuration Source (RTVCFGSR)

Type choices, press Enter.

|                                 |           |                             |
|---------------------------------|-----------|-----------------------------|
| Configuration description . . . | > QESLINE | Name, generic*, *ALL        |
| + for more values               |           |                             |
| Type . . . . .                  | > *LIND   | *ALL, *NWS, *NWID, *LIND... |
| Source file . . . . .           | QCLSRC    | Name, QCLSRC                |
| Library . . . . .               | > QGPL    | Name, *LIBL, *CURLIB        |
| Source member . . . . .         | *CFGD     | Name, *CFGD                 |
| Retrieve option . . . . .       | > *NET    | *NET, *OBJ                  |

Additional Parameters

|                              |                                   |                |
|------------------------------|-----------------------------------|----------------|
| Member option . . . . .      | *REPLACE                          | *ADD, *REPLACE |
| Text 'description' . . . . . | > 'QESLINE - ECS line definition' |                |

Bottom

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

Figure 150. RTVCFGSR example

The default for the Retrieve option parameter is \*NET. For nonswitched lines, all the attached controllers and devices are retrieved at the same time. For switched lines, run separate RTVCFGSR commands for the individual configuration objects of the switched network.

An example of the output from the retrieve operation is shown in Figure 151.

Columns . . . : 1 80 Browse

SEU==>

0000.01 /\* QESLINE 7/07/99 17:44:23 \*/

0000.02 CRTLINS DLC LIND(QESLINE) RSRNAME(CMN01) ONLINE(\*NO) ROLE(\*SEC) +

0000.03 INTERFACE(\*RS232V24) CNN(\*SWTPP) VRYWAIT(\*NOWAIT) +

0000.04 AUTOCALL(\*NO) EXCHID(05636850) NRZI(\*YES) MAXCTL(1) +

0000.05 CLOCK(\*MODEM) LINESPEED(2400) MODEM(\*V54) +

0000.06 MODEMRATE(\*FULL) SWTCNN(\*DIAL) AUTOANS(\*NO) +

0000.07 AUTODIAL(\*YES) DIALCMD(\*V25BIS) CALLNBR(\*NONE) STINADR(1C) +

0000.08 MAXFRAME(521) THRESHOLD(\*OFF) DUPLEX(\*HALF) MODULUS(8) +

0000.09 MAXOUT(7) INACTMR(300) POLLRSPDLY(0) LINKSPEED(9600) +

0000.10 COSTCNN(128) COSTBYTE(128) SECURITY(\*NONSECURE) +

0000.11 PRPDLY(\*TELEPHONE) USRDFN1(128) USRDFN2(128) USRDFN3(128) +

0000.12 DSRDRPTMR(6) AUTOANSTYP(\*DIR) CTSTMR(25) RMTANSTMR(60) +

0000.13 CMNRCYLMT(2 5) TEXT(\*BLANK)

Figure 151. RTVCFGSR output example

## 12.2.4 Configuration status

The Work with Configuration Status command is frequently the entry point for communications problem determination, since the status of the configuration object (line, controller, or device) represents the primary symptom of the problem.

Figure 152 on page 160 shows an example of the WRKCFGSTS display for an operation using an Electronic Customer Support (ECS) connection. Note the

various values for the status. These are explained in Table 20. It also shows the configuration objects that define the Electronic Customer Support (ECS) connection during the connection process.

```

Work with Configuration Status ITSOSYS1
 09/07/99 00:53:19
Position to Starting characters

Type options, press Enter.
 1=Vary on 2=Vary off 5=Work with job 8=Work with description
 9=Display mode status 13=Work with APPN status...

Opt Description Status -----Job-----
 QESLINE CONNECT PENDING
 QESCTL VARY ON PENDING
 QESPAP VARY ON PENDING
 *UNKNOWN VRYONP/ALLOCATE QPADEV000M OPER01 082243

Parameters or command
====>
F3=Exit F4=Prompt F12=Cancel F23=More options F24=More keys
Bottom

```

Figure 152. ECS connection in progress

Figure 153 shows the status for a successful connection. Refer to Table 20 for an explanation of the status of each configuration object.

```

Work with Configuration Status ITSOSYS1
 09/07/99 00:53:39
Position to Starting characters

Type options, press Enter.
 1=Vary on 2=Vary off 5=Work with job 8=Work with description
 9=Display mode status 13=Work with APPN status...

Opt Description Status -----Job-----
 QESLINE ACTIVE
 QESCTL ACTIVE
 QESPAP ACTIVE
 *UNKNOWN ACTIVE/ALLOCATE QPADEV000M OPER01 082243

Parameters or command
====>
F3=Exit F4=Prompt F12=Cancel F23=More options F24=More keys
Bottom

```

Figure 153. Successful ECS connection



Table 20 provides an explanation of the configuration status.

Table 20. Communication object status

| Status             | Description                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Varied off         | The system is not using the communications object.                                                                                                                                                                                                |
| Vary on pending    | The system is varying the object on. Responses are pending from the remote system.                                                                                                                                                                |
| Varied on          | The system has established capability to communicate through the communications object. A message is sent to QSYSOPR.                                                                                                                             |
| Connect pending    | Switched connections remain in this state until communication is established.                                                                                                                                                                     |
| Active             | A connection has been made with the remote system with the device represented by the communications object at the next lower level in the hierarchy.                                                                                              |
| Recovery pending   | An error has occurred and a message has been sent to QSYSOPR. The reply to the message determines the next action to be taken.                                                                                                                    |
| Recovery cancelled | Error recovery has been cancelled as a result of the reply to the message posted to QSYSOPR. A message is sent to QHST.                                                                                                                           |
| Failed             | An error occurred that can only be recovered with a vary off and vary on of the communications object. Some situations require an IOP reset. A message is sent to QHST. A Product Activity Log (PAL) or error log, and an LIC Log entry are made. |
| Damaged            | A low level instruction failed to complete and the communications object must be recreated to resume operation. An LIC Log entry is made.                                                                                                         |
| Locked             | The status of the communications object cannot be determined due to an object lock. Use the <code>WRKOBJLCK</code> command to determine where the lock is held.                                                                                   |
| Unknown            | The status indicator cannot be determined. This is an error condition. Use the <code>DMPOBJ</code> command and report the condition to your service provider.                                                                                     |
| Signon display     | The subsystem is performing sign-on processing. The sign-on display is not necessarily shown on the display.                                                                                                                                      |
| System request     | The System Request function has been invoked on a display. The interactive session on the device is stopped, until the session resumes.                                                                                                           |
| Held               | A lock is held on the device that is preventing communication.                                                                                                                                                                                    |

### 12.2.5 Messages

Messages related to communications failures are sent to the QSYSOPR message queue. Many of the messages that relate to communications errors require a reply. The action that the system takes in response to the error is conditioned by the reply to the message issued to the system operator message queue.

To further understand message options, refer to the following chapters:

- Chapter 4, “Collecting messages” on page 29
- Section 4.5, “Messages in the system operator message queue (QSYSOPR)” on page 41
- Chapter 6, “Collecting the history log (QHST)” on page 69

In many instances, the help text of the message provides enough detail to identify the cause of the problem, or additional information required by your service provider to analyze the problem. The possible causes are listed along with return codes and cause codes that relate directly to the condition that has produced the communications symptom being experienced.

### 12.2.6 Problem analysis: F14 on QSYSOPR

The AS/400e servers use a mechanism on many messages issued to the system operator message queue. This mechanism allows the operator to quickly gain access to problem determination and problem reporting. Messages where this feature is available are identified on the display with an asterisk.

The display in Figure 154 shows a message, at which you can press the F14 key to perform problem analysis.

```
Display Messages

Queue : QSYSOPR System: ITSOSYS1
Library : QSYS Program : *DSPMSG
Severity : 90 Delivery : *HOLD

Type reply (if required), press Enter.
Job 045813/QTCP/QTOWMAN was ended by user ITSCID44.
Job 045814/QTCP/QTOKVPNIKE was ended by user ITSCID44.
Job 045832/QTCP/QTOWMAN was ended by user ITSCID44.
Job 045833/QTCP/QTOKVPNIKE was ended by user ITSCID44.
Job 045330/QSYS/QYPSPFRCOL completed normally on 07/07/99 at 10:56:27.
Job 045842/QSYS/QYPSPFRCOL completed normally on 07/07/99 at 11:05:25.
* APPN session initiation attempt has failed.
Device DSP01 no longer communicating.
Device DSP02 no longer communicating.
Device DSP03 no longer communicating.
Device DSP04 no longer communicating.
Job 045844/QSYS/QYPSPFRCOL completed normally on 07/07/99 at 12:03:03.
Job 045851/QSYS/QYPSPFRCOL completed normally on 07/07/99 at 13:05:03.
More...

F3=Exit F11=Remove a message F12=Cancel
F13=Remove all F16=Remove all except unanswered F24=More keys
* - Work with problem allowed for message.
```

Figure 154. QSYSOPR: F14 Work with problem allowed for message

#### 12.2.6.1 The system problem log (WRKPRB)

Once a problem is detected by the system or perceived by the user, problem determination procedures may be run. The results of these actions may be submitted to your service provider by using either the WRKPRB or ANZPRB command.

Refer to Chapter 7, “System problem log and Save APAR Data” on page 81, for more information on using the system problem log.

### 12.2.7 Verify Communications (VFYCMN)

The Verify Communications (VFYCMN) command is used to help ensure that the communications equipment operates correctly. The procedure is used to test communications components at the following levels:

- Communications I/O adapter
- Cable
- Local modem
- Remote modem
- Link

Verification tests run on the I/O adapter, and cable levels require a wrap connector to complete the test. If necessary, consult your hardware service provider before proceeding with these tests.

Local and remote modem tests depend on the modems involved to support the Link Problem Determination Aid procedures (LPDA-1 and LPDA-2).

Later releases of OS/400 have moved the test functions into the System Service Tools. The display in Figure 155 is shown to notify the operator to use the SST options.

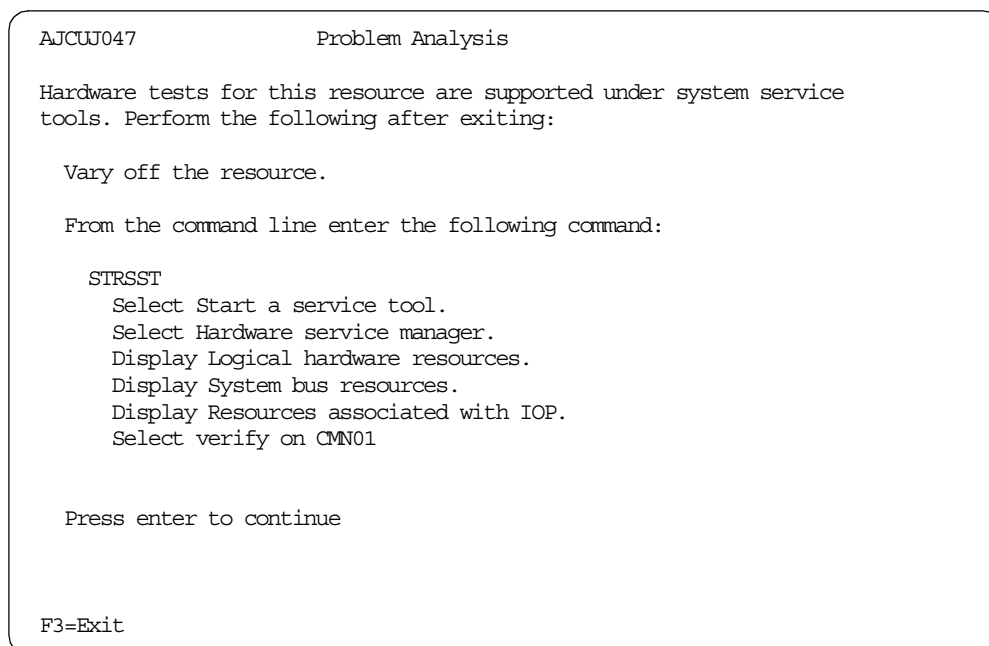


Figure 155. Communication verification tests

When the tests are to be run on hardware released prior to OS/400 V4R1, use the VFYCMN command to see the menu shown in Figure 156 on page 164.

AJCWJ036Select a Communications Test

Select one of the following:

1. Remote modem test

2. Local modem test

3. Cable wrap test

4. Communications input/output adapter wrap test

5. Link test

6. Communications interface trace

7. Concurrent LPDA-2 tests

Selection

F3=Exit

Figure 156. VFYCMN: Select a Communications Test menu

### 12.2.8 Communications trace

The communications trace facility is a service function to allow the capture of data on a communications line. The user must have special authority of \*SERVICE in the user profile to run a communications trace.

The trace facility has the following CL command interfaces in addition to the System Service Tools menu:

- STRCMNTRC
- ENDCMNTRC
- CHKCMNTRC
- PRTCMNTRC
- DLTCMNTRC

Once the data is traced, it may be formatted and placed in a spooled file for printing or browsing. The trace data may also be written to an output file in an unformatted manner.

For further information, refer to Chapter 13, “Collecting a communications trace” on page 177.

### 12.2.9 LIC Trace (TRCINT)

The Licensed Internal Code (LIC) trace (TRCINT) is a service function to allow the capture of the data and internal control blocks at the LIC level. This tool requires some preliminary problem determination activity. In most cases, specific direction from your service provider is required.

The TRCINT function is the CL command interface to the service tool. It is most commonly used in the collection of what is known as a *source/sink trace*, in relation to communications errors. The LIC trace has a large number of other trace options.

Seek assistance from your service provider to ensure that the trace captures the required information.

The display in Figure 157 shows the options for the source/sink trace. For further information, refer to Chapter 17, “Tracing the Licensed Internal Code (LIC)” on page 227.

```
Display Command String

TRCINT SET (*ON)
 TRCTBL (ITSOTEST)
 SIZE (*MAX)
 TRCFULL (*STOPTRC)
 TRCTYPE (*SRCSINK)
 DEV (ITSODEV)
 CTL ((ITSOCTL))
 LIN ((ITSOLIN))
```

Figure 157. TRCINT: Source/sink trace

---

## 12.3 SNA communications

In addition to the problem determination aids listed in the previous section, the items in the following sections apply to communications within Systems Network Architecture (SNA).

### 12.3.1 SNA sense codes

Some messages issue SNA sense codes, as shown in Figure 158 on page 166. This screen displays sense code 08040000. The meaning of this sense code is:

8004 Unrecognized Destination:

A node in the path has no routing information for the destination specified either by the SLU name in a BIND request or by the transmission header (TH). Refer to the latest version of *Systems Network Architecture Formats*, GA27-3136, for information about this sense code.

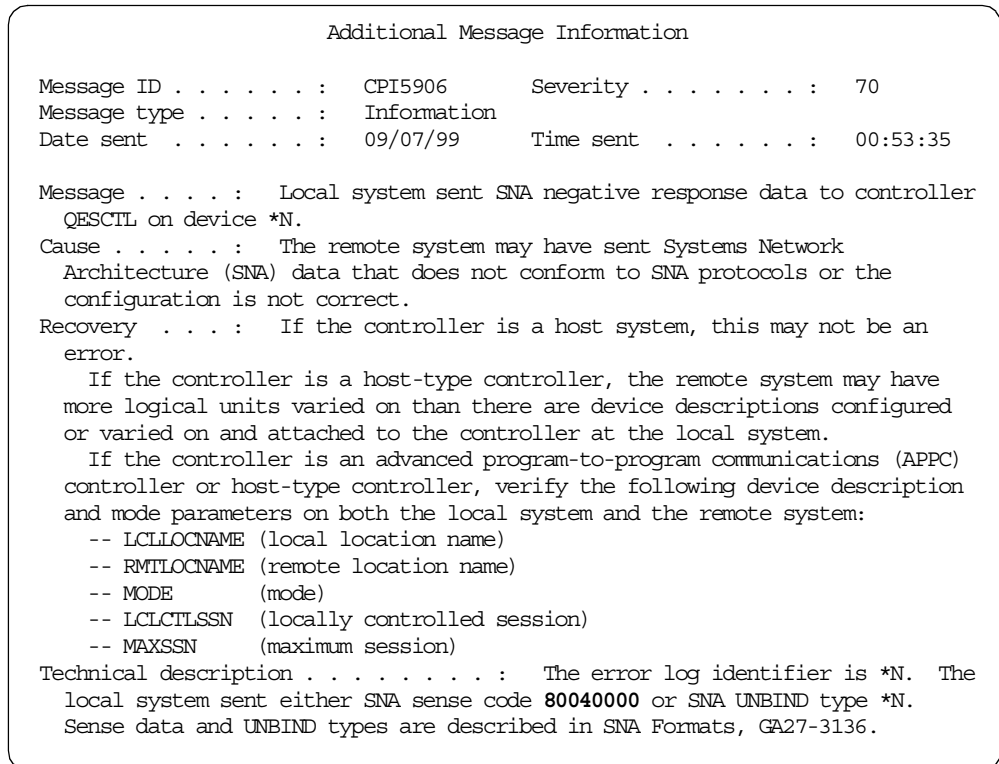


Figure 158. SNA sense code

Refer to *Systems Network Architecture Formats*, GA27-3136, or a tool such as GetSense (supplied with the Personal Communications product) for the meaning of the individual codes.

### 12.3.2 Communications error recovery

Communications errors may be classified by several different classes:

- **Class 1 errors:** Are data transmission and integrity errors
- **Class 2 errors:** Leave the affected resource in a PENDING state
- **Class 3 errors:** Require the affected resource to be varied off and on
- **Class 4 errors:** Are application or program errors

The problem determination and recovery performed to handle the errors at these levels involve the analysis of communications parameters such as:

- Communication object configuration parameters (retry and time-out)
- System values (such as QCMNRCYLMT)

The problem determination and recovery also includes such activities as:

- Resetting the status of the communications object
- Handling the errors issued to the QSYSOPR message queue

For a detailed description of these situations and methods of recovery, refer to *Communications Management*, SC41-5406.

---

## 12.4 TCP/IP communications

TCP/IP has rapidly become commonplace in the AS/400e environment. The following items relate specifically to problem determination in a TCP/IP network involving AS/400e servers.

### 12.4.1 PING command

The PING command is the most commonly used diagnostic tool in a TCP/IP environment. PING is the shortened form of the term Packet INternet Groper. PING runs a procedure to verify that a connection to another machine is possible.

The PING command can use LOOPBACK as a parameter, in place of a system name or TCP/IP address, to verify the capability of the TCP/IP stack (software) within the AS/400e server, for example, `PING LOOPBACK` compared to `PING system-name`.

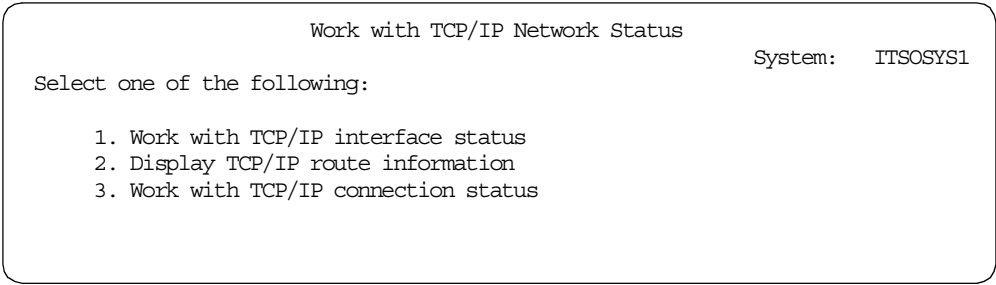
Refer to the following references for information about using the PING command:

- *AS/400 TCP/IP Configuration and Reference*, SC41-5420
- *IBM AS/400 TCP/IP Configuration and Operation*, GG24-3442
- *System Administrators Companion to AS/400 Availability and Recovery*, SG24-2161

### 12.4.2 NETSTAT command

The Network Status (NETSTAT) command displays information about the status of the TCP/IP routes, links, and connections. The AS/400e operator also uses the NETSTAT command to start and end the connection.

The NETSTAT command displays a menu, which is shown in Figure 159.



```
Work with TCP/IP Network Status System: ITSOSYS1

Select one of the following:

 1. Work with TCP/IP interface status
 2. Display TCP/IP route information
 3. Work with TCP/IP connection status
```

Figure 159. NETSTAT menu

The options on the NETSTAT menu have the functions listed here:

- **Option 1:** Displays the link configuration information. It shows the status of each link and allows the user to start or end a link.
- **Option 2:** Shows the TCP/IP route information
- **Option 3:** Displays the actual connection status and provides detailed information for each of the connections. In addition, it allows the user to end a connection.

Refer to the following manuals for further information:

- *AS/400 TCP/IP Configuration and Reference*, SC41-5420
- *IBM AS/400 TCP/IP Configuration and Operation*, GG24-3442

### 12.4.3 Trace TCP/IP Application (TRCTCPAPP)

TCP/IP communications applications, such as Telnet and FTP, often require a Virtual Terminal Manager (VTM) LIC trace for detailed problem determination. This trace can be gathered by either the Trace TCP Application (TRCTCPAPP) command or by selecting the VTM options from the LIC trace function within SST.

TCP/IP code is written using a combination of C++ program modules, which do not provide an adequate level of diagnostic output when traced with the TRCJOB command. In addition, the TRCJOB command does not give developers meaningful trace points for problem diagnosis. The TRCTCPAPP command is used to gather detailed LIC level information

For a complete description of the TRCTCPAPP command options, refer to *OS/400 CL Reference*, SC41-5726.

Refer to the *AS/400 TCP/IP Configuration and Reference*, SC41-5420, for examples to use the TRCTCPAPP command.

#### **VTM LIC trace considerations**

It is important to note that running the VTM VLIC trace has potential performance impacts on the AS/400e server. Some examples using this command are:

- To trace all VTM activity, enter:

```
TRCTCPAPP APP(*TELNET) SET(*ON)
```

- To trace the activity on a specific device, when you know the device name, enter:

```
TRCTCPAPP APP(*TELNET) SET(*ON) DEVD(devicename)
```

- To trace the activity on a specific device, when you know the IP address of the client, enter:

```
TRCTCPAPP APP(*TELNET) SET(*ON) RMINETADR(*INET®www.xxx.yyy.zzz®)
```

- To turn the trace off and spool output, enter:

```
TRCTCPAPP APP(*TELNET) SET(*OFF)
```

**Note:** When you use this function, you can create large amounts of spooled output, if a general trace is specified. You can change the job description of the job performing the trace to cause the TRCTCPAPP output to be written to an output file. Consult your service provider if the amount of output anticipated may be large, to determine whether using an output file is more appropriate to capture the output.

### 12.4.4 Trace SSL Connections (TRCCNN)

The Trace Connections (TRCCNN) command is provided to produce a trace formatted similar to a communications trace, but it uses the LIC trace data as its input. In this manner, the original form of the TCP/IP packets can be traced, prior to any outbound translation or encryption, and after translation or decryption on inbound. In addition, this trace solves the general issue of how to service SSL applications.



The TRCCNN command is shipped as part of the OS/400 V4R5 base code and is available to V4R4 systems by the installation of PTF SF56672.

To run the TRCCNN command, the user must have \*SERVICE special authority and enough authority to use the objects as shown in Table 21.

*Table 21. TRCCNN: Required object authority*

| <b>Object</b> | <b>Library</b> | <b>Type</b> | <b>Authority</b> |
|---------------|----------------|-------------|------------------|
| TRCCNN        | QSYS           | *CMD        | *USE             |
| QSCCNN        | QSYS           | *PGM        | *USE             |
| QSCCNN1       | QSYS           | *PGM        | *USE             |
| QSCFMTTRC     | QSYS           | *PGM        | *USE             |

The help text from the command is documented in the SF56672 PTF cover letter. An example is illustrated in Figure 160 on page 170 through Figure 162 on page 172. The full text is included here for reference.

The Trace Connection (TRCCNN) command allows the tracing of encrypted data flowing over internet protocol (IP) and Secure Sockets Layer (SSL) connections.

TRCCNN uses the Trace Internal (TRCINT) command to collect the trace records and generate an intermediate spooled file named QPCSMPT.

The QPCSMPT spooled file data is used to generate a spooled file named QSYSPRT. The user data for the QSYSPRT file is 'TRCCNN'.

You can also use TRCCNN with a QPCSMPT spooled file generated by using TRCINT directly. TRCCNN can extract and format the IP and SSL connection-related trace records. This allows you to use TRCINT to collect many types of trace records and then use TRCCNN to format the subset of trace records related to IP or SSL connections.

Parameters:

SET  
---

Specifies whether tracing is started, stopped or ended. Also, you can select to format trace record data collected previously using the TRCCNN or TRCINT (Trace Internal) command.

\*ON  
The collection of internal trace records is started for the trace types specified in the TRCTYPE parameter. The trace table name will be QTRCCNNXXXXXX where XXXXXX is the job number of the current job.

\*OFF  
Collection of trace records stops. A spooled file named QPCSMPT is generated by the TRCINT command and contains the collected trace record data. TRCCNN formats this data in a second spooled file named QSYSPRT. The user data for the QSYSPRT spooled file is 'TRCCNN'.  
The QTRCCNNXXXXXX trace table is deleted.

\*END  
Collection of trace records stops and the QTRCCNNXXXXXX trace table is deleted. No spooled output is generated.

\*FORMAT  
Formats trace data in a QPCSMPT spooled file created by a previous invocation of TRCCNN or TRCINT.  
The formatted data is written to a spooled file named QSYSPRT. The user data for the QSYSPRT spooled file is 'TRCCNN'.  
Use the TRCTYPE parameter to specify which connection-related trace records to format.  
Use the JOB and SPLNBR parameters to identify which QPCSMPT file to use.

TRCTYPE  
-----

It is valid only if SET(\*ON) or SET(\*FORMAT) is specified.  
If SET(\*ON) is specified, identifies the types of trace records to start collecting. If SET(\*FORMAT) is specified, identifies the types of collected trace records to format. Multiple trace types may be specified.

\*IP  
Trace IP (internet protocol) data.

\*SSL  
Trace SSL (Secure Sockets Layer) connection data.

Figure 160. TRCCNN: Help text (Part 1 of 3)

```

SIZE

 It is only valid if SET(*ON) is specified.
 Specifies the size of the trace table.
 16000 - Default value
 The trace table size is 16000 kilobytes.
*MAX
 The trace table is set to the maximum size of 998000 kilobytes.
*MIN
 The trace table is set to the minimum size of 128 kilobytes.
table-size
 Specify the size of the trace table in kilobytes. Valid values
 range from 128 through 998000 kilobytes.

TRCFULL

 It is only valid if SET(*ON) is specified.
 Specifies whether the trace records wrap (replace the oldest
 records with new records) or stop tracing when the trace table
 is full.
*WRAP - Default value
 When the trace table is full, the trace wraps to the beginning
 The oldest trace records are written over by new ones as they
 are collected.
*STOPTRC
 Tracing is stopped when the trace table is full of trace
 records.

FMIDTA

 It is valid only if SET(*FORMAT) or SET(*OFF) is specified.
 Specifies the number of bytes of traced data to be formatted.
*CALC - Default value
 The system determines the number of bytes of data to be
 formatted.
number-of-bytes
 Specify the number of bytes of data to be formatted. The
 minimum number of bytes allowed is 72.

JOB

 It is valid only if SET(*FORMAT) is specified.
 Specifies the name or qualified name of the job that created the
 input QPCSMPT spooled file (SPLNBR parameter). This parameter
 is valid only if SET(*FORMAT) is specified.
* - Default value
 The job that issued this command is the job that created the
 input QPCSMPT spooled file.
job-name
 Specify the name of the job that created the input QPCSMPT
 spooled file.
user-name
 Specify the user name that identifies the user profile under
 which the job was run that created the input QPCSMPT spooled
 file.
job-number
 Specify the system-assigned job number of the job that created
 the input QPCSMPT spooled file.
SPLNBR

 It is valid only if SET(*FORMAT) is specified.
 Specifies the file number of the QPCSMPT spooled file from the
 job (JOB parameter) that created the spooled file. This parameter
 is valid only if SET(*FORMAT) is specified.

```

Figure 161. TRCCNN: Help text (Part 2 of 3)

\*LAST - Default value  
 The highest-numbered spooled file named QPCSMPT created by the specified job is used.

\*ONLY  
 Only one spooled file named QPCSMPT was created by the specified job; therefore, the number of the spooled file is not necessary. If \*ONLY is specified and more than one spooled file for the specified job is named QPCSMPT, an error message is issued.

spooled-file-number  
 Specify the number of the QPCSMPT spooled file created by the specified job.

TCPDTA  
 -----  
 It is valid only if SET(\*ON) is specified and \*IP is in the list of TRCTYPE.  
 Specifies whether a subset of TCP/IP trace data should be collected. Each parameter element is optional; if no element value is specified, no filtering of trace data is done for that element. For example, if \*ARP is specified for element 1, only trace records where the ARP protocol is used are collected. If no value is specified for element 1, trace records using all TCP/IP protocols are collected.

Element 1: Protocol  
 Specify a TCP/IP protocol to be traced.  
 \*TCP - Enable trace for transmission control protocol.  
 \*UDP - Enable trace for user datagram protocol.  
 \*ICMP - Enable trace for internet control message protocol.  
 \*IGMP - Enable trace for internet group management protocol.  
 \*ARP - Enable trace for address resolution protocol.

Element 2: Local Ports  
 Specify one or two local port numbers for which trace data is collected.

Element 3: Remote Ports  
 Specify one or two remote port numbers for which trace data is collected.

Element 4: Local IP Address  
 Specify a local internet protocol address in the form nnn.nnn.nnn.nnn where nnn is a number between 1 and 255.

Element 5: Remote IP Address  
 Specify a remote internet protocol address in the form nnn.nnn.nnn.nnn where nnn is a number between 1 and 255.

Element 6: Line Description Name  
 Specify the name of a line description for which TCP/IP trace data is to be collected.

3. Usage information:  
 Call the TRCCNN command to start SSL traces:  
     TRCCNN SET(\*ON) TRCTYPE(\*SSL)  
 Call the TRCCNN command to start IP traces:  
     TRCCNN SET(\*ON) TRCTYPE(\*IP)  
 Call the TRCCNN command to stop traces and clear trace storage.  
     TRCCNN SET(\*END)  
 Call the TRCCNN command to stop traces and generate a spooled file (QSYSPRT) that contains the formatted trace data:  
     TRCCNN SET(\*OFF)

Figure 162. TRCCNN: Help text (Part 3 of 3)

---

## 12.5 Other communications

Data may be traced and formatted for lines, network interfaces (NWI), or network servers (NWS) for any of the communications types in the following list:

- Asynchronous communications
- Asynchronous Transfer Mode (ATM)
- Binary Synchronous Communications (BSC)
- Distributed Data Interfaces (DDI)
- Ethernet Version 2 or IEEE 802.3
- Frame Relay
- Integrated services digital network Data Link Control (IDLC)
- Integrated Services Digital Network (ISDN)
- Network basis input/output system (NETBIOS)
- Point to Point Protocol (PPP)
- Synchronous Data Link Control (SDLC)
- Token-ring Network
- Wireless communications
- X.25

SNA and TCP/IP connections are covered in detail in this publication. Seek advice from your service provider if you need assistance to trace and format a trace involving any of these protocols.

---

## 12.6 System jobs overview

The tools and techniques summarized in this chapter up to this point deal with the hardware resources and the associated interfaces, the configurations and the status of the communications devices, and the messages issued.

The AS/400e software associated with communications presents a range of system jobs that need to be understood. The following sections summarize those system jobs.

### 12.6.1 System jobs

System jobs are created by OS/400 to perform operations such as controlling system resources. The system jobs related to communications functions are shown in Table 22.

*Table 22. Communications-related system jobs*

| Job                 | Function                                                                                                                                                        |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SCPF                | The SCPF system job provides the environment and directs the functions necessary to start the OS/400 licensed program during an initial program load (IPL).     |
| QSYSARB<br>QSYSARBn | The system arbiters (QSYSARB and QSYSARB2 through QSYSARB5), started by an SCPF system job, provide the environment for the running of high-priority functions. |
| QLUS                | Provides event handling for logical unit devices (communications devices) and also acts as the manager of communications devices.                               |
| QALERT              | The alert manager system job performs the tasks necessary to process alerts.                                                                                    |

| Job                   | Function                                                                                                                                                                                                                                                                                                             |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| QSYSCOMM1             | The system communications job handles some communications activity and some I/O system activity.                                                                                                                                                                                                                     |
| QCMNARB01<br>QCMNARBn | The communications arbiter system jobs process work for communications. This work includes communications connect, disconnect, and error recovery processing. The system starts these jobs during every IPL. The QCMNARB system value setting determines the number of communication arbiters jobs that are started. |

### 12.6.2 Subsystem jobs

The subsystems described in Table 23 have the ability to contain communications-related jobs within the system.

Table 23. Communications-related subsystems

| Subsystem | Description                                                                                                                                                                          |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| QBASE     | The default subsystem for all user-related jobs, including communications. If the system is configured for a controlling subsystem and other specific subsystems, QBASE is not used. |
| QCMN      | APPC jobs.                                                                                                                                                                           |
| QSERVER   | Contains the database and file server jobs. These jobs are started by the STRHOSTSVR command.                                                                                        |
| QSYSWRK   | Contains the TCP/IP driver jobs and pass-through server jobs. These jobs are created by the STRTCP or STRTCPSPVR commands.                                                           |
| QSNADS    | Contains the jobs related to SNA distributions.                                                                                                                                      |

### 12.6.3 Server jobs

Server jobs depend on the system configurations and the applications being run. They are too numerous to detail in this publication, and the names are prone to change from release to release.

Refer specific problems with the server jobs to your service provider.

---

## 12.7 Operations Navigator

Operations Navigator uses a Windows 95 graphical user interface to access AS/400e server functions. Figure 163 illustrates the communications ability to use the graphical interface.

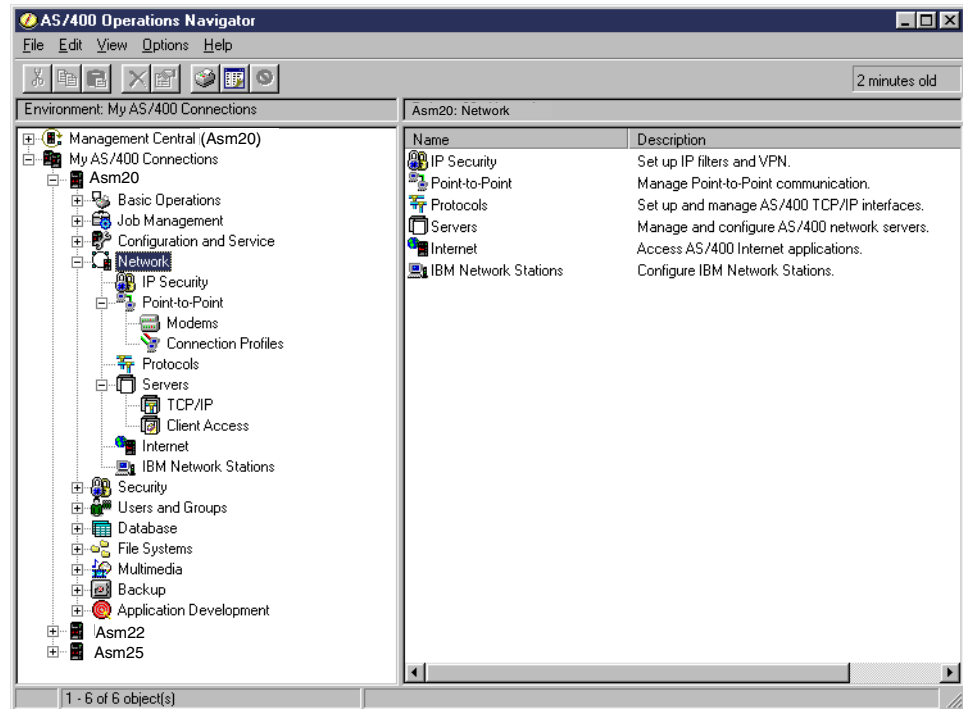


Figure 163. Operations Navigator: Communications functions

The display shown in Figure 164 illustrates the graphical nature of the Operations Navigator panel showing the status of the TCP/IP servers on the AS/400e server.

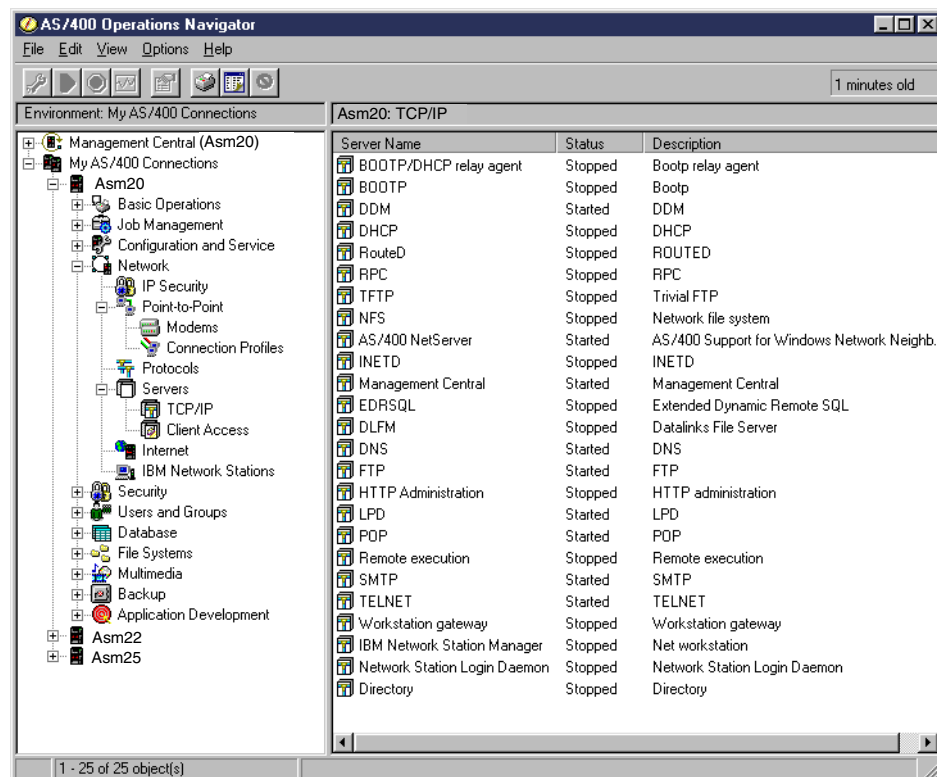


Figure 164. Operations Navigator: TCP/IP server status

If you are more comfortable with a graphical user interface, you will find that the facilities provided by Operations Navigator vary depending on:

- The release of the AS/400e system software
- The release of the Operations Navigator client

Some functions required for problem determination are not available using Operations Navigator. Native 5250 displays must be used in these cases.



---

## Chapter 13. Collecting a communications trace

A communications trace is one of the tools to isolate communication problems related to your AS/400e system's network connection. You should understand the concepts introduced in Chapter 12, "Communications problem determination" on page 155, before you attempt to collect communications trace data.

You can use the communications line or network interface description while the communications trace is running. You must know the name of the line or network interface description before you start the procedure.

Traces can be run using Command Language (CL) commands or from SST.

---

### 13.1 Getting started

#### Note

Review the method for locating the printed output in 1.7, "Finding your printed output" on page 12.

To collect a communications trace, you need to follow these steps:

1. Vary off the line or network interface, if instructed.
2. Start the communications trace.
3. Vary on the line or network interface, if instructed.
4. Cause the error to occur.
5. End the communications trace.
6. Format or print the communications trace.
7. Verify that the communications trace captured the error.
8. Delete the communications trace when it is no longer needed.

If you are instructed by the service provider to vary off the line, enter the following command:

```
VRYCFG CFGOBJ(line-name) CFGTYPE(*LIN)
 STATUS(*OFF)
```

If you are working with a switched line, you must also enter the following command to vary off the controller and devices:

```
VRYCFG CFGOBJ(ctl-name) CFGTYPE(*CTL)
 STATUS(*OFF)
```

You must have service authority to use the communications trace commands or SST. Contact the security officer or system administrator if you do not have this authority.

---

### 13.2 Using commands for a communications trace

Commands will start, stop, check status, print, and delete a communications trace. These commands perform the same function as the communications trace service tool in SST.

Use Table 24 to select a communications trace command.

Table 24. Selecting CL commands for performing communications trace functions

| If you want to:                       | Use this command: | Refer to:                                                                          |
|---------------------------------------|-------------------|------------------------------------------------------------------------------------|
| Start a communications trace          | STRCMNTRC         | 13.2.1, "Starting a communications trace using STRCMNTRC" on page 178              |
| Stop a communications trace           | ENDCMNTRC         | 13.2.3, "Using ENDCMNTRC to stop a communications trace" on page 181               |
| Check communication trace status      | CHKCMNTRC         | 13.2.2, "Using CHKCMNTRC to check the communications trace status" on page 179     |
| Format or save a communications trace | PRTC MNTRC        | 13.2.4, "Using PRTC MNTRC to format and save the communications trace" on page 181 |
| Delete a communications trace         | DLTCMNTRC         | 13.2.5, "Using DLTCMNTRC to delete a communications trace" on page 184             |

**Attention**

Information collected in a communications trace buffer is lost during the IPL process.

### 13.2.1 Starting a communications trace using STRCMNTRC

To start a communications trace, complete the following steps:

1. Type `STRCMNTRC` on any command line, and press F4 (Prompt). A display appears as shown in Figure 165.

```

 Start Communications Trace (STRCMNTRC)

Type choices, press Enter.

Configuration object >
Type >
Buffer size *MAX
Data direction *BOTH
Trace full *WRAP
Number of user bytes to trace:
 Beginning bytes *CALC
 Ending bytes
Trace description *BLANK

Name
*LIN, *NWI, *NWS
*MIN, *MAX, 128K, 256K, 2M...
*SND, *RCV, *BOTH
*WRAP, *STOPTRC
Number, *CALC, *MAX
Number, *CALC

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

```

Figure 165. Start Communications Trace display

2. Type the configuration object name (line or network interface description) in the Configuration object prompt.
3. Type the configuration object type in the Type prompt.
4. Type \*MAX in the Buffer size prompt.
5. Type a description of the trace in the Trace description prompt.
6. Press the Enter key.

### 13.2.1.1 Tips when starting a communication trace

Consider these tips when starting a communications trace:

- You may see other parameters in the STRCMNTRC command, depending on the configuration being traced. If you need more information on these parameters, use the F1 (Help) key to display the help text.
- The default for the Number of user bytes to trace parameter has changed with different operating system levels.
- On LAN connections, the communications trace facility now defaults to only capturing the first 100 bytes of each frame transmitted. If you need to see all the data in each frame, select \*MAX for this parameter.
- All the data for other protocols is captured.

### 13.2.2 Using CHKCMNTRC to check the communications trace status

The CHKCMNTRC command checks the status of communications traces started from the STRCMNTRC command or the communications trace service tool in SST.

To check the status of a communications trace or of all communications traces for one configuration type, complete the following steps:

1. Type `CHKCMNTRC` on any command line, and press F4 (Prompt). A display appears as shown in Figure 166.

Check Communications Trace (CHKCMNTRC)

Type choices, press Enter.

Configuration object . . . . .

Name, \*ALL

Type . . . . .

\*LIN, \*NWI, \*NWS

F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display

F24=More keys

Bottom

Figure 166. Check Communications Trace display

2. Perform one of the following tasks:
  - Type the name of the configuration object in the Configuration object prompt and the type of the configuration object in the Type prompt.
  - Type `*ALL` in the Configuration object prompt and the type of the configuration object in the Type prompt to check the status of traces for all lines or network interface descriptions.

3. A message appears for each trace. For example, if you entered:

```
CHKCMNTRC CFGOBJ(*ALL) CFGTYPE(*LIN)
```

The following messages are displayed:

```
Communications trace TRNLIN type *LIN has status ACTIVE
Communications trace QTILINE type *LIN has status WAITING
CHKCMNTRC completed successfully
```

Message CPF39B0 No traces exist is issued when no traces are active.

4. If the trace status of the configuration object is waiting, continue with the next step. Otherwise, go to step 7.
5. If you are working with a switched line, enter the following command to vary on the controller. Otherwise, continue with the next step for all other types of lines.

```
VRYCFG CFGOBJ(ctl-name) CFGTYPE(*CTL)
STATUS(*ON)
```

6. Enter the following command to vary on the line:

```
VRYCFG CFGOBJ(line-name) CFGTYPE(*LIN)
STATUS(*ON)
```

7. Enter the commands and programs that caused the problem. Trace the data on the line for a period of time specified by your service provider.
8. After the error occurs, complete the steps in the following section.

**Note**

Do not delay performing these steps. Otherwise, trace information can overflow or too much data can be collected unnecessarily.

### 13.2.3 Using ENDCMNTRC to stop a communications trace

Use the `ENDCMNTRC` command to stop or end a communications trace running on the system.

To stop a communications trace using this command, complete this process:

1. Type `ENDCMNTRC` on any command line, and press F4 (prompt). A display appears as shown in Figure 167.

End Communications Trace (ENDCMNTRC)

Type choices, press Enter.

|                                |                  |
|--------------------------------|------------------|
| Configuration object . . . . . | Name             |
| Type . . . . .                 | *LIN, *NWI, *NWS |

Bottom

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

Figure 167. End Communications Trace display

2. In the Configuration object prompt, type the configuration object name.
3. In the Type prompt, type the configuration object type.
4. Press the Enter key.

### 13.2.4 Using PRTCMNTRC to format and save the communications trace

Use the Print Communications Trace (`PRTCMNTRC`) command to transfer the trace data for the configuration object to a spooled file or outfile.

Before you save the trace, complete the following steps:

1. Go to 13.2.2, “Using CHKCMNTRC to check the communications trace status” on page 179, and follow the steps to check the status of the trace.
2. If the trace is not stopped, go to 13.2.3, “Using ENDCMNTRC to stop a communications trace” on page 181, to end the trace.

To save the trace, complete these steps:

1. To print (format) the trace, enter `PRTCMNTRC` on a command line, and press F4 (Prompt). The display shown in Figure 168 appears.

Print Communications Trace (PRTCMNTRC)

Type choices, press Enter.

|                                |        |                  |
|--------------------------------|--------|------------------|
| Configuration object . . . . . |        | Name             |
| Type . . . . .                 |        | *LIN, *NWI, *NWS |
| Output . . . . .               | *PRINT | *PRINT, *OUTFILE |

Bottom

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

*Figure 168. Print Communications Trace display*

2. In the Type prompt, type the configuration object type.  
Perform one of the following tasks:
  - To save the trace in an outfile, go to step 5.
  - To format and save the trace in a spooled file, continue with the next step.
3. Type `*PRINT` in the Output prompt. Press the Enter key. A display appears like the example in Figure 169.

Print Communications Trace (PRTCMNTRC)

Type choices, press Enter.

|                                                                     |          |                        |
|---------------------------------------------------------------------|----------|------------------------|
| Configuration object . . . . .                                      |          | Name                   |
| Type . . . . .                                                      |          | *LIN, *NWI, *NWS       |
| Output . . . . .                                                    | *PRINT   | *PRINT, *OUTFILE       |
| File to receive output . . . . .                                    |          | Name                   |
| Library . . . . .                                                   | *LIBL    | Name, *LIBL, *CURLIB   |
| Output member options:                                              |          |                        |
| Member to receive output . . .                                      | *FIRST   | Name, *FIRST           |
| Replace or add records . . . .                                      | *REPLACE | *REPLACE, *ADD         |
| Character code . . . . .                                            | *CALC    | *EBCDIC, *ASCII, *CALC |
| Line description . . . . .                                          | *ALL     | Name, *ALL             |
| Controller description . . . . .                                    | *ALL     | Name, *ALL             |
| Format SNA data only . . . . .                                      | *NO      | *NO, *YES              |
| Format RR, RNR commands . . . .                                     | *NO      | *NO, *YES              |
| Format TCP/IP data . . . . .                                        | *LINTYPE | *LINTYPE, *YES, *NO    |
| Format LCP data . . . . .                                           | *YES     | *YES, *NO              |
| Format NCP data . . . . .                                           | *YES     | *YES, *NO              |
| More...                                                             |          |                        |
| F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display |          |                        |
| F24=More keys                                                       |          |                        |

Figure 169. Print Communications Trace: Additional options

4. Press the Enter key.

If you are instructed by the service provider to choose a specific format, go to step 1 on page 182. Otherwise, go to step 7.

5. If you want to save the trace in an outfile, type \*OUTFILE in the Output prompt, and press the Enter key. A display appears like the one in Figure 170.

Print Communications Trace (PRTCMNTRC)

Type choices, press Enter.

|                                                                     |          |                        |
|---------------------------------------------------------------------|----------|------------------------|
| Configuration object . . . . . >                                    |          | Name                   |
| Type . . . . . >                                                    |          | *LIN, *NWI, *NWS       |
| Output . . . . . >                                                  | *OUTFILE | *PRINT, *OUTFILE       |
| File to receive output . . . . .                                    |          | Name                   |
| Library . . . . .                                                   | *LIBL    | Name, *LIBL, *CURLIB   |
| Output member options:                                              |          |                        |
| Member to receive output . . .                                      | *FIRST   | Name, *FIRST           |
| Replace or add records . . . .                                      | *REPLACE | *REPLACE, *ADD         |
| Character code . . . . .                                            | *CALC    | *EBCDIC, *ASCII, *CALC |
| Controller description . . . . .                                    | *ALL     | Name, *ALL             |
| Bottom                                                              |          |                        |
| F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display |          |                        |
| F24=More keys                                                       |          |                        |

Figure 170. Print Communications Trace to an outfile

**Note**

The trace is not formatted in the database file (outfile). It is formatted when it is printed.

6. Type the name and library of the database file in the File to receive output prompt, and press the Enter key.
7. Go to 13.4, “Verifying the contents of the communications trace” on page 192, and follow the steps to display the trace.

### 13.2.5 Using DLTCMNTRC to delete a communications trace

The DLTCMNTRC command is used to delete a communications trace data that exists on the system. To delete trace data, complete these steps:

1. Type `DLTCMNTRC` on any command line, and press F4 (Prompt). A display appears like the example in Figure 171.

Delete Communications Trace (DLTCMNTRC)

Type choices, press Enter.

|                                |                  |
|--------------------------------|------------------|
| Configuration object . . . . . | Name             |
| Type . . . . .                 | *LIN, *NWI, *NWS |

F9=All parameters    F11=Keywords    F14=Command string    F24=More keys

Bottom

Figure 171. Delete Communications Trace display

2. In the Configuration object prompt, type the configuration object name.
3. In the Type prompt, type the configuration object type.
4. Press the Enter key.
5. Select one of the following options:
  - To collect more information about your problem, go to the appropriate chapter regarding that problem in this guide.
  - If you do not need to collect any more information in this guide, go to 23.1, “Sending the problem report” on page 285, and follow the steps to submit the communications trace with the problem report.



## 13.3 Using SST for a communications trace

You can control a communications trace from the System Service Tools (SST). This tool or the commands can be used in the same trace session. For example, you can start a trace in SST and stop it by using the ENDCMNTTRC command.

The following displays illustrate the method of controlling a communications trace from the SST Work with Communications Traces menu.

### 13.3.1 Starting a communications trace using SST

To start a communications trace, complete the following steps:

1. If you are at the Work with Communications Traces display, continue with the next step. Otherwise, enter the `STRSST` command, and type option 1 to Start a Service Tool.
2. Select option 3 (Work with communications trace) from the Start a Service Tool menu. A display appears as shown in Figure 172.

Work with Communications Traces

Type options, press Enter.

2=Stop trace      4=Delete trace      6=Format and print trace  
7=Display message      8=Restart trace

Configuration

| Opt                | Object | Type | Trace Description | Protocol | Trace Status |
|--------------------|--------|------|-------------------|----------|--------------|
| (No active traces) |        |      |                   |          |              |

F3=Exit      F5=Refresh      F6=Start trace      F10=Change size  
F11=Display buffer size      F12=Cancel

Figure 172. SST: Work with Communications Trace display

3. Press F6 to start a trace. A display appears as shown in Figure 173 on page 186.

```

 Start Trace

Type choices, press Enter.

Configuration object

Type 1 1=Line, 2=Network interface
 3=Network server

Trace description

Buffer size 1 1=128K, 2=256K, 3=2M, 4=4M
 5=6M, 6=8M, 7=16M, 8=32M
 9=64M

Stop on buffer full N Y=Yes, N=No

Data direction 3 1=Sent, 2=Received, 3=Both

Number of bytes to trace:
 Beginning bytes *CALC Value, *CALC, *MAX
 Ending bytes *CALC Value, *CALC

F3=Exit F5=Refresh F12=Cancel

```

Figure 173. SST: Start Trace options

4. Type the name of the line or network interface description you want to trace in the Configuration object prompt. This example uses the line `TRNLINE`.
5. Type the type of configuration object in the Type prompt.
6. Type `6` in the Buffer size prompt.
7. Type a description of the trace in the Trace description prompt. The display shown in Figure 174 appears.

```

 Start Trace

Type choices, press Enter.

Configuration object trnline

Type 1 1=Line, 2=Network interface
 3=Network server

Trace description ITSO machine 6/29/99

Buffer size 7 1=128K, 2=256K, 3=2M, 4=4M
 5=6M, 6=8M, 7=16M, 8=32M
 9=64M

Stop on buffer full N Y=Yes, N=No

Data direction 3 1=Sent, 2=Received, 3=Both

Number of bytes to trace:
 Beginning bytes *CALC Value, *CALC, *MAX
 Ending bytes *CALC Value, *CALC

F3=Exit F5=Refresh F12=Cancel

```

Figure 174. SST: Start Trace example

8. Press the Enter key. A display appears as shown in Figure 175.

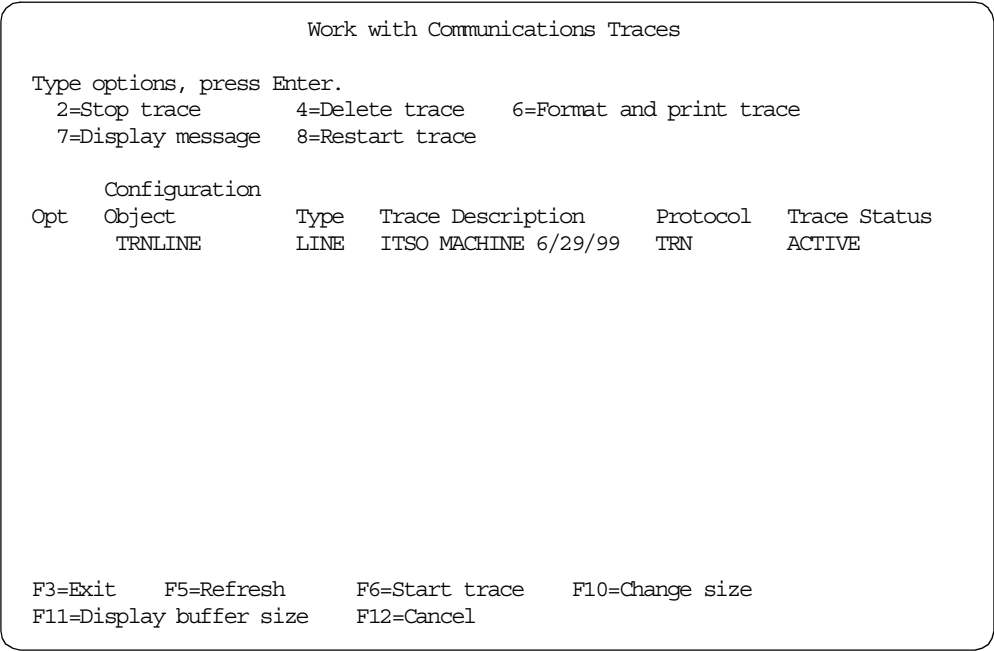


Figure 175. SST: Communication trace started

9. Perform one of the options shown in Table 25.

Table 25. SST: Communication trace status

| If the trace status is      | Go to:                                                           |
|-----------------------------|------------------------------------------------------------------|
| Waiting                     | Step 10                                                          |
| Error                       | Delete the trace and repeat the steps to recreate the trace data |
| Other than waiting or error | Step 10                                                          |

10. Press F3 (Exit) until you exit from the service tool.

**Note**

The trace does not stop if you exit SST while the trace is running.

11. Press the Enter key to exit SST.

12. If the trace status is *waiting*, continue with the next step. Otherwise, go to step 15.

13. If you are working with a switched line, enter the following command to vary on the controller. Otherwise, continue with the next step.

```
VRFCFG CFGOBJ(ctl-name) CFGTYPE(*CTL)
STATUS(*ON)
```

14. Enter the following command to vary on the line:

```
VRYPFG CPGOBJ (line-name) CPGTYPE (*LIN)
STATUS (*ON)
```

15. Enter the commands and programs that caused the problem. Trace the data for the period of time specified by your service provider.
16. Go to 13.3.2, "Stopping a communications trace using SST" on page 188, after the error occurs.

**Note:** It is important to stop the trace promptly to avoid collecting too much data or to prevent wrapping the data.

### 13.3.2 Stopping a communications trace using SST

To stop the trace, follow these steps:

1. If you are at the Work with Communications Traces display, continue with the next step. Otherwise, enter the `STRSST` command, type option 2 (Work with Active Service Tools), and then select option 3 (Work with Communications Traces) on the Start a Service Tool menu.

#### Note

If the status is *waiting*, press F5 (Refresh) to refresh the status on the Work with Communications Traces display.

2. Type 2 in the Opt column next to the name of the line or network interface description you want to stop tracing.
3. Press the Enter key. A display appears as shown in Figure 176.

Work with Communications Traces

Type options, press Enter.

2=Stop trace      4=Delete trace      6=Format and print trace  
7=Display message      8=Restart trace

| Configuration |         |      |                      |          |              |
|---------------|---------|------|----------------------|----------|--------------|
| Opt           | Object  | Type | Trace Description    | Protocol | Trace Status |
|               | TRNLINE | LINE | ITSO MACHINE 6/29/99 | TRN      | STOPPING     |

F3=Exit      F5=Refresh      F6=Start trace      F10=Change size  
F11=Display buffer size      F12=Cancel

Figure 176. SST: Stopping a communications trace

In this example, the trace status changed to *stopping*.

4. Press F5 (Refresh) to refresh the display. A display appears like the example in Figure 177.

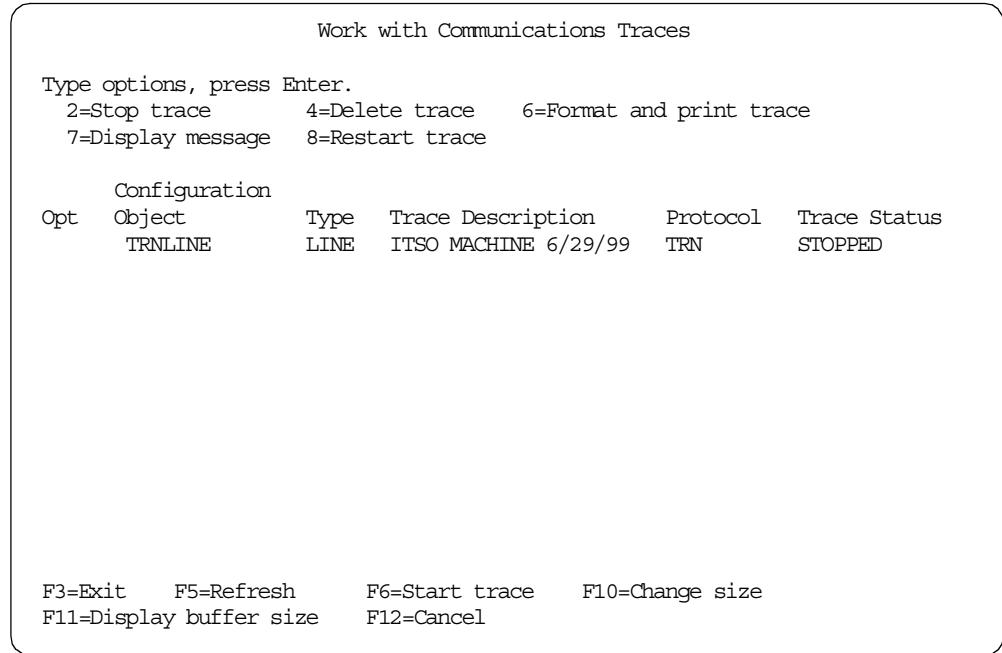


Figure 177. SST: Communication trace stopped

In this example, the trace status changed to *stopped*.

5. Continue with the following section to format and save the trace.

### 13.3.3 Formatting and saving the communications trace using SST

To format and save the communications trace using SST, follow these steps:

1. If you are at the Work with Communications Traces display, continue with the next step. Otherwise, go to 19.3.1, “Starting a Service Tool” on page 254, and select option 3 (Work with communications trace) on the Start a Service Tool menu.
2. If you are at the Work with Communications Traces display, and the trace you want to format is not stopped, go to step 2 on page 188 to stop the trace. A display appears like the example in Figure 178 on page 190.

```

Work with Communications Traces

Type options, press Enter.
 2=Stop trace 4=Delete trace 6=Format and print trace
 7=Display message 8=Restart trace

Configuration
Opt Object Type Trace Description Protocol Trace Status
 TRNLINE LINE ITSO MACHINE 6/29/99 TRN STOPPED

F3=Exit F5=Refresh F6=Start trace F10=Change size
F11=Display buffer size F12=Cancel
Trace buffer wrapped

```

Figure 178. SST: Communication trace example

#### Tip

In the example above, the trace buffer has filled and begun to overwrite the data collected earlier in the trace. In this case, the SST issues the `Trace buffer wrapped` message at the bottom of the screen to alert you to the fact that you may need to re-run the trace with a larger buffer size selected.

The spooled output also contains the `Trace buffer wrapped` warning message.

In this example, TRN is the protocol for the line being traced.

3. Type `6` in the Opt column next to the name of the stopped configuration object that you want to format and print.
4. Press the Enter key. A display appears for a TRN protocol as shown in Figure 179.

Format Trace Data

Configuration object . . . . .: TRNLINE

Type . . . . .: LINE

Type choices, press Enter.

Controller . . . . . \*ALL \*ALL, name

Data representation . . . . . 2 1=ASCII, 2=EBCDIC, 3=\*CALC

Format RR, RNR commands . . . N Y=Yes, N=No

Format Broadcast data . . . Y Y=Yes, N=No

Format MAC or SMT data only . N Y=Yes, N=No

Format UI data only . . . . N Y=Yes, N=No

Format SNA data only . . . . N Y=Yes, N=No

Format TCP/IP data only . . . Y Y=Yes, N=No

Format IPX data only . . . . N Y=Yes, N=No

F3=Exit

F5=Refresh

F12=Cancel

Figure 179. SST: Formatting communications trace data

**Note**

The format choices shown in this display are not available for every protocol.

- Press the Enter key to format the trace data for the format choices shown. Wait for the following message to appear:

Format of trace data complete.

The QPCSMPT spooled file containing the trace is created.

- If you are instructed by the service provider to choose a specific format, continue formatting the data as required, creating another spooled file each time you select the Format and print trace option.

**Tip**

It is appropriate in most cases to format the data in the communications trace buffer in more than one manner. You can format the data as many times as required until the trace buffer is deleted.

- Type 6 in the Opt column next to the name of the configuration object you were tracing in the previous steps.

Wait for the Format of trace data complete message or the No trace records found message. The QPCSMPT spooled file is created that contains the trace data.

- Press F3 (Exit) until you exit the communications trace and the System Service Tools (SST).
- Press the Enter key to exit SST.

Go to 13.4, “Verifying the contents of the communications trace”, to display the trace.

#### 13.3.4 Deleting a communications trace using SST

To delete a trace, perform the following steps

1. If you are at the Work with Communications Traces display, continue with the next step. Otherwise, go to 19.3.1, “Starting a Service Tool” on page 254, and select option 3 (Work with communications trace).
2. Type 4 in the Opt column next to the name of the line you traced.
3. Press the Enter key.
4. Wait for the Confirm Delete of Traces display.
5. Press the Enter key to delete the trace.
6. Press F3 (Exit) to exit.

Select one of the following options:

- To continue working with a service tool, go to 19.3, “Working with SST” on page 254.
- To collect more information about your problem, go to the appropriate chapter for that problem in this redbook.
- If you do not need to collect any more information in this guide, go to 23.1, “Sending the problem report” on page 285, to submit the communications trace with the problem report.

---

### 13.4 Verifying the contents of the communications trace

#### Note

Refer to the procedure for locating the appropriate spooled files created while collecting problem determination information.

To verify the contents of the communications trace, complete the following steps:

1. Press F11 (View 2) to view the date and time of the spooled file or files with which you want to work.
2. Type 5 in the Opt column next to the spooled file QPCSMPT that you want to display. QPCSMPT contains the communications trace.
3. Press the Enter key. A display appears as shown in Figure 180.



```

Display Spooled File
File : QPCSMPT
Control
Find
*.....1.....2.....3.....4.....5.....6.....7.....8.....9.....0.....1.....2.....3
COMMUNICATIONS TRACE Title: M01_TGTELNET 12/13/00 10:26:31 Page: 1
Trace Description : M01_TGTELNET
Configuration object : TRNLINE
Type : 1 1=Line, 2=Network Interface
3=Network server
Object protocol : TRN
Start date/Time : 12/11/00 08:04:02.455
End date/Time : 12/11/00 08:05:05.189
Bytes collected : 130299
Buffer size : 1 1=128K, 2=256K, 3=2M, 4=4M
5=6M, 6=8M, 7=16M, 8=32M
9=64M
Data direction : 3 1=Sent, 2=Received, 3=Both
Stop on buffer full : N Y=Yes, N=No
Number of bytes to trace
Beginning bytes : *CALC Value, *CALC, *MAX
Ending bytes : *CALC Value, *CALC
Select Trace Options:

F3=Exit F12=Cancel F19=Left F20=Right F24=More keys
More...
```

Figure 180. Display the communications trace spooled file

4. Verify that this is the communications trace for the line or network interface description traced and that the time the trace started and ended is correct.
5. Verify that you have selected the correct data collection and format options. You will find these listed on the subsequent pages of the printed output.
6. If there is more than one communications trace because you selected a specific format, perform one of the following options. Otherwise, continue with the next step:
  - To use SST, go to step 2 on page 192.
  - To use commands, go to 13.2.4, “Using PRTCMNTRC to format and save the communications trace” on page 181.

Go to 13.2.5, “Using DLTCMNTRC to delete a communications trace” on page 184, or 13.3.4, “Deleting a communications trace using SST” on page 192, to delete the trace when it is no longer needed or it is not the one you want to submit with the problem report. The trace that is collected is automatically deleted if you perform an IPL. However, the spooled file is still saved.

## 13.5 Further information

To further explore the facilities and functions of the Communications Trace tool, refer to the following IBM manuals and technical resources:

- *OS/400 Diagnostic Aids*, LY44-5907
- *CL Reference*, SC41-5722
- Software Knowledge Base at:  
<http://www.as400service.ibm.com/supporthome.nsf/home/Software+Knowledge+Base>



---

## Chapter 14. Dumping a job

Dumping the internal structures of a job is useful when a problem with a particular job behaves in a predictable manner. For example, a particular function goes into a wait state or fails with a particular message.

Dumping a job is equivalent to taking a photograph of a moving target. If the movement is predictable enough, a photograph can be planned, resulting in a snapshot at the required point, using CL commands or using the System Service Tools (SST).

The system automatically produces dumps for some unmonitored escape messages. Dumps can also be produced manually.

There are two types of dumps that relate to jobs (or processes) in the system:

- **Process dump:** A process dump captures the OS/400 view of the job structures.

This dump is taken when the problem is suspected to be at the OS/400 level (or above the machine interface).

- **Process internal dump:** A process internal dump captures the machine or Licensed Internal Code (LIC) view of the job structures.

This dump is taken when the problem is suspected to be at the LIC level (or below the machine interface).

---

### 14.1 Process dump

A process dump is taken by using the Dump Job (DMPJOB) command.

The current interactive job is dumped when the DMPJOB command is used from a command line. Jobs other than the current job must be serviced to direct the operating system to dump the required job structures, when the DMPJOB command is used. Servicing a job is performed by using the STRSRVJOB command.

Perform the following steps to create a process dump:

1. Use the STRSRVJOB command to service the job for which a process dump is to be taken, unless the current interactive job is to be dumped.
2. Type DMPJOB on the command line and prompt with the F4 key. A display appears like the example shown in Figure 181 on page 196.

Dump Job (DMPJOB)

Type choices, press Enter.

|                                 |      |                             |
|---------------------------------|------|-----------------------------|
| Program to dump:                |      |                             |
| Program . . . . .               | *ALL | Name, *ALL, *NONE           |
| Library . . . . .               |      | Name, *ALL                  |
| Call level . . . . .            |      | Number, *LAST, *FIRST, *ALL |
| + for more values               |      |                             |
| Job structure areas . . . . .   | *ALL | *ALL, *NONE                 |
| Objects referenced by address . | *YES | *YES, *NO                   |
| Job threads . . . . .           | *YES | *YES, *NO, *THDSTK          |
| Thread ID to include . . . . .  | *ALL | Thread ID, *ALL, *SELECT    |
| + for more values               |      |                             |

Bottom

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

Figure 181. Dump Job: Command prompt

- Unless instructed by your service provider to change any of the parameters, press Enter.

The DMPJOB command produces a spooled file with the label QPSRVDMP.

#### Note

Refer to the procedure for locating spooled output in 1.7, “Finding your printed output” on page 12.

## 14.2 Process internal dump

A process internal dump is created by using the DMPJOBINT command or through the System Service Tools.

The current interactive job is dumped when the DMPJOBINT command is used from a command line. Jobs other than the current job must be serviced to direct the operating system to dump the required job structures, when the DMPJOBINT command is used. Servicing a job is performed by using the STRSRVJOB command.

Perform the following steps to create a process dump:

- Use the STRSRVJOB command to service the job for which a process internal dump is to be taken, unless the current interactive job is to be dumped.
- Type DMPJOBINT on the command line, and press the Enter key. A display appears, as shown in Figure 182, if the command is prompted. There are no parameters to prompt for this display.

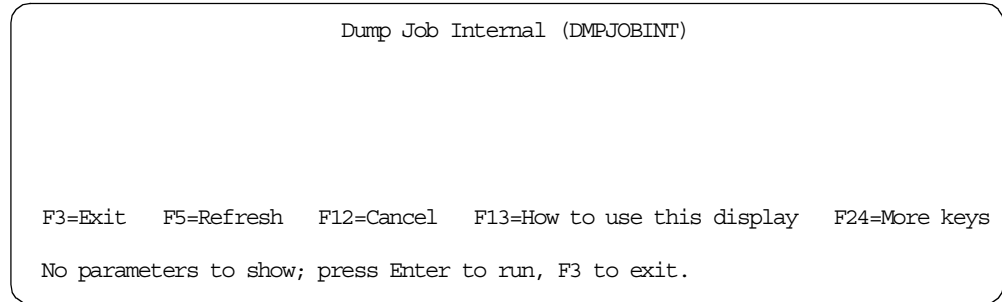


Figure 182. DMPJOBINT command: Has no parameters to prompt

3. The DMPJOBINT command produces an LIC log. A message is issued to the users job indicating the identifier that is associated with the dump. A display appears when the additional information is viewed by pressing the Help key (Figure 183). The LIC log created has a major and minor code of 0800 0000 and is identified as an MI Requested Dump.

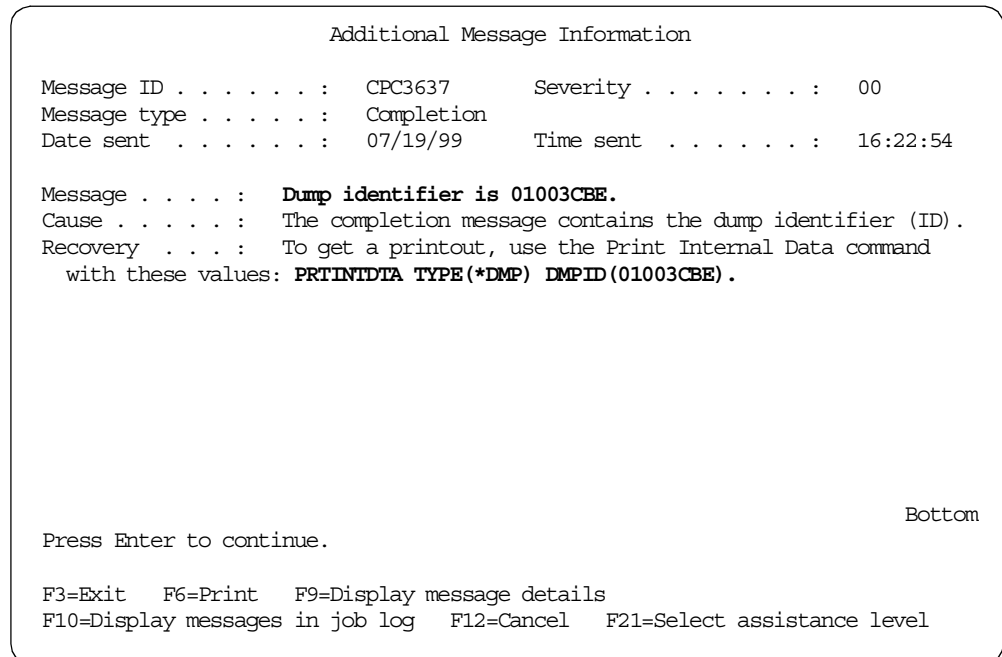


Figure 183. DMPJOBINT: Message CPC3637 is issued

4. To create a spooled file of the LIC log, use the PRTINTDTA command as specified in the displayed message (CPC3637) in Figure 183.

A spooled file with a label QPCSMPT is created when the PRTINTDTA command is used.

## 14.3 Using System Service Tools for a process internal dump

A process internal dump may be created from the System Service Tools (SST) menu by following these steps:

1. Enter `STRSST` from the command line. Select option 1 from the display shown in Figure 184.

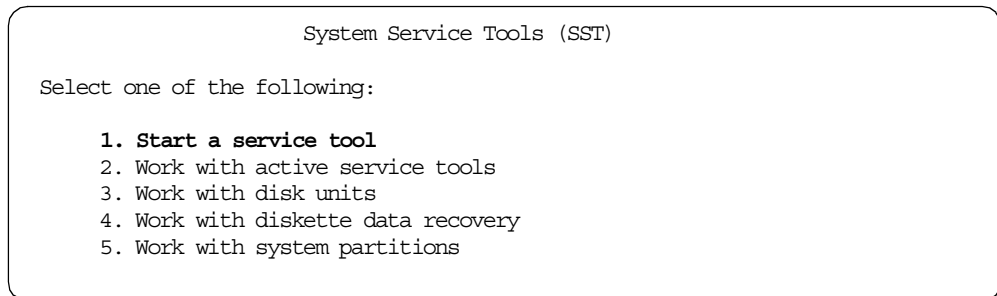


Figure 184. SST menu

2. Select option 4 from the menu shown in Figure 185 to start the Display, Alter, Dump function.

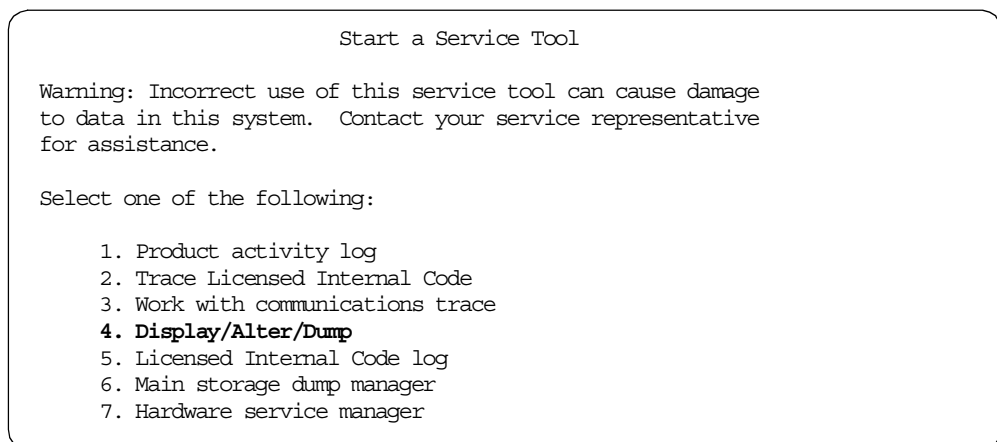


Figure 185. Start Service Tool menu

3. Select option 2 (Dump to Printer) on the Dump Output Device display as shown in Figure 186.

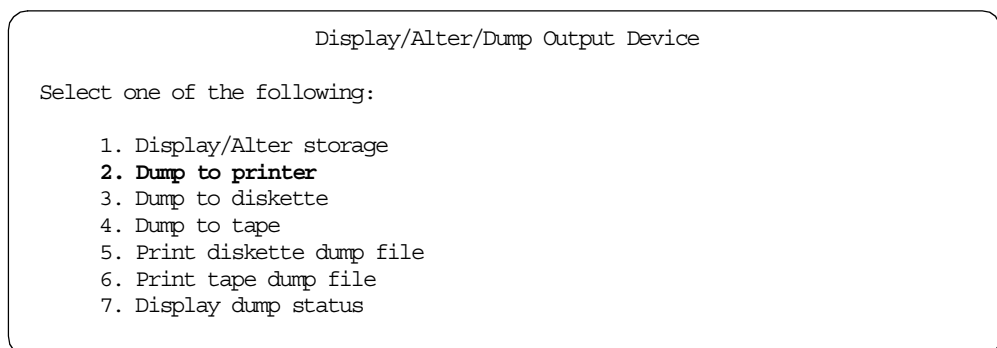


Figure 186. SST: Dump Output Device selection

4. Select option 4 (Tasks and Processes) from the Select Data screen, as shown in Figure 187.

```

 Select Data

Output device : Printer

Select one of the following:

 1. Machine Interface (MI) object
 2. Licensed Internal Code (LIC) data
 3. LIC module
 4. Tasks/Processes
 5. Starting address

```

Figure 187. SST: Select Data menu

5. Select option 2 (Process) on the screen as shown in Figure 188.

```

 Select Task/Process

Output device : Printer

Select one of the following:

 1. Task
 2. Process

```

Figure 188. SST: Select Task/Process menu

6. Select option 5 (Display a list of processes) as shown in Figure 189.

```

 Find Process

Output device : Printer

Select one of the following:

 1. Find by process (PCS - Process Control Space) name
 2. Find by Task Dispatching Element (TDE) address
 3. Find by TDE number
 4. Find by TDE ID
 5. Display list of processes

```

Figure 189. SST: Find Process menu

7. Select the process to be dumped by typing 1 in the left-hand column as shown in Figure 190 on page 200.

| Work with Processes                                  |               |                     |                 |                         |  |              |
|------------------------------------------------------|---------------|---------------------|-----------------|-------------------------|--|--------------|
| Type option, press Enter.                            |               |                     |                 |                         |  |              |
| 1=Select process to work with      2=Display threads |               |                     |                 |                         |  |              |
| Process Name                                         |               | TDE Number          | TDE ID          | TDE Address             |  | Thread Count |
| QTFTP00071QTCP                                       | 048220        | 000000000C31        | 000001B2        | B000100007807000        |  | 1            |
| QZSCSRVS QUSER                                       | 048212        | 000000000C0D        | 00000207        | B0001000077B7000        |  | 1            |
| QZRCSRVS QUSER                                       | 048210        | 000000000C0B        | 00000204        | B000100007783000        |  | 1            |
| QZRCSRVS QUSER                                       | 048209        | 000000000C0A        | 00000202        | B000100007785000        |  | 1            |
| QZSOSIGN QUSER                                       | 048208        | 000000000C09        | 000001D9        | B0001000077AD000        |  | 1            |
| <b>1 QPADEV0014OPER01</b>                            | <b>048203</b> | <b>000000000BF3</b> | <b>000001D0</b> | <b>B000100007787000</b> |  | <b>1</b>     |
| REPORT QNOTES                                        | 048192        | 000000000BD1        | 00000200        | B00010000773B000        |  | 1            |
| EVENT QNOTES                                         | 048191        | 000000000BC9        | 000001F8        | B00010000772B000        |  | 8            |

Figure 190. SST: Work with Processes display

8. Press Enter to confirm your choice of process.
9. Press Enter, and the Display Process Found Information screen appears.
10. Select the option from the Select Format screen as directed by your service provider. In the majority of cases, option 2 for a Dump in Hexadecimal is required, as shown in Figure 191.

| Select Format                                  |         |
|------------------------------------------------|---------|
| Output device . . . . .                        | Printer |
| Select one of the following:                   |         |
| 1. Dump in hexadecimal                         |         |
| 2. <b>Dump in hexadecimal (logical blocks)</b> |         |
| 3. Format dis-assembled code for Cursors       |         |

Figure 191. SST: Select Format menu

11. Specify a dump title as illustrated in the example in Figure 192.

```

 Specify Dump Title

Output device : Printer

Type choices, press Enter.

Dump title ITSO Example - 07/19/99

Perform seizures 1 1=Yes, 2=No

Partial print page numbers:
 From page 1 1-2147483647
 Through page 9999 1-2147483647

```

Figure 192. SST: Specify Dump Title display

The following message is displayed at the bottom of the screen when Enter is pressed to submit the dump:

Dump to printer successfully submitted.



12. Press F16 to return to the SST menu.
13. Press F10 to obtain a command entry screen.
14. Enter the `WRKJOB` command, and select option 4 to locate the spooled file with the QPCSMPT label created by this procedure.

**Note**

In addition to using the System Service Tools (SST) to create a process internal dump, the functions are also available under Dedicated Service Tools (DST).

---

## 14.4 Changing a message description

If the problem causes a specific set of messages each time you run a particular function, and one of the error messages is an unmonitored escape message, the message description for that message can be altered to produce job dumps automatically when that message is issued. This is achieved by changing the DMPLST parameter in the message description.

We recommend that you use the Add Message Description (`ADDMSGD`) command to create the message again, and then place the new message in an override file. This avoids any confusion or unwanted dumps, if the system supplied message description is not changed back to its original setting.

For example, if a program performed a step where an object in a library was renamed, and this function was not able to complete due to the fact that the required name was already in existence, an escape message CPF2132 would be issued.

Looking at the message description for CPF2132, we find that the DMPLST parameter is set to `*NONE`, as shown in Figure 193 on page 202.

| Display Message Attributes         |                | System: | AS20    |
|------------------------------------|----------------|---------|---------|
| Message ID . . . . .               | : CPF2132      |         |         |
| Message file . . . . .             | : QCPFMMSG     |         |         |
| Library . . . . .                  | : QSYS         |         |         |
| Severity . . . . .                 | : 40           |         |         |
| Log problem . . . . .              | : *NO          |         |         |
| Default program . . . . .          | : *NONE        |         |         |
| Default library . . . . .          | :              |         |         |
| Message level . . . . .            | : 12/13/92 22  |         |         |
| Alert option . . . . .             | : *NO          |         |         |
| <b>Data to be dumped . . . . .</b> | <b>: *NONE</b> |         |         |
|                                    |                |         | More... |
| Press Enter to continue.           |                |         |         |
| F3=Exit F12=Cancel                 |                |         |         |

Figure 193. DSPMSGD: Display Message Attributes display

Use the CHGMSGD command to alter the Data to be dumped attributes for the message CPF2132. Perform the following steps to change this parameter:

1. Type DSPMSGD on the command line, and press F4 to prompt the command.
2. Enter the message ID and message file parameters as shown in Figure 194.

| Change Message Description (CHGMSGD) |                      |                      |                                  |
|--------------------------------------|----------------------|----------------------|----------------------------------|
| Type choices, press Enter.           |                      |                      |                                  |
| <b>Message identifier . . . . .</b>  | <b>&gt; CPF2132</b>  | Name                 |                                  |
| <b>Message file . . . . .</b>        | <b>&gt; QCPFMMSG</b> | Name                 |                                  |
| <b>Library . . . . .</b>             | <b>yourlib</b>       | Name, *LIBL, *CURLIB |                                  |
| First-level message text . . . . .   | *SAME                |                      |                                  |
| Second-level message text . . . . .  | *SAME                |                      |                                  |
| Severity code . . . . .              | *SAME                | 0-99, *SAME          | ...                              |
|                                      |                      |                      | More...                          |
| F3=Exit                              | F4=Prompt            | F5=Refresh           | <b>F10=Additional parameters</b> |
| F13=How to use this display          |                      |                      | F12=Cancel                       |
|                                      |                      |                      | F24=More keys                    |

Figure 194. CHGMSGD: Command prompt

3. Press F10 for additional parameters, and scroll down to find the Data to be Dumped parameter, as shown in Figure 195.

```

Change Message Description (CHGMSGD)

Type choices, press Enter.

Range of reply values:
 Lower value *SAME
 Upper value
Relationship for valid replies:
 Relational operator *SAME *SAME, *NONE, *EQ, *LE...
 Value
Default reply value *SAME

Additional Parameters

Default program to call *SAME Name, *SAME, *NONE
Library Name, *LIBL, *CURLIB
Data to be dumped *SAME 1-99, *SAME, *NONE, *JOB...
 + for more values
More...

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

```

Figure 195. CHGMSGD: Additional Parameters

The values for the DMPLST parameter are shown in Figure 196.

```

Specify Value for Parameter DMPLST

Type choice, press Enter.

Type : INTEGER
Data to be dumped *SAME

Single Values
 *SAME
 *NONE
Other Values
 *JOB
 *JOBINT
 *JOBIMP

```

Figure 196. DMPLST parameters

The DMPLST parameter specifies the data dumped when this message is sent as an escape message to a program that is not monitoring for it. This parameter can specify that data related to the job be dumped, that data from message data fields be dumped, or that a combination of these be dumped. The standard job dump can also be requested.

You can enter multiple values for this parameter. If you are on an entry display and you need additional entry fields to enter these multiple values, type a plus sign (+) in the entry field opposite the phrase “+”.

The values for this parameter are defined here:

- \*JOB** This value is the same as specifying \* on the Job name prompt (JOB parameter) and \*PRINT on the Output prompt (OUTPUT parameter) of the DSPJOB (Display Job) command.
- \*JOBDMF** The data areas of the job are dumped as specified by the Dump Job (DMPJOB) command. \*JOBDMF can be specified by itself, with \*JOB, with \*JOBINT, or with a list of message data field numbers.
- \*JOBINT** The internal machine data structures related to the job processing are dumped to the machine error log as specified by the Dump Job Internal (DMPJOBINT) command. \*JOBINT can be specified by itself, with \*JOBDMF, \*JOB, or with a list of message data field numbers.

---

## Chapter 15. Dumping an object

Dumping objects is a problem analysis procedure used when problems with object structure and integrity are encountered.

Reading the contents of an object dump is not an easy task and is usually left to the AS/400e server developers. For example, developers may use an object dump to examine the extent of damage to the object while working for the cause of the problem. For more information on object damage, refer to Appendix I, “Damaged objects” on page 345.

There are two CL commands that dump an object in the AS/400e server:

- **Dump Object (DMPOBJ):** The Dump Object (DMPOBJ) command dumps the contents or attributes of the specified operating system object to a spooled printer file named QPSRVDMP. The dump captures the OS/400 view of the object structures.
- **Dump System Object (DMPSYSOBJ):** The Dump System Object (DMPSYSOBJ) command is used primarily for problem analysis tasks. It dumps the content or attributes of machine interface (MI) system objects to a spooled printer file named QPSRVDMP. The system dump captures the machine or Licensed Internal Code (LIC) view of the object structures.

These commands are shipped with public \*EXCLUDE authority. To use these commands, sign on as QPGMR, QSYSOPR, QSRV, or QSRVBAS, or have \*ALLOBJ authority.

---

### 15.1 Dump Object (DMPOBJ)

This section outlines the steps to perform an object dump using the DMPOBJ command. In our example, we dump the startup-job object named QSTRUP with object type \*PGM located in QGPL library. Follow these steps:

1. Type `DMPOBJ` from any command line. Press F4. A display appears like the example shown in Figure 197 on page 206.

Dump Object (DMPOBJ)

Type choices, press Enter.

|                       |               |                             |
|-----------------------|---------------|-----------------------------|
| Object.....           | <b>QSTRUP</b> | Name                        |
| Library . . . . .     | <b>QGPL</b>   | Name, *LIBL, *CURLIB, QTEMP |
| Object type . . . . . | <b>*PGM</b>   | *ALRTBL, *AUTL, *BNDDIR...  |

Bottom

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

Figure 197. Dump Object display

2. Type the object name, library name, and object type. Press Enter.
3. The DMPOBJ command produces a spooled file with a label QPSRVDMP.

**Tip**

If you do not know the object type or the library name, use the `WRKOBJ` command to find the required information.

## 15.2 Dump System Object (DMPSYSOBJ)

This section outlines the steps to perform an object dump using the DMPSYSOBJ command. In our example, we perform a dump system object on a display device description object named DSP01 located in QSYS library. Follow these steps:

1. Type `DMPSYSOBJ` from any command line. Press F4. A display appears as shown in Figure 198.

```

 Dump System Object (DMPSYSOBJ)

Type choices, press Enter.

Object DSP01
Context or library QSYS
Internal object type *ALL *ALL, 01, 02, 03, 04, 07...
Internal object subtype *ALL Character value, *ALL
Object type *DEV *ALL, *ALRTBL, *AUTL...
Hexadecimal offsets *NONE 00000000-00FFFFFF, *NONE
 + for more values
Area of space to dump:
 Hexadecimal offset * 00000000-00FFFFFF, *
 Hexadecimal length or * 00000001-00FFFFFF, *

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

```

Figure 198. Dump System Object (DMPSYSOBJ) display

2. Type the object name, library name, and object type. Leave the remaining parameters at their default (which are the initial values displayed) unless you are instructed by your service provider to change any of the parameters. Press Enter. In this example, the device description for DSP01 is dumped.

The DMPSYSOBJ command produces a spooled file with a label QSRVDMP.

## 15.3 Using System Service Tools for a dump system object

A dump system object dump can be performed from the System Service Tools (SST) menu by following these steps:

1. Enter `STRSST` from the command line. The menu shown in Figure 199 appears. Select option 1 on this menu.

```

 System Service Tools (SST)

Select one of the following:

 1. Start a service tool
 2. Work with active service tools
 3. Work with disk units
 4. Work with diskette data recovery
 5. Work with system partitions

```

Figure 199. SST menu

2. The menu shown in Figure 200 on page 208 appears. Select option 4 from the menu to start the Display, Alter, Dump function.

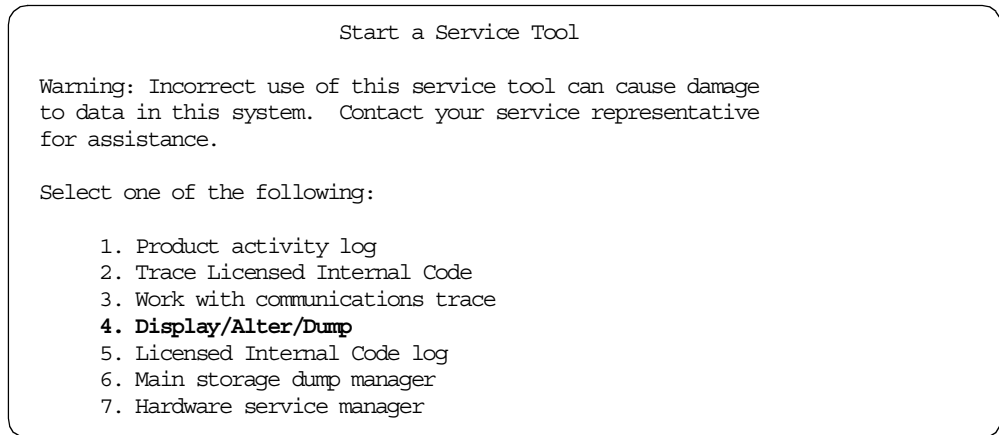


Figure 200. Start Service Tool menu

3. On the Display/Alter/Dump Output Device display, select option 2 (Dump to Printer) as shown in Figure 201.

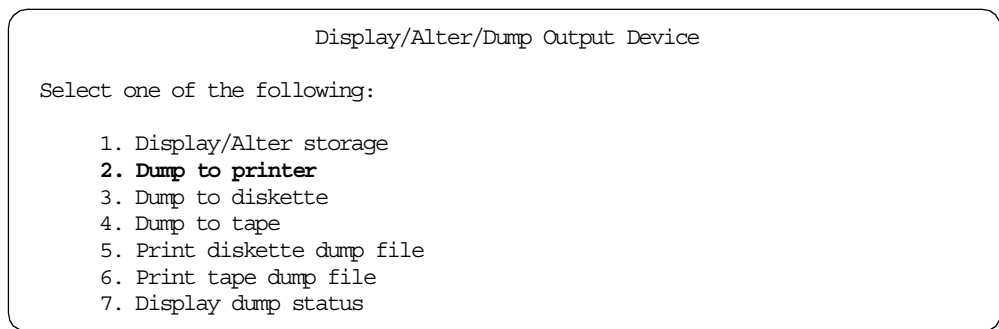


Figure 201. SST: Display/Alter/Dump Output Device selection

4. Select option 1 (Machine Interface (MI) object) from the Select Data menu, as shown in Figure 202.

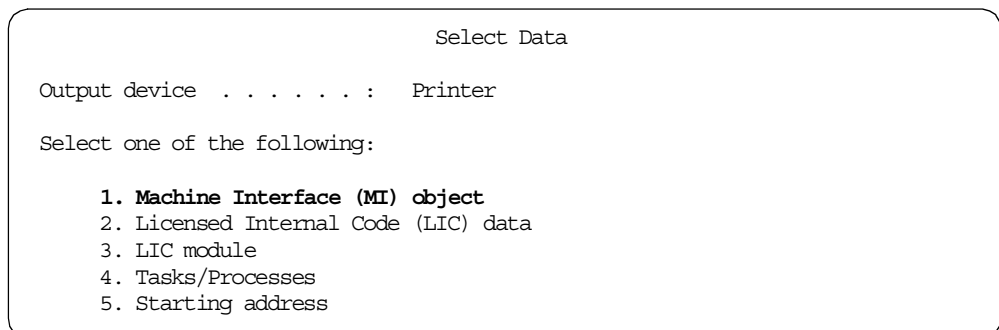


Figure 202. SST: Select Data menu

5. Scroll up or page down to see more options. In this example, we select option 16 (Device description (10)), as shown in Figure 203.



```

 Select MI Object

Output device : Printer

Select one of the following:

 11. Data space (0B)
 12. Data space index (0C)
 13. Cursor (0D)
 14. Index (0E)
 15. Commit block (0F)
 16. Device description (10)
 17. Line description (11)
 18. Controller description (12)
 19. Dump space (13)
 20. Class of service (14)

 More...

Selection

F3=Exit F12=Cancel

```

Figure 203. SST: Select MI Object menu

6. Select option 1 (Find by object name), as shown in Figure 204.

```

 Find MI Object

Output device : Printer

Select one of the following:

 1. Find by object name
 2. Find by object address

```

Figure 204. SST: Find MI Object menu

7. Enter the name of the device and the subtype as shown in Figure 205. In our example, we enter DSP01 for the Name prompt and leave the default for the Subtype prompt.

```

 Find By Object Name

Output device : Printer

Type choices, press Enter.

Object:
 Type : (10) - Device Description
 Name : DSP01
 Subtype : 01 00-FF

```

Figure 205. SST: Find By Object Name display

For more information on object type and subtype, refer to Chapter 14 “Object Types and Subtypes” in *OS/400 Diagnostic Aids*, LY44-5907.

The Display Object Found Information screen appears as shown in Figure 206.

Display Object Found Information

Output device . . . . . : Printer

Object:

Type . . . . . : (10) - Device Description

Name . . . . . : DSP01

Subtype . . . . . : 01

Context:

Name . . . . . : Machine Context

Subtype . . . . . : 00

User profile:

Name . . . . . : QPGMR

Subtype . . . . . : 01

Press Enter to continue.

F3=Exit F12=Cancel

Figure 206. SST: Display Object Found Information display

8. Press Enter to proceed. The Select Format display appears as shown in Figure 207.

Select Format

Output device . . . . . : Printer

Select one of the following:

1. Dump in hexadecimal

2. **Dump in hexadecimal (logical blocks)**

Figure 207. SST: Select Format display

9. Select the option from the Select Format display as directed by your service provider. In the majority of cases, option 2 (Dump in Hexadecimal (logical blocks)) is required.
10. Specify a dump title as illustrated in the example in Figure 208.

Specify Dump Title

Output device . . . . . : Printer

Type choices, press Enter.

Dump title . . . . . ITSO Example - 07/19/99

Perform seizes . . . . . 1 1=Yes, 2=No

Partial print page numbers:

From page . . . . . 1 1-2147483647

Through page . . . . . 9999 1-2147483647

Figure 208. SST: Specify Dump Title display

- Press Enter to submit the dump. The following message is displayed at the bottom of the screen:  
  
Dump to printer successfully submitted.
- Press F16 to return to the SST menu.
- Press F10 to obtain a command entry screen.
- Enter the `WRKJOB` command, and select option 4 to locate the spooled file with the QPCSMVRT label created by this procedure.

The same procedure can also be performed with DST to perform a dump system object.



---

## Chapter 16. Collecting an input/output processor (IOP) dump

This chapter explains how to use the input/output debug utility in to collect a dump for an input/output processor (IOP). You can access the input/output debug utility in Hardware Service Manager from either the System Service Tools (SST) or Dedicated Service Tools (DST) menus.

The IOP dump contains information such as data from the memory, hardware registers, and error log of an IOP. This operation takes place at the hardware bus level and may be used to gather data from an inoperable IOP. The data can be displayed, printed, or saved to a tape or diskette. In some error situations, the IOP automatically stores dump information in a Product Activity Log (PAL) entry. You can locate it by searching for the class of the entries that are labeled *Dump*.

If you do not have service authority to use SST or DST, contact the security officer or system administrator. This authority is necessary if you are using SST or DST.

### Attention

Improper use of an IOP dump causes a system failure, which requires a system IPL to recover. Use this tool under the direction of your service provider.

---

### 16.1 Performing an IOP dump on most IOPs

This section outlines the steps to perform an IOP dump using SST or DST. The steps are as follows:

1. If you are not at the Start a Service Tool menu and you are using:
  - SST, go to 19.3.1, "Starting a Service Tool" on page 254.
  - DST, go to 20.3.1, "Starting a DST service tool" on page 267.

Then, return here to continue.

2. Select option 7 (Hardware Service Manager) from the Start a Service Tool menu:
  - For DST, select option 4.
  - For SST, select option 7.

Press Enter. A menu appears like the example shown in Figure 209 on page 214.

```

Hardware Service Manager

Attention: This utility is provided for service representative use only.

System unit : 9406-720 XX-XXXX
Release : V4R4M0 (1)

Select one of the following:

1. Packaging hardware resources (systems, frames, cards,...)
2. Logical hardware resources (buses, IOPs, controllers,...)
3. Locate resource by resource name
4. Failed and non-reporting hardware resources
5. System power control network (SPCN)
6. Work with service action log
7. Display label location work sheet
8. Device Concurrent Maintenance

Selection
 2

F3=Exit F6=Print configuration F9=Display card gap information
F10=Display resources requiring attention F12=Cancel

```

Figure 209. Hardware Service Manager menu

3. Select option 2 (Logical hardware resources (buses, IOPs, controllers,...)). Press Enter. The Logical Hardware Resources menu appears as shown in Figure 210.

```

Logical Hardware Resources

Select one of the following:

1. System bus resources
2. Processor resources
3. Main storage resources

Selection
 1

F3=Exit F6=Print configuration F12=Cancel

```

Figure 210. Logical Hardware Resource menu

4. Select option 1 (System bus resources). Press Enter. The Logical Hardware Resource on System Bus display appears as shown in Figure 211.

```

Logical Hardware Resources on System Bus

System bus(es) to work with *ALL *ALL, 1- 2
Subset by *ALL *ALL, *STG, *WS, *CMN, *CRP

Type options, press Enter.
 2=Change detail 4=Remove 5=Display detail 6=I/O Debug
 8=Associated packaging resource(s) 9=Resources associated with IOP

Opt Description Type-Model Status Resource
 System Bus - Operational SPD01
 System Bus - Operational SPD02
 Combined Function IOP * < 2809-001 Operational CMB01
 9 Combined Function IOP 2809-001 Operational CMB02
 Virtual System Bus - Operational SPD03
 Virtual Bus Adapter 268A-000 Operational SOC01

F3=Exit F5=Refresh F6=Print F8=Include non-reporting resources
F9=Failed resources F10=Non-reporting resources
F11=Display serial/part numbers F12=Cancel

```

Figure 211. Logical Hardware Resources on System Bus display

- Enter option 9 (Resources associated with IOP) in the Opt column next to the IOP for which you want to perform an IOP dump. A display appears as shown in Figure 212.

```

Logical Hardware Resources Associated with IOP

Type options, press Enter.
 2=Change detail 4=Remove 5=Display detail 6=I/O Debug
 7=Verify 8=Associated packaging resource(s)

Opt Description Type-Model Status Resource
 Combined Function IOP 2809-001 Operational CMB02
 Communications IOA 2724-001 Operational LIN03
 Communications Port 2724-001 Operational CMN06
 Communications Channel 605A-001 Operational CHN01

F3=Exit F5=Refresh F6=Print F8=Include non-reporting resources
F9=Failed resources F10=Non-reporting resources
F11=Display serial/part numbers F12=Cancel

```

Figure 212. Logical Hardware Resources Associated with IOP display

- Verify that this is the correct IOP with the correct IOA or device attached.
- Enter option 6 (I/O Debug) on the Opt column next to the IOP. The Select IOP Debug Function menu appears as shown in Figure 213 on page 216.

```

 Select IOP Debug Function

Resource name : CMB02
Dump type : Normal

Select one of the following:

 1. Read/Write I/O processor data
 2. Dump I/O processor data
 3. Reset I/O processor
 4. IPL I/O processor
 5. Enable I/O processor trace
 6. Disable I/O processor trace

Selection
 2

F3=Exit F12=Cancel
F8=Disable I/O processor reset F9=Disable I/O processor IPL

```

Figure 213. Select IOP Debug Function menu

8. Enter option 2 (Dump I/O processor data). Press Enter. A display appears as shown in Figure 214.

#### Attention

Performing a dump on an IOP that controls the disk drive may cause a system failure, which requires a system IPL to recover. Schedule this IOP dump for an off-peak time, and perform these IOP dumps using DST.

```

 Dump I/O Processor Data

Note: Improper data offset when requesting storage dump may fail
an operational IOP.

Type choices, press Enter.

Data type 1 1=Dump
 2=Error log
 3=Storage
 4=Registers

Data offset 00000000
Data length *ALL *ALL, hexadecimal number
Issue unit reset 2 1=Yes, 2=No

F3=Exit F12=Cancel

```

Figure 214. Dump I/O Processor Data display



### Important

Certain processors need a unit reset to perform a dump. Issuing an IOP reset to a processor that is running can cause the processor to become inoperable. This may result in a system failure, which in turn, requires a system IPL to recover. Consult your service provider if you need to reset the IOP.

9. Use the default setting unless advised by your service provider. Note that the default setting for issuing a unit reset is 2 (No). Therefore, it does not disrupt the system operation. Press Enter to proceed. The Work with Processor Data display appears as shown in Figure 215.

```
Work with Processor Data

Select one of the following:

1. Display/Alter data
2. Print data
3. Save data to diskette
4. Save data to tape

Selection

F3=Exit F12=Cancel
00456C90 (hex) bytes of data were dumped.
```

Figure 215. Work with Processor Data menu

The nnnnnnnn (hex) bytes of data were dumped message appears at the bottom of the display.

This ends the procedure to perform an IOP dump on most IOPs. Proceed to the following section or to 16.1.2, “Printing the IOP dump data” on page 219.

### Note

Do not press F3 (Exit) or F12 (Cancel) at the Work with Processor Data menu (refer to Figure 215). If so, all dump data *will be lost*.

## 16.1.1 Saving the IOP dump data to tape

This procedure is a continuation from the previous section. The steps to save the IOP dump data are described here:

1. From the Work with Processor Data menu (see Figure 215 on page 217), enter option 4 (Save data to tape). The Specify Tape File display appears as shown in Figure 216 on page 218.

Specify Tape File

Type choices, press Enter.

Volume ID . . . . . **ITSO001**

File name . . . . . **IOPDUMP**

Sequence number . . . . . 0000      0000-9999

Check for active files . . . . . 2      1=Yes, 2=No

F3=Exit      F12=Cancel

Figure 216. Specify Tape File display

2. Type the volume identifier, file name, sequence number, and 1 or 2 for the Check for active files field at its respective prompt.  
 Entering 1 at the Check for active file prompt causes the system to check whether there are any active files residing on the removable media that is to be inserted onto the tape drive. If an active file is found, a message will be issued. If you enter 2 at the Check for active file prompt, the system does not check for active files. Any active file residing on the tape will be over written.
3. Press Enter to continue. The Select Tape Unit display appears as shown in Figure 217.

Select Tape Unit

Type choice, press Enter.

Tape unit . . . . . **TAP01**      Name, F4 for list

F3=Exit      F4=Prompt      F12=Cancel

Figure 217. Select Tape Unit display

4. Insert a removable media onto a tape unit, and set it to *ready* status.
5. Type the tape unit identifier at the Tape unit prompt (for example, TAP01). Press Enter to proceed.

6. After the save is completed, the Tape save was successful message appears.

This ends the procedure to save the IOP dump data to tape.

### 16.1.2 Printing the IOP dump data

This procedure is a continuation from 16.1, “Performing an IOP dump on most IOPs” on page 213. The steps to print the IOP dump data are described here:

1. From the Work with Processor Data menu (refer to Figure 215 on page 217), type option 2 (Print data), and press Enter.
2. The Print request successfully submitted to service printer message appears at the bottom of the display.
3. Enter the WRKSPLF command to locate your printout with the file name QPCSMPRT.

This ends the procedure to print the IOP dump data.

## 16.2 Performing an IOP dump for communication controllers

This section outlines the steps to perform an IOP dump or exception dump for a #2617 Ethernet communication controller and #2619 token-ring communication controller. Follow these steps:

1. Follow step 1 through step 4 from 16.1, “Performing an IOP dump on most IOPs” on page 213. Return here after you have completed step 4 of the procedure. The display shown in Figure 218 appears.

```

Logical Hardware Resources on System Bus

System bus(es) to work with *ALL *ALL, 1- 1
Subset by *ALL *ALL, *STG, *WS, *CMN

Type options, press Enter.
 2=Change detail 4=Remove 5=Display detail 6=I/O Debug
 8=Associated packaging resource(s) 9=Resources associated with IOP

Opt Description Type-Model Status Resource
 System Bus - Operational SPD01
 Multiple Function IOP * 918B-001 Operational CMB01
 Workstation IOP < 2661-001 Operational WS01
 9 Communications IOP 2619-001 Operational CC04
 Storage IOP 6502-001 Operational SI01
 Communications IOP 6616-001 Operational CC03

F3=Exit F5=Refresh F6=Print F8=Include non-reporting resources
F9=Failed resources F10=Non-reporting resources
F11=Display serial/part numbers F12=Cancel

```

Figure 218. Logical Hardware Resource on System Bus display

2. Type option 9 (Resources associated with IOP) in the Opt column next to the IOP for which you want to perform an IOP dump. A display appears as shown in Figure 219 on page 220.

| Logical Hardware Resources Associated with IOP                          |                     |            |             |               |
|-------------------------------------------------------------------------|---------------------|------------|-------------|---------------|
| Type options, press Enter.                                              |                     |            |             |               |
| 2=Change detail    4=Remove    5=Display detail    6=I/O Debug          |                     |            |             |               |
| 7=Verify    8=Associated packaging resource(s)                          |                     |            |             |               |
| Opt                                                                     | Description         | Type-Model | Status      | Resource Name |
| 6                                                                       | Communications IOP  | 2619-001   | Operational | CC04          |
|                                                                         | Communications IOA  | 2619-001   | Operational | LIN09         |
|                                                                         | Communications Port | 2619-001   | Operational | CMN10         |
|                                                                         | Communications IOA  | 605A-001   | Operational | LIN10         |
|                                                                         | Workstation IOA     | 6055-001   | Operational | CTL02         |
| F3=Exit    F5=Refresh    F6=Print    F8=Include non-reporting resources |                     |            |             |               |
| F9=Failed resources    F10=Non-reporting resources                      |                     |            |             |               |
| F11=Display serial/part numbers    F12=Cancel                           |                     |            |             |               |

Figure 219. Logical Hardware Resources Associated with IOP display

3. Verify that this is the correct IOP with the correct IOA or device attached.
4. Type option 6 (I/O Debug) in the Opt column next to the IOP. A menu appears like the example shown in Figure 220.

| Select IOP Debug Function                                      |        |
|----------------------------------------------------------------|--------|
| Resource name . . . . .                                        | CC04   |
| Dump type . . . . .                                            | Normal |
| Select one of the following:                                   |        |
| 1. Read/Write I/O processor data                               |        |
| 2. Dump I/O processor data                                     |        |
| 3. Reset I/O processor                                         |        |
| 4. IPL I/O processor                                           |        |
| 5. Enable I/O processor trace                                  |        |
| 6. Disable I/O processor trace                                 |        |
| Selection                                                      |        |
| F3=Exit <b>F6=Set dump type</b> F12=Cancel                     |        |
| F8=Disable I/O processor reset    F9=Disable I/O processor IPL |        |

Figure 220. Select IOP Debug Function menu

5. Press F6 to Set dump type. A menu appears as shown in Figure 221.

Set Dump Type

Select one of the following:

1. Set IOP for normal dump
2. Set IOP for exception dump

Selection

F3=Exit      F5=Clear exception dump storage      F12=Cancel

Figure 221. Set Dump Type menu

6. Press F5 to clear the exception dump storage. The Successfully cleared exception dump storage message appears at the bottom of the screen.
7. Type option 2 to set the IOP for exception dump. Press Enter. The The IOP card set to exception dump must not be moved message appears at the bottom of the screen.
8. Press F12 to return to the Select IOP Debug Function menu (refer to Figure 220).
9. Type option 2 to dump the I/O processor data. Press Enter. A display appears like the one in Figure 222.

Dump I/O Processor Data

Note: Improper data offset when requesting storage dump may fail an operational IOP.

Type choices, press Enter.

|                            |          |                                                   |
|----------------------------|----------|---------------------------------------------------|
| Data type . . . . .        | 1        | 1=Dump<br>2=Error log<br>3=Storage<br>4=Registers |
| Data offset . . . . .      | 00000000 |                                                   |
| Data length . . . . .      | *ALL     | *ALL, hexadecimal number                          |
| Issue unit reset . . . . . | 2        | 1=Yes, 2=No                                       |

F3=Exit      F12=Cancel

Figure 222. Dump I/O Processor Data display

10. Use the default settings unless your service provider advises you to use another option. Press Enter to proceed. The system inhibits activity for a few seconds. The Work with Processor Data menu appears as shown in Figure 223.

**Important**

The IOP exception dump for the #2617/#2619 communication controllers can be performed while a customer is using the controller as long as you use 2 (No) for the Issue unit reset prompt.

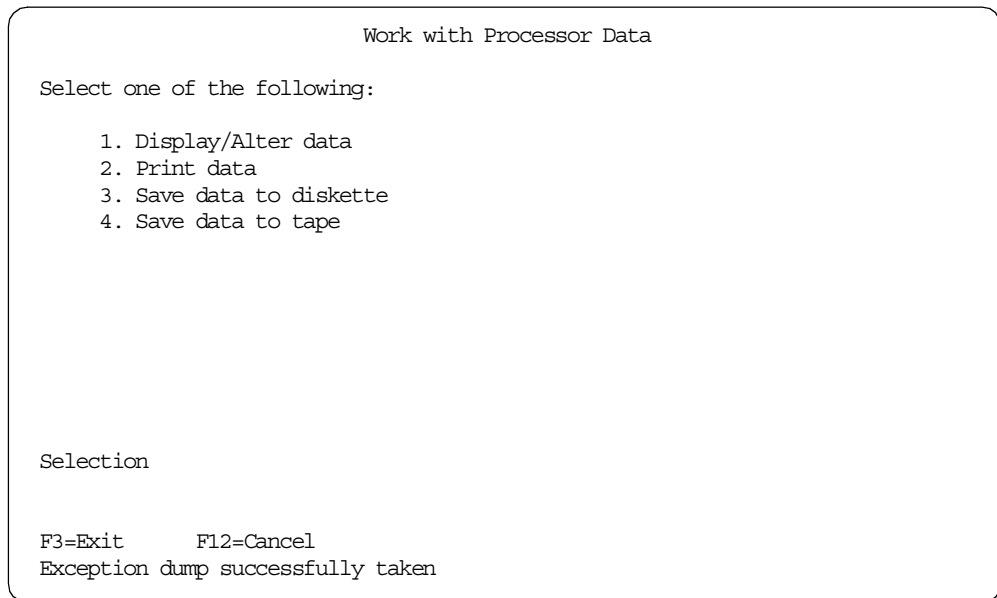


Figure 223. Work with Processor Data menu

11. The Exception dump successfully taken message appears at the bottom of the display.

Proceed to 16.1.1, “Saving the IOP dump data to tape” on page 217, or 16.1.2, “Printing the IOP dump data” on page 219.

---

## 16.3 Restoring the IOP dump tape to another system

This section outlines the steps to restore the IOP dump saved in 16.1.1, “Saving the IOP dump data to tape” on page 217. Complete this process:

1. If you are at the Start a Service Tool menu, continue with the next step. Otherwise, go to 19.3.1, “Starting a Service Tool” on page 254. Return here after you review how to start a Service Tool.
2. Type option 4 (Display/Alter/Dump) from the Start a Service Tool menu. A display appears as shown in Figure 224.

```

 Display/Alter/Dump Output Device

Select one of the following:

 1. Display/Alter storage
 2. Dump to printer
 3. Dump to diskette
 4. Dump to tape
 5. Print diskette dump file
 6. Print tape dump file
 7. Display dump status

Selection
 6

F3=Exit F12=Cancel

```

Figure 224. Display/Alter/Dump Output Device menu

3. Type option 6 (Print tape dump file). A display appears like the example shown in Figure 225.

```

 Print Tape File

Type choices, press Enter.

Partial print page numbers:
 From page 1 1-2147483647
 Through page 2147483647 1-2147483647

Volume ID ITSO001

File IOPDUMP

Sequence number 0000 0000-9999

F3=Exit F12=Cancel

```

Figure 225. Print Tape File display

4. Type 2147483547 for the Through page option since you do not know how many pages this IOP dump tape produces. Type the volume identifier and the file name of the tape in its respective field.

#### Tip

If you do not know the volume identifier and the file name of the tape, use the DSPTAP DEV(TAP01) DATA(\*LABELS) CL command to find out. You can check the information from another session without having to exit from this menu.

5. Press Enter. The Select Tape Unit display appears as shown in Figure 226.

Select Tape Unit

Type choice, press Enter.

Tape unit . . . . .

TAP01

Name, F4 for list

F3=Exit

F4=Prompt

F12=Cancel

Figure 226. Select Tape Unit display

6. Insert the LIC log tape on to the tape unit, and set it to *ready* status.
7. Type the tape unit identifier in the Tape unit prompt, for example, TAP01. Press Enter to proceed.
8. The restore process starts. You are brought back to the Print Tape File menu (refer to Figure 225 on page 223). The Print of tape file successfully submitted message appears at the bottom of the display.
9. Press F3 (Exit) to return to the Display/Alter/Dump Output Device menu (refer to Figure 224 on page 223).

**Note**

Do not exit the *Display/Alter/Dump Output Device* menu at this time. This causes the dump request to terminate.

10. Enter option 7 (Display dump status) to check the status of your dump request. A display appears as shown in Figure 227.



```
Display Status of Dump

Dump requests
not complete : 1

Title of
active dump : File IOPDUMP Vol IBMIRD

Press Enter to continue.

F3=Exit F5=Refresh F12=Cancel
```

Figure 227. Display Status of Dump

11. Press F5 to refresh the display occasionally, and wait for the Dump completed normally - File IOPDUMP Vol IBMIRD message to appear.
12. Press F3 three times to exit from the service tool.
13. Press Enter when prompted to exit SST.
14. Use the `WRKSPLF CL` command to locate your printout with the file name QPCSMPT.

This ends the procedure to restore the IOP dump tape to another system using SST.



---

## Chapter 17. Tracing the Licensed Internal Code (LIC)

Tracing the Licensed Internal Code is often referred to as an *LIC trace* or *internal trace*. LIC trace is used to collect data about the internal operation of the Licensed Internal Code. The LIC trace monitors various internal events. Therefore, it can be used to debug a problem that can be re-created, but is not visible at the application level. This tool is usually used under the direction of your service provider.

The process to collect the LIC trace data follows this order:

1. Start the trace.
2. Run the job until a failure occurs. A trace without a failure cannot be used to solve a problem, but it can be used to compare the difference between a failing event and a non-failing event.
3. Stop the trace.
4. Dump the trace data to a tape, diskette, or printer.

Traces can be run by using the Trace Internal (TRCINT) command from any command line or by selecting the Trace Licensed Internal Code option from System Service Tools (SST) or Dedicated Service Tools (DST). For some LIC traces, you must know the name of the controller, device, or line that has the problem.

The most commonly traced LIC functions are those related to input and output activities also known as *source/sink*. A source/sink trace tracks events of selected line, controller, device, network interface, and network server. Other events are traced relative to activities within a specific component and even instruction execution within a LIC module. The latter is to be used under the direction from higher levels of support such as the IBM developer. Therefore, the examples given in this book will be based on a source/sink trace. More information on other LIC traces is available in Chapter 17 of *AS/400 Licensed Internal Code Diagnostic Aids - Volume 1*, LY44-5900.

There are two ways to start the LIC trace:

- **SST:** Go to 17.1, "Using SST to collect an LIC trace" on page 228, or DST.
- **TRCINT CL command:** Go to 17.2, "Using the TRCINT command to collect an LIC trace" on page 234.

If you do not have service authority to use SST or DST, contact the security officer or system administrator. The service authority is necessary if you are using SST or DST.

### Note

The DST method is similar to the SST method, except for the options, which are different. You should always start the trace using a CL command or SST unless a workstation is not available. You should also review the method for locating the printed output in 1.7, "Finding your printed output" on page 12, prior to using the process outlined in this chapter.

## 17.1 Using SST to collect an LIC trace

This section outlines the steps required to take a source/sink trace from SST and collect data for further problem determination. In this example, we perform a source/sink trace from a workstation where there is no response from the system when the F1 help key is used. Follow these steps:

1. If you are not at the Start a Service Tool menu, follow the steps in 19.3.1, “Starting a Service Tool” on page 254. Return here after you review how to start a Service Tool.
2. Type option 2 (Trace Licensed Internal Code) from the Start a Service Tool menu. Press Enter. The Work with Internal Trace Table display appears as shown in Figure 228.

Work with Internal Trace Tables

Type options, press Enter.

|              |                            |            |
|--------------|----------------------------|------------|
| 2=Allocate   | 3=Work with enable details | 4=Delete   |
| 5=Display    | 6=Dump                     | 7=Activate |
| 8=Deactivate | 9=Clear                    |            |

| Opt | Table Name                 | Updated  | -----    | Status | -----    |
|-----|----------------------------|----------|----------|--------|----------|
|     | SYSTEM DEFAULT TRACE TABLE | 03/31/99 | Complete |        | Disabled |

F3=Exit      **F6=Create table**      F12=Cancel

Figure 228. Work with Internal Trace Tables display

3. If you are using the system default trace table, we recommend that you use option 9 to clear the trace table. Create a new table by pressing F6 (Create table). The display shown in Figure 229 appears.

```

 Create Internal Trace Table

Type choices, press Enter.

Table name F1 help key no response

Table size 64000 kilobytes 128- 1032192

Wrap allowed Y Y=Yes, N=No

F3=Exit F12=Cancel

```

Figure 229. Create Internal Trace Table display

4. Type a meaningful name for the table name describing the symptoms of the problem, for example, "F1 help key no response". A table size of 64000 is generally recommended. Press Enter to create the table. The display shown in Figure 230 appears.

```

 Work with Internal Trace Tables

Type options, press Enter.
 2=Allocate 3=Work with enable details 4=Delete
 5=Display 6=Dump 7=Activate 8=Deactivate 9=Clear

Opt Table Name Updated ----- Status -----
 SYSTEM DEFAULT TRACE TABLE 03/31/99 Complete Disabled
 3 F1 HELP KEY NO RESPONSE 07/02/99 Cleared Disabled

F3=Exit F6=Create table F12=Cancel

```

Figure 230. Work with Internal Trace Tables display with a new table created

5. A new table is created with a status of *Cleared* and *Disabled*. Enter option 3 (Work with enable details). The Enable Internal Trace display appears as shown in Figure 231 on page 230.

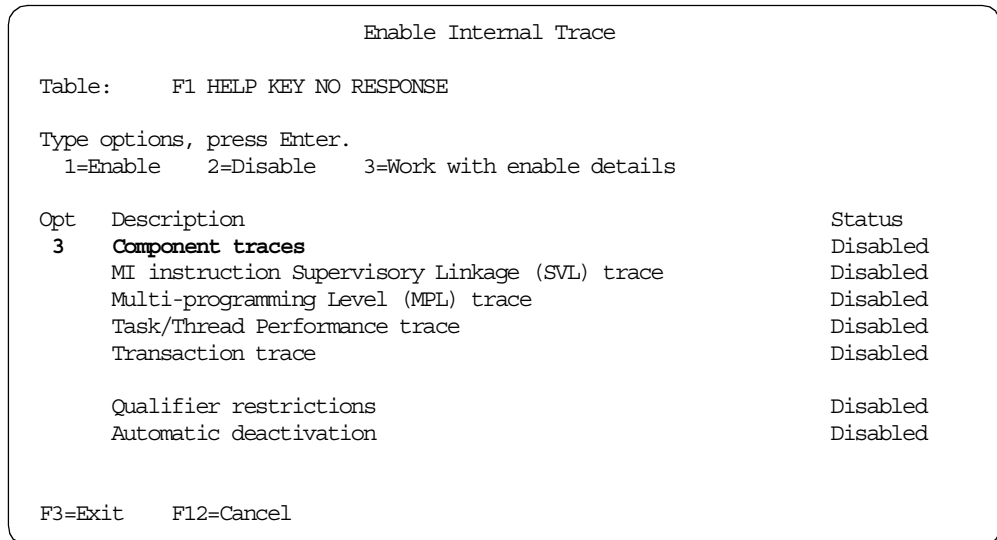


Figure 231. Enable Internal Trace display

- Enter option 3 (Work with enable details) next to Component traces to select the type of trace to be collected. A display appears like the one in Figure 232.

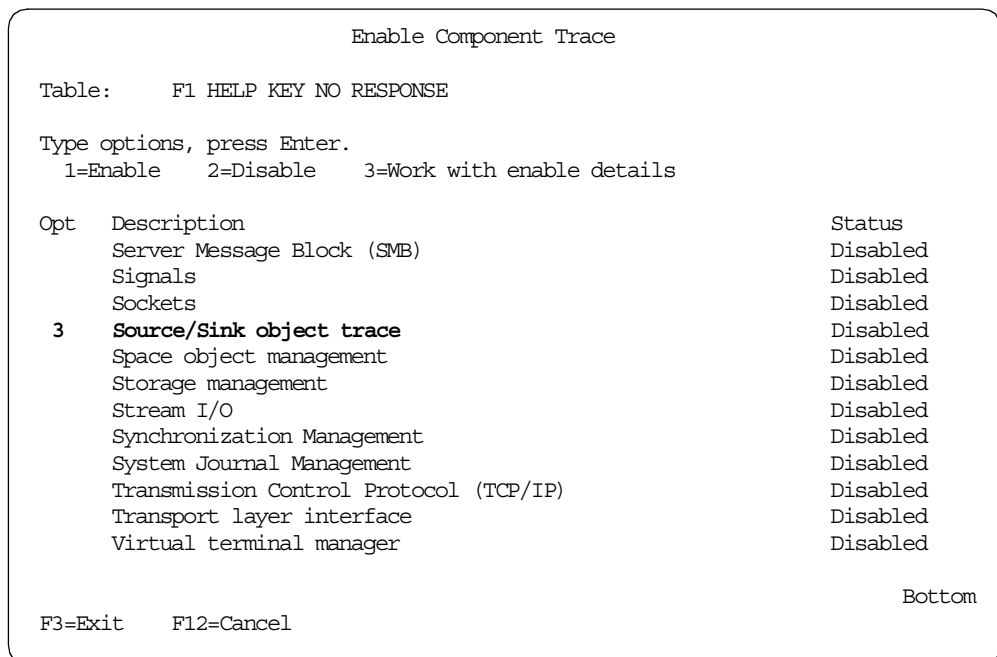


Figure 232. Enable Component Trace display

- Scroll down or page down until you see **Source/Sink object trace**. Enter option 3 next to this description to work with enable details. A display appears like the example in Figure 233.

| Enable Source/Sink Object Trace |                                                    |                                  |
|---------------------------------|----------------------------------------------------|----------------------------------|
| Table: F1 HELP KEY NO RESPONSE  |                                                    |                                  |
| Type options, press Enter.      |                                                    |                                  |
| 1=Enable 2=Disable              |                                                    |                                  |
| Opt                             | Description                                        | Status                           |
|                                 | Control blocks/Error path (detailed internal data) | Disabled                         |
|                                 | Licensed Internal Code (LIC) messages (SRMs/ORBs)  | Disabled                         |
|                                 | Protocol (SNA/SDLC or RD fields)                   | Disabled                         |
|                                 | User data (data stream/SCS)                        | Disabled                         |
|                                 | Machine Services Control Point (MSCP)              | Disabled                         |
| 0 objects are enabled.          |                                                    |                                  |
| F3=Exit                         | F6=Add object                                      | F10=Work with objects F12=Cancel |

Figure 233. Enable Source/Sink Object Trace display

#### Note

Sometimes an IBM developer may ask you to trace additional data such as Common Class Input/Output Manager (CCIO) and Machine Service Control Point (MSCP). You can select them at the same time as the Source/Sink object trace.

8. Press F6 to enter the line, controller, and device (one at a time). The display shown in Figure 234 appears.

| Specify Source/Sink Object     |                   |                                                                                                                                                                              |
|--------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table: F1 HELP KEY NO RESPONSE |                   |                                                                                                                                                                              |
| Type choices, press Enter.     |                   |                                                                                                                                                                              |
| Type . . . . .                 | 2                 | 1=Controller description (CTLD)<br>2=Device description (DEVD)<br>3=Line description (LIND)<br>4=Network interface description (NWID)<br>5=Network server description (NWSD) |
| Object . . . . .               | DSP01             |                                                                                                                                                                              |
| Sub-objects . . . . .          | N                 | N=No<br>Y=Yes                                                                                                                                                                |
| F3=Exit                        | F6=Add DST object | F12=Cancel                                                                                                                                                                   |

Figure 234. Specify Source/Sink Object display

9. After you enter the line, controller, and device, press Enter. The Enable Source/Sink Object Trace display appears. Enter option 1 next to User data (data stream/SCS) to enable the user data. Refer to Figure 235 on page 232.

```

 Enable Source/Sink Object Trace

Table: F1 HELP KEY NO RESPONSE

Type options, press Enter.
 1=Enable 2=Disable

Opt Description Status
 Control blocks/Error path (detailed internal data) Disabled
 Licensed Internal Code (LIC) messages (SRMs/ORBs) Disabled
 Protocol (SNA/SDLC or RD fields) Disabled
 1 User data (data stream/SCS) Disabled
 Machine Services Control Point (MSCP) Disabled

 2 objects are enabled.

F3=Exit F6=Add object F10=Work with objects F12=Cancel

```

Figure 235. Enable Source/Sink Object Trace display

10. Press Enter three times to return to the Work with Internal Trace Tables display, which is shown in Figure 236.

```

 Work with Internal Trace Tables

Type options, press Enter.
 2=Allocate 3=Work with enable details 4=Delete
 5=Display 6=Dump 7=Activate 8=Deactivate 9=Clear

Opt Table Name Updated ----- Status -----
 SYSTEM DEFAULT TRACE TABLE 03/31/99 Complete Disabled
 7 F1 HELP KEY NO RESPONSE 07/02/99 Active Enabled

F3=Exit F6=Create table F12=Cancel

```

Figure 236. Work with Internal Trace Tables with the new table enabled

11. Enter option 7 to activate the trace components that have been enabled from the previous steps. The status changes from *Cleared* to *Active*.
12. Recreate the problem at the device that you specified earlier.
13. After the problem is recreated, enter option 8 to deactivate it. The status changes from *Active* to *Complete*.
14. Enter option 6 to dump the trace table. The display shown in Figure 237 appears.



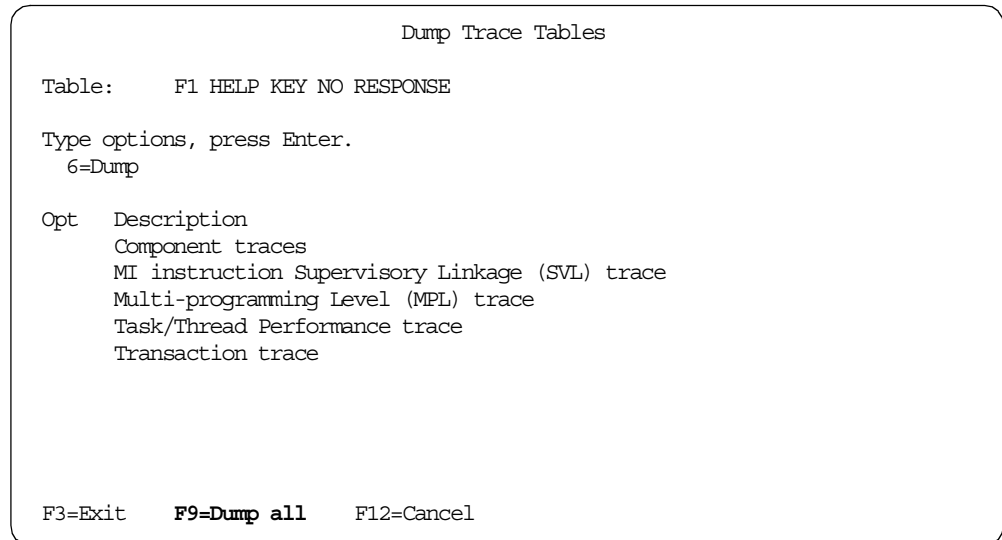


Figure 237. Dump Trace Tables display

15. Press F9 to dump the entire selection, unless you are instructed otherwise by your service provider. The Specify Time Qualification display appears as shown in Figure 238.

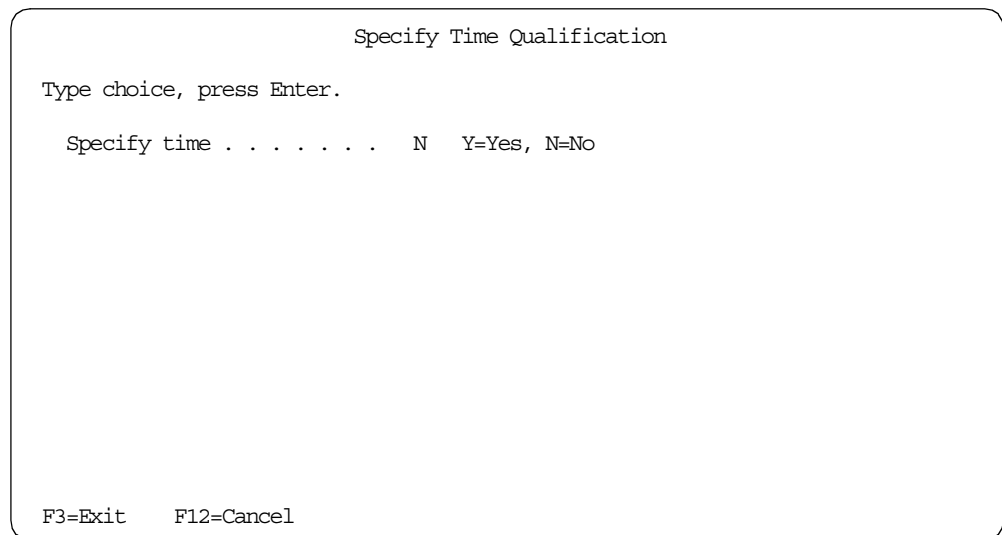


Figure 238. Specify Time Qualification display

16. Select the default setting of N (No) for Specify time, and press Enter. This collects the entire trace data gathered. The Select Dump Device display appears as shown in Figure 239 on page 234.

Select Dump Device

Type choices, press Enter.

|                              |   |                                                      |
|------------------------------|---|------------------------------------------------------|
| Dump device . . . . .        | 1 | 1=Printer<br>2=Tape<br>3=Diskette                    |
| Title . . . . . PMR 57644500 |   |                                                      |
| TDE cross reference . . .    | 1 | 1=Only for records dumped<br>2=All TDEs during trace |

F3=Exit    F12=Cancel

Figure 239. Select Dump Device display

17. You have the option to print or write the trace directly to tape. We recommend that you name the title with the PMR number. This helps your service provider to cross-reference the documentation received with their problem management system. Press Enter to proceed.
18. Wait until the Dump completed successfully message appears at the bottom of the display.
19. Exit the System Service Tools (SST).

If you selected the option to print the trace, you should be able to locate your printout with the file name QPCSMPT by using the `WRKSPLF` command. This ends the procedure to collect a source/sink trace.

---

## 17.2 Using the TRCINT command to collect an LIC trace

This section outlines the steps to start a source/sink trace using the TRCINT command and collect data for further problem determination. In this example, we perform a source/sink trace from a workstation where there is no response from the system when the F1 help key is used.

1. Type `TRCINIT` on the command line, and press F4. A display appears like the one shown in Figure 240.

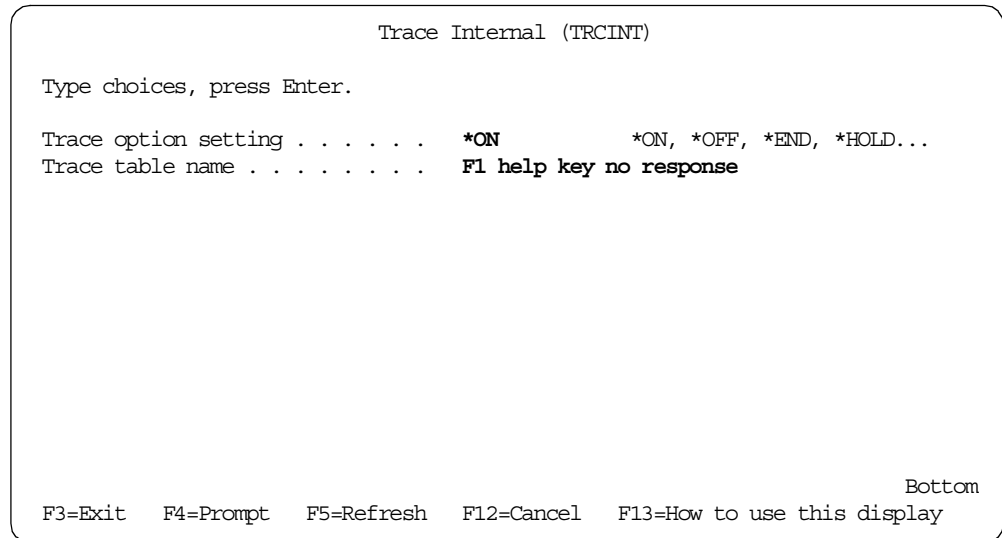


Figure 240. Trace Internal display

2. Type **\*ON** in the Trace option setting prompt. You can use the default setting for Trace table name or create a new table by typing a meaningful name that describes the symptom of the problem, for example, “F1 help key no response”.
3. Press Enter to continue. The Trace Internal display shows more options (see Figure 241).

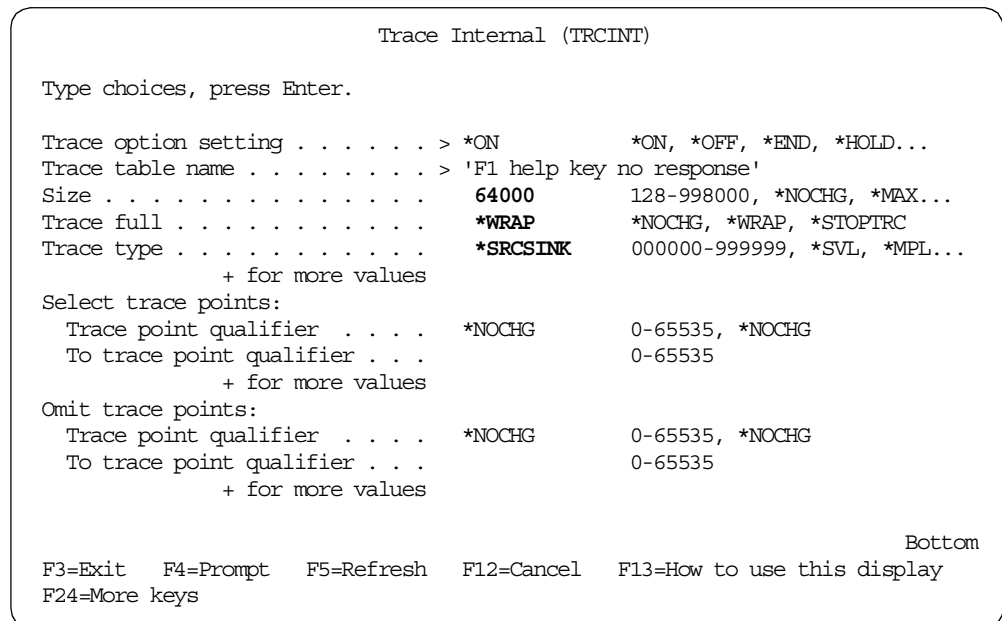


Figure 241. Trace Internal display with more options

4. Change the Size option to **64000** (recommended) and Trace full option to **\*WRAP**.
5. At the Trace type, type **\*SRCSINK** and press Enter. The display refreshes with more options. Refer to Figure 242 on page 236.

```

Trace Internal (TRCINT)

Type choices, press Enter.

Trace option setting > *ON *ON, *OFF, *END, *HOLD...
Trace table name > 'F1 help key no response'
Size > 64000 128-998000, *NOCHG, *MAX...
Trace full > *WRAP *NOCHG, *WRAP, *STOPTRC
Trace type > *SRCSINK 000000-999999, *SVL, *MPL...
 + for more values
Select trace points:
 Trace point qualifier *NOCHG 0-65535, *NOCHG
 To trace point qualifier . . . 0-65535
 + for more values
Omit trace points:
 Trace point qualifier *NOCHG 0-65535, *NOCHG
 To trace point qualifier . . . 0-65535
 + for more values
Device > DSP01 Name, *NONE
 + for more values
More...
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display

```

Figure 242. Trace Internal display with more options

6. Scroll down or page down to see the option for Controller, Line, and so on.
7. Type the device name, controller name, line name, and so on. For example, in this problem, we need to specify the workstation name (DSP01) and the controller name (CTL01). The items to be traced varies with the situation; consult your service provider on what should be included. Press Enter.
8. Recreate the problem at the device that you specified when starting the trace.
9. After the problem is recreated, use the same TRCINT command and press F4. A display appears similar to the example in Figure 240 on page 235.
10. Type \*OFF for the Trace option setting prompt and meaningful text to describe the problem in the Trace table name prompt. Then, press Enter. The display refreshes with one more prompt (Figure 243).

```

Trace Internal (TRCINT)

Type choices, press Enter.

Trace option setting > *OFF *ON, *OFF, *END, *HOLD...
Trace table name > 'F1 help key no response'
Task information > *TRCREf *ALL, *TRCREf

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

```

Figure 243. Trace Internal display

11. Leave the default setting for Task information, and press Enter again.
12. Once you set the trace off, the records are written to the spool printer file QPCSMPT. Use the `WRKSPLF` command to locate your printout.
13. To dump the records to a tape drive, use the same `TRCINT` command, and press F4. A display similar to the example in Figure 240 on page 235 appears.
14. Type `*SAVE` for the Trace option setting prompt and meaningful text to describe the problem in the Trace table name prompt. Then, press Enter. The display refreshes with one more option (Figure 244).

```

 Trace Internal (TRCINT)

Type choices, press Enter.

Trace option setting > *SAVE *ON, *OFF, *END, *HOLD...
Trace table name > 'F1 help key no response'
Output device TAP01 Name
Task information *TRCREF *ALL, *TRCREF

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

```

Figure 244. Trace Internal display

15. Insert a removable media onto the tape drive, and set it to *Ready* status.
16. Type the tape identifier in the Output device prompt (for example, TAP01). Press Enter to continue with the save process.

This ends the procedure to collect a LIC trace using the `TRCINT` command.



---

## Chapter 18. Collecting Licensed Internal Code (LIC) logs

The Licensed Internal Code (LIC) writes informational or error messages to the LIC log during normal system operations. Each message written to the LIC log shows an internal dump identifier. See 4.6, “Checking the contents of the additional message information” on page 42, for more information about finding an internal log ID in a message.

The Licensed Internal Code (LIC) log contains a range of information that is useful in discovering LIC code errors. The information is stored in entries, which may indicate:

- The status of the system (for example, type of IPL)
- The execution of an internal cleanup routine
- A problem with task or system object

If you do not have service authority to use SST or DST, contact the security officer or system administrator. This authority is necessary if you are using SST or DST.

### Note

We recommend that you review the method for locating the printed output in 1.7, “Finding your printed output” on page 12, prior to reading this chapter.

---

### 18.1 Using PRTINTDTA to collect one entry in the LIC log

This section outlines the steps to collect one entry in the LIC log using the PRTINTDTA command. The steps are as follows:

1. Type `PRTINTDTA` on the command line, and press F4 (Prompt). A display appears like the example shown in Figure 245 on page 240.

### Note

See 4.6, “Checking the contents of the additional message information” on page 42, for a reference of a dump identifier in a message. See Figure 35 on page 44.

Print Internal Data (PRTINTDTA)

Type choices, press Enter.

|                                 |          |                              |
|---------------------------------|----------|------------------------------|
| Type of data . . . . .          | *DMP     | *DMP, *INTCFG, *NOTES        |
| Dump identifier . . . . .       | 01020576 | Character value, *NONE, *ALL |
| Time period for internal data:: |          |                              |
| Beginning time . . . . .        | *AVAIL   | Time, *AVAIL                 |
| Beginning date . . . . .        | *CURRENT | Date, *CURRENT               |
| Ending time . . . . .           | *AVAIL   | Time, *AVAIL                 |
| Ending date . . . . .           | *CURRENT | Date, *CURRENT               |

Bottom

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

Figure 245. Print Internal Data (PRTINTDTA) display

2. Type \*DMP in the Type of data field.
3. Type the dump identifier in the Dump identifier field. This example uses 01020576 as the dump identifier.
4. Press Enter, and use the WRKSPLF command to locate your printout with the file name QPCSMPT.

This ends the procedure for collecting a single entry of the LIC log.

## 18.2 Using PRTINTDTA to collect LIC log entries for a specific time

This section outlines the steps to collect LIC log entries for a specific time using the PRTINTDTA command. The steps are outlined here:

1. Type PRTINTDTA on the command line, and press F4 (Prompt).
2. Type \*DMP in the Type of data field.
3. Type \*ALL in the Dump identifier field.
4. To save the LIC logs for the current day, press the Enter key. Otherwise, enter the beginning and ending time and date near the time the problem occurred. The time the problem occurred should be within the beginning and ending time range. Consult your service provider regarding the beginning and ending time range to use because the recommendation can vary from problem to problem. For this example, we set the range to be an hour apart from the time that the problem occurred. Your display should appear like the example in Figure 246.



Print Internal Data (PRTINTDTA)

Type choices, press Enter.

Type of data . . . . .

Dump identifier . . . . .

Time period for internal data::

Beginning time . . . . .

Beginning date . . . . .

Ending time . . . . .

Ending date . . . . .

\*DMP

\*ALL

14:00:00

06/01/99

16:00:00

06/01/99

\*DMP, \*INTCFG, \*NOTES

Character value, \*NONE, \*ALL

Time, \*AVAIL

Date, \*CURRENT

Time, \*AVAIL

Date, \*CURRENT

F3=Exit

F4=Prompt

F5=Refresh

F12=Cancel

F13=How to use this display

F24=More keys

Bottom

Figure 246. Print Internal Data (PRTINTDTA) display

- Press Enter. Use the `WRKSPLF CL` command to locate your printout with the file name `QPCSMPT`.

This ends the procedure for collecting LIC entries for a specific time using the `PRTINTDTA CL` command.

### 18.3 Using SST or DST to collect specific entries in the LIC log

This section outlines the steps to collect one or more specific entries in the LIC log using SST or DST. The steps are outlined here:

- If you are not at the Start a Service Tool menu and you are using:
  - SST, go to 19.3.1, “Starting a Service Tool” on page 254.
  - DST, go to 20.3.1, “Starting a DST service tool” on page 267.
 Then, return here to continue.
- Select option 5 (Licensed Internal Code log) from the Start a Service Tool menu.
  - For DST, select option 2.
  - For SST, select option 5.

A menu appears like the example shown in Figure 247 on page 242.

```

 Licensed Internal Code Log

Select one of the following:

 1. Select entries from the Licensed Internal Code (LIC) log
 2. Dump entries to printer from the Licensed Internal Code log
 3. Dump entries to tape from the Licensed Internal Code log
 4. Dump entries to diskette from the Licensed Internal Code log
 5. Change the Licensed Internal Code log sizes
 6. Clear the Licensed Internal Code log
 7. Display the status of the Licensed Internal Code log

Selection
 1

F3=Exit F12=Cancel

```

Figure 247. Licensed Internal Code Log menu

3. Type option 1 (Select entries from the Licensed Internal Code (LIC) log). Press Enter. The display shown in Figure 248 appears.

```

 Specify Licensed Internal Code Log Selection Values

Type choices, press Enter.

Entry ID:
 Starting FFFFFFFF 00000000-FFFFFF

Entry type:
 Major code 0000 0000-FFFF
 Minor code 0000 0000-FFFF

Starting:
 Date 00/00/00 MM/DD/YY
 Time 00:00:00 HH:MM:SS

Ending:
 Date 00/00/00 MM/DD/YY
 Time 00:00:00 HH:MM:SS

F3=Exit F12=Cancel

```

Figure 248. Specify Licensed Internal Code Log Selection Values display

4. Complete one of the following options:
  - Enter a specific Entry ID (for a particular dump), and press the Enter key. For more information on the dump ID, refer to 4.6, “Checking the contents of the additional message information” on page 42.
  - Enter a specific Entry type, and press the Enter key. For more information on entry types, refer to Chapter 18 in *AS/400 Licensed Internal Code Diagnostic Aids - Volume 1*, LY44-5900.
5. Press the Enter key to display all the LIC log entries.

6. The display shown in Figure 249 appears when you choose to display all LIC log entries.

| Select Entries from Licensed Internal Code Log              |                 |                         |             |             |                 |                 |              |
|-------------------------------------------------------------|-----------------|-------------------------|-------------|-------------|-----------------|-----------------|--------------|
| Type options, press Enter to dump entry to selected device. |                 |                         |             |             |                 |                 |              |
| 1=Printer 2=Tape 3=Diskette 5=Display entry 8=Display note  |                 |                         |             |             |                 |                 |              |
| Opt                                                         | Entry ID        | Major Description       | Major Code  | Minor Code  | Date            | Time            | Dump K bytes |
|                                                             | 01005C06        | Synchronization         | 2100        | 0143        | 07/02/99        | 17:31:38        | 0            |
|                                                             | 01005C07        | Synchronization         | 2100        | 0143        | 07/02/99        | 17:31:38        | 0            |
|                                                             | 01005C08        | Synchronization         | 2100        | 0143        | 07/02/99        | 17:31:39        | 0            |
|                                                             | 01005C09        | Synchronization         | 2100        | 0143        | 07/02/99        | 17:31:54        | 0            |
|                                                             | 01005C0A        | Synchronization         | 2100        | 0143        | 07/02/99        | 17:31:55        | 0            |
|                                                             | <b>01005C0B</b> | <b>Service function</b> | <b>0C00</b> | <b>0280</b> | <b>07/03/99</b> | <b>09:19:42</b> | <b>40</b>    |
|                                                             | 01005C0C        | Damage encountered      | 0301        | 0104        | 07/03/99        | 14:09:35        | 0            |
|                                                             | 01005C0D        | Damage encountered      | 0301        | 0104        | 07/03/99        | 14:09:35        | 0            |
|                                                             | 01005C0E        | Damage encountered      | 0301        | 0104        | 07/03/99        | 14:11:21        | 0            |
|                                                             | 01005C0F        | Damage encountered      | 0301        | 0104        | 07/03/99        | 14:11:21        | 0            |
|                                                             | 01005C10        | Damage encountered      | 0301        | 0104        | 07/03/99        | 14:11:24        | 0            |
|                                                             | 01005C11        | Damage encountered      | 0301        | 0104        | 07/03/99        | 14:11:24        | 0            |
|                                                             | 01005C12        | Damage encountered      | 0301        | 0104        | 07/03/99        | 14:11:28        | 0            |
|                                                             | 01005C13        | Damage encountered      | 0301        | 0104        | 07/03/99        | 14:11:28        | 0            |
|                                                             |                 |                         |             |             |                 |                 | Bottom       |
| F3=Exit F12=Cancel                                          |                 |                         |             |             |                 |                 |              |

Figure 249. Select Entries from Licensed Internal Code Log display

The most current or latest entries are shown at the bottom of the log. To see an earlier entry, page up or scroll down the display.

Dump data exists for the LIC log entries that have one or more K bytes of a dump shown in the *Dump K Bytes* column of the display (Figure 249). In our example, a 40K dump exists for the 01005C0B entry ID.

For more information on the *Major Code and Minor Code*, refer to Chapter 18 in *AS/400 Licensed Internal Code Diagnostic Aids - Volume 1*, LY44-5900, and to Chapter 2 in *AS/400 Licensed Internal Code Diagnostic Aids - Volume 2*, LY44-5901.

7. Type 1 in the Opt column next to each LIC log entry that you want to save in a spooled file. You can select more than one entry.
8. Press Enter, and the X is the print dump request identifier message appears.
9. Press F3 to exit the Select Entries from Licensed Internal Code Log menu, and the x Print request has completed successfully message appears.
10. If you are using:
  - SST, use the WRKSPPLF CL command to locate your printout with file name QPCSMPT.
  - DST, the printout goes to the service printer.
11. Press F3 twice to exit from the service tool.

12.If you are using:

- SST, press the Enter key to exit SST.
- DST, select option 1 (Exit Dedicated Service Tools (DST)) option from the Exit Dedicated Service Tools menu, and press the Enter key to exit DST.

This ends the procedure to collect specific entries in the LIC log using SST or DST.

---

## 18.4 Dumping all LIC log entries to a removable media using SST or DST

### Note

Dumping all LIC log entries to a printer may create a spooled file with tens of thousands of pages. This may result in storage problems for some systems. We recommend that you dump the entries to tape for the entire LIC log. For example, we dumped all LIC log entries of a Model 720, and it generated a spooled file of one hundred and twenty-thousand pages. We also converted the spooled file to a physical file, and the size of the resulting physical file was 850 Mb. Next, we tried dumping all LIC log entries to tape and saved it successfully on to a 150 MB tape.

This section outlines the steps to dump entries in the LIC log to a tape. The steps are as follows:

1. If you are at the Start a Service Tool menu, continue with the next step.

Otherwise, if you are using:

- SST, go to 19.3.1, "Starting a Service Tool" on page 254.
- DST, go to 20.3.1, "Starting a DST service tool" on page 267.

Then, return here to continue.

2. Select option 5 (Licensed Internal Code log) from the Start a Service Tool menu:

- For DST, select option 2.
- For SST, select option 5.

Press Enter. The display shown in Figure 250 appears.

```

Licensed Internal Code Log

Select one of the following:

1. Select entries from the Licensed Internal Code (LIC) log
2. Dump entries to printer from the Licensed Internal Code log
3. Dump entries to tape from the Licensed Internal Code log
4. Dump entries to diskette from the Licensed Internal Code log
5. Change the Licensed Internal Code log sizes
6. Clear the Licensed Internal Code log
7. Display the status of the Licensed Internal Code log

Selection
 3

F3=Exit F12=Cancel

```

Figure 250. Licensed Internal Code Log menu

3. Type option 3 (Dump entries to tape from the Licensed Internal Code log). Press Enter. A display appears like the one in Figure 251.

```

Dump Entries to Tape from Licensed Internal Code Log

Type choices, press Enter.

Dump option 3 1=Header
 2=Header and note entry
 3=Header and entire entry

Entry ID:
Starting 00000000 00000000-FFFFFFFF
Ending FFFFFFFF 00000000-FFFFFFFF

Entry type:
Major code 0000 0000-FFFF
Minor code 0000 0000-FFFF

Starting:
Date 00/00/00 MM/DD/YY
Time 00:00:00 HH:MM:SS
Ending:
Date 00/00/00 MM/DD/YY
Time 00:00:00 HH:MM:SS

F3=Exit F12=Cancel

```

Figure 251. Dump Entries to Tape from Licensed Internal Code Log display

4. Leave the default setting as 3 for the Dump option. The header and entire entry are required for problem determination.
5. Press Enter to dump all the entries in the LIC log. The Select Tape File display appears as shown in Figure 252 on page 246.

Select Tape File

Type choices, press Enter.

Volume ID . . . . .

ITS0001

File . . . . .

LICLOG01

Sequence number . . . . .

0000

0000-9999

Check for active files . . . . .

1

1=Yes, 2=No

F3=Exit

F12=Cancel

Figure 252. Select Tape File display

6. Type the Volume ID (identifier), and press Enter. The Dump Entries from Licensed Internal Code Log Warning display appears as shown in Figure 253.

Dump Entries from Licensed Internal Code Log Warning

Warning: Do not remove the media from the device until the Service Function is ended or until you are prompted to remove it.

Press Enter to continue.

F3=Exit

F12=Cancel

Figure 253. Dump Entries from Licensed Internal Code Log Warning display

7. Press Enter to proceed. The Select Tape Unit display appears as shown in Figure 254.

Select Tape Unit

Type choice, press Enter.

Tape unit . . . . . **TAP01**      Name, F4 for list

F3=Exit      F4=Prompt      F12=Cancel

Figure 254. Select Tape Unit display

8. Insert a removable media onto a tape unit, and set it to *Ready* status.
9. Type the tape unit identifier (example, TAP01), and press Enter.
10. The dumping proceeds. Then, you are brought back to the Dump Entries to Tape from Licensed Internal Code Log display (refer to Figure 251 on page 245). The `nnn is the tape dump request identifier` message appears at the bottom of the display.
11. Press F3 to return to the Licensed Internal Code Log menu (refer to Figure 250 on page 245).

**Note**

Do not exit the Licensed Internal Code Log menu at this time. This will cause the dump request to be terminated.

12. Type option 7 (Display the status of the Licensed Internal Code log) to check the status of your dump request. Press Enter. The display shown in Figure 255 on page 248 appears.

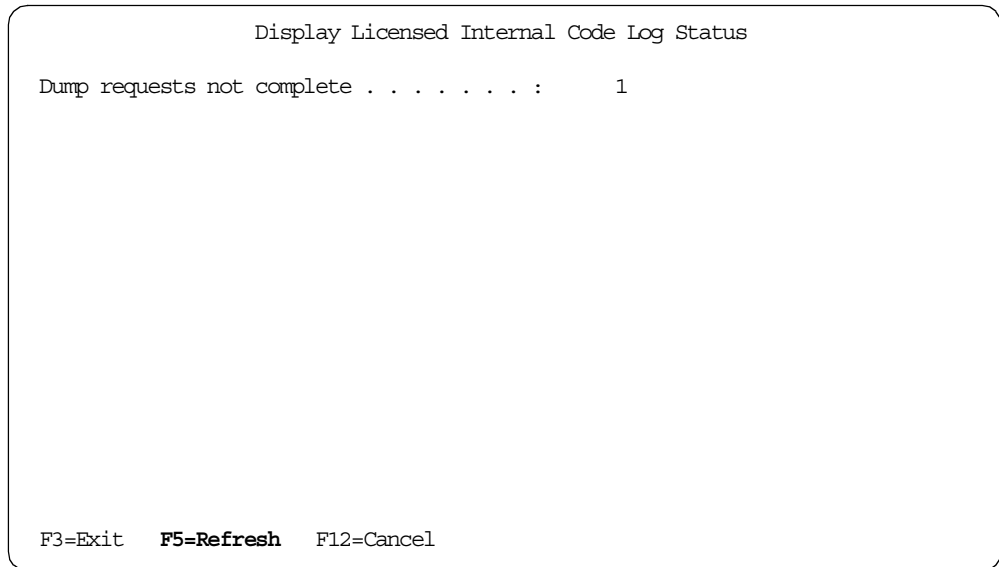


Figure 255. Display Licensed Internal Code Log Status display

13. Press F5 (Refresh) to refresh occasionally, and wait until the message 1 Tape request has completed normally appears.

14. Press F3 twice to exit from the service tool.

15. If you are using:

- SST, press the Enter key to exit SST.
- DST, select the **Exit Dedicated Service Tools (DST)** option from the Exit Dedicated Service Tools menu, and press the Enter key to exit DST.

This ends the procedure to dump all LIC log entries to a removable media using SST or DST.

---

## 18.5 Restoring the LIC log tape to another system using SST

This section outlines the steps to restore the LIC log entries saved in the previous section.

### Note

The final output of this procedure is a spooled file with tens of thousands of pages. Therefore, ensure that you are restoring to a system that has sufficient storage.

Complete these steps:

1. If you are at the Start a Service Tool menu, continue with the next step. Otherwise, go to 19.3.1, "Starting a Service Tool" on page 254. Then, return here to continue.
2. Type option 4 (Display/Alter/Dump) from the Start a Service Tool menu. Press Enter. A menu appears like the example shown in Figure 256.



```

 Display/Alter/Dump Output Device

Select one of the following:

 1. Display/Alter storage
 2. Dump to printer
 3. Dump to diskette
 4. Dump to tape
 5. Print diskette dump file
 6. Print tape dump file
 7. Display dump status

Selection
 6

F3=Exit F12=Cancel

```

Figure 256. Display/Alter/Dump Output Device menu

3. Type option 6 (Print tape dump file). Press Enter. The Print Tape File display appears as shown in Figure 257.

```

 Print Tape File

Type choices, press Enter.

Partial print page numbers:
 From page 1 1-2147483647
 Through page 2147483647 1-2147483647

Volume ID ITSO0001

File LICLOG01

Sequence number 0000 0000-9999

F3=Exit F12=Cancel

```

Figure 257. Print Tape File display

4. Type 2147483547 for the Through page option since you do not know how many pages this LIC log tape produce. Type the Volume ID (identifier) and the File name of the tape in the respective fields.

**Tip**

If you do not know the volume identifier and the file name of the tape, use the following command to find out:

```
DSPTAP DEV(TAP01) DATA(*LABELS)
```

Here, *TAP01* is the name of the tape device.

5. Press Enter to proceed. The Select Tape Unit display appears as shown in Figure 258.

Select Tape Unit

Type choice, press Enter.

Tape unit . . . . . **TAP01**      Name, F4 for list

F3=Exit      F4=Prompt      F12=Cancel

Figure 258. Select Tape Unit display

6. Insert the LIC log tape on to the tape unit, and set it to *Ready* status.
7. Type the tape unit identifier for the Tape unit prompt (for example, TAP01). Press Enter to continue.
8. The restoring process starts. Then, you are brought back to the Print Tape File menu (refer to Figure 257 on page 249). The *Print of tape file successfully submitted* message appears at the bottom of the display.
9. Press F3 (Exit) to return to the Display/Alter/Dump Output Device menu (refer to Figure 256 on page 249).

**Note**

*Do not* exit the Display/Alter/Dump Output Device menu at this time. This will cause the dump request to terminate.

10. Enter option 7 (Display dump status) to check the status of your dump request. Press Enter. A display appears like the one in Figure 259.

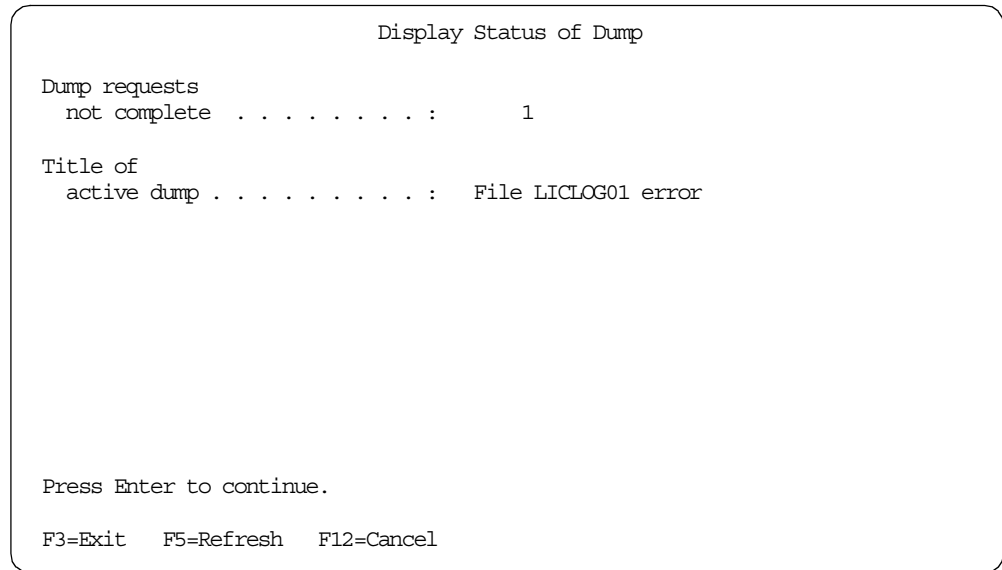


Figure 259. Display Status of Dump

11. Press F5 to refresh the display occasionally and wait for the Dump completed normally - File LICLOG01 Vol IBMIRD message to appear.
12. Press F3 three times to exit from the service tool.
13. Press Enter when prompted to exit SST.
14. Enter the `WRKSPLF` command to locate your printout with the file name QPCSMPT.

This ends the procedure to restore the LIC log tape to another system using SST.



---

## Chapter 19. Using System Service Tools (SST)

This chapter describes how to use System Service Tools (SST). You can use SST while running application programs. However, only one person can use certain options in SST at a time. System Service Tools (SST) is a subset of functions that are available under Dedicated Service Tools (DST). Use Dedicated Service Tools (DST) when SST is not available. See Chapter 20, "Using Dedicated Service Tools (DST)" on page 259, for information about DST.

---

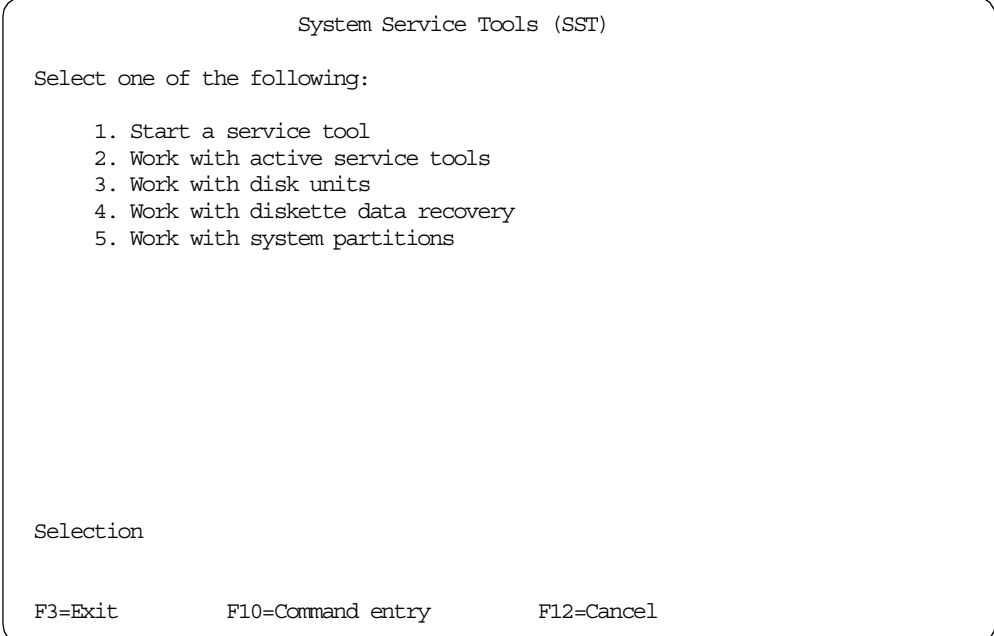
### 19.1 Getting started

The use of SST is managed through OS/400 security. Specify \*SERVICE authority in the special authority (SPCAUT) parameter of the user profile to use SST. Contact the security officer or system administrator to obtain proper authority to use SST.

---

### 19.2 Accessing SST

To access SST, enter STRSST on a command line. A menu appears like the one shown in Figure 260.



```
System Service Tools (SST)

Select one of the following:

1. Start a service tool
2. Work with active service tools
3. Work with disk units
4. Work with diskette data recovery
5. Work with system partitions

Selection

F3=Exit F10=Command entry F12=Cancel
```

Figure 260. System Service Tools (SST) menu

Continue to the following section to work with a service tool.

---

## 19.3 Working with SST

This section describes the various tasks you can perform when working with SST.

### 19.3.1 Starting a Service Tool

To start a System Service Tool, follow these steps:

1. If you are not at the Start a Service Tool menu for SST, follow the steps in 19.2, “Accessing SST” on page 253. Otherwise, continue with the next step.
2. Select option 1 (Start a service tool) from the SST main menu to display a list of the tools you can use. A menu appears like the example in Figure 261.

Start a Service Tool

Warning: Incorrect use of this service tool can cause damage to data in this system. Contact your service representative for assistance.

Select one of the following:

1. Product activity log
2. Trace Licensed Internal Code
3. Work with communications trace
4. Display/Alter/Dump
5. Licensed Internal Code log
6. Main storage dump manager
7. Hardware service manager

Selection

F3=Exit                  F12=Cancel                  F16=SST menu

Figure 261. Start a Service Tool menu

3. Select a service tool from the list of tools displayed in Figure 261.

**Note:** Options 4 and 7 in Figure 261 are not discussed in the following list. Please contact your IBM Service Provider for instructions and usage of these tools.

If you selected to work with:

- **Product activity logs:** Go to Chapter 21, “Collecting the Product Activity Log” on page 277.
- **Trace Licensed Internal Code:** Go to Chapter 17, “Tracing the Licensed Internal Code (LIC)” on page 227.
- **Work with Communications trace:** Go to Chapter 13, “Collecting a communications trace” on page 177.
- **Licensed Internal Code (LIC) log:** Go to Chapter 18, “Collecting Licensed Internal Code (LIC) logs” on page 239.
- **Input/Output debug utility:** Go to Chapter 16, “Collecting an input/output processor (IOP) dump” on page 213.

**Note:** This option appears on some SST panels depending on your OS/400 release level of the system.

- **Main storage dump manager:** Go to Chapter 10, “Main storage dumps” on page 135.
- **None of these options:** Go to 19.3, “Working with SST” on page 254.

#### 19.3.1.1 Leaving an active SST service tool

To leave an active service tool without leaving SST, press F16 (SST menu) to leave an SST service tool while it is active. Pressing F16 (SST menu) allows you to reach the SST main menu quickly.

##### Note

F16 (SST menu) does not show up on many of the menus for internal service tools. However, it can be entered from all displays. F16 (SST menu) has no other purpose when using service tools.

Go to step 2 in 19.3.1, “Starting a Service Tool” on page 254, to continue working with SST.

#### 19.3.1.2 Returning to an active SST service tool

To return to the active service tool, select option 2 (Work with active service tools) from the SST main menu.

A display appears, as shown in Figure 262, which contains a list of all the active service tools.

| Work with Active Service Tools                            |                            |                    |
|-----------------------------------------------------------|----------------------------|--------------------|
| Type options, press Enter.                                |                            |                    |
| 1=Select service tool                                     |                            | 4=End service tool |
| Option                                                    | Service Tool               | Status             |
|                                                           | Licensed Internal Code log | Active             |
|                                                           | Product activity log       | Active             |
|                                                           | Hardware service manager   | Active             |
| F3=Exit      F5=Refresh      F12=Cancel      F16=SST menu |                            |                    |

Figure 262. Work with Active Service Tools

Type 1 in the Opt column next to the service tool to which you want to return, and press the Enter key. If you were working with:

- **Trace Licensed Internal Code:** Go to Chapter 17, “Tracing the Licensed Internal Code (LIC)” on page 227.
- **Licensed Internal Code (LIC) logs:** Go to Chapter 18, “Collecting Licensed Internal Code (LIC) logs” on page 239.
- **Product activity logs:** Go to Chapter 21, “Collecting the Product Activity Log” on page 277.
- **Communications trace:** Go to Chapter 13, “Collecting a communications trace” on page 177.
- **Input/output debug:** Go to Chapter 16, “Collecting an input/output processor (IOP) dump” on page 213.
- **Main storage dump manager:** Go to Chapter 10, “Main storage dumps” on page 135.

If no service tools are active, a screen is displayed like the example in Figure 263.

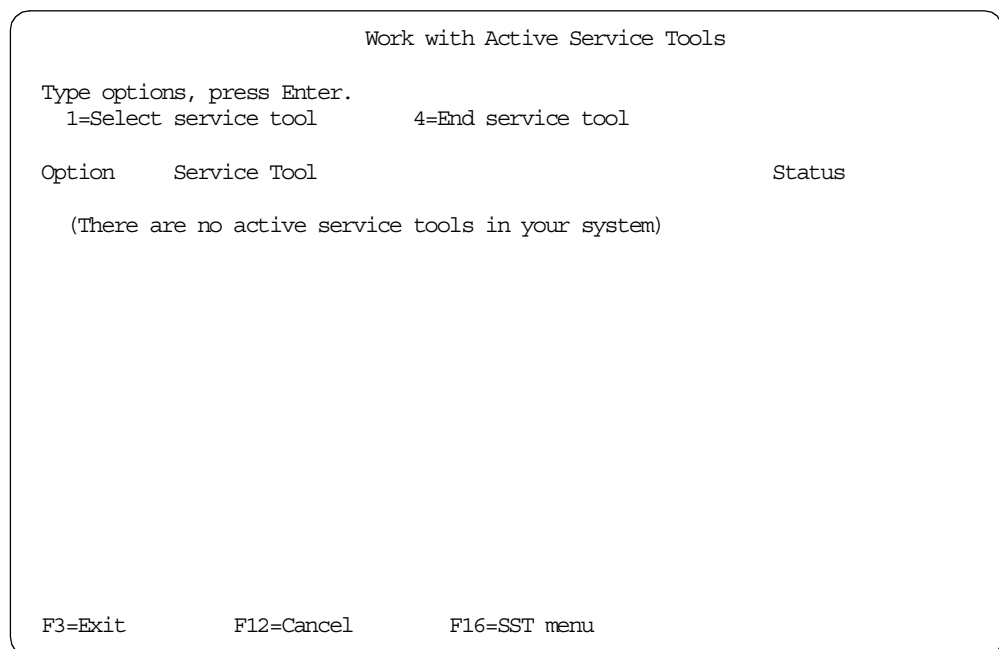


Figure 263. Work with Active Service Tools display

### 19.3.2 Leaving SST to access a command line

To keep any service tool active and, at the same time, run programs or enter commands outside of SST, select one of the following options:

- To use a function key:
  - a. Press F16 (SST menu) to access the SST main menu.
  - b. Press F10 (Command entry). The Command Entry display appears. Use this display to enter commands.
- To use the System Request key:
  - a. Press the System Request key from within any of the System Service Tools.



- b. Select the option to transfer to a secondary job from the System Request menu.
- c. Sign on to another session.

Enter commands and programs on the command line. To return to SST, continue to the following section.

### 19.3.3 Returning to SST

To return to SST after leaving SST, if you used the System Request key to leave SST, complete the following steps. Otherwise, press F3 (Exit) until you return to SST.

1. Press the System Request key.
2. Select the **Transfer to alternative job** option from the System Request menu.

Go to step 2 in 19.3.1, “Starting a Service Tool” on page 254, to continue working with SST.

### 19.3.4 Ending SST

To end SST, press F3 (Exit) or F12 (Cancel) from any menu until the Exit System Service Tools display appears, as shown in Figure 264.

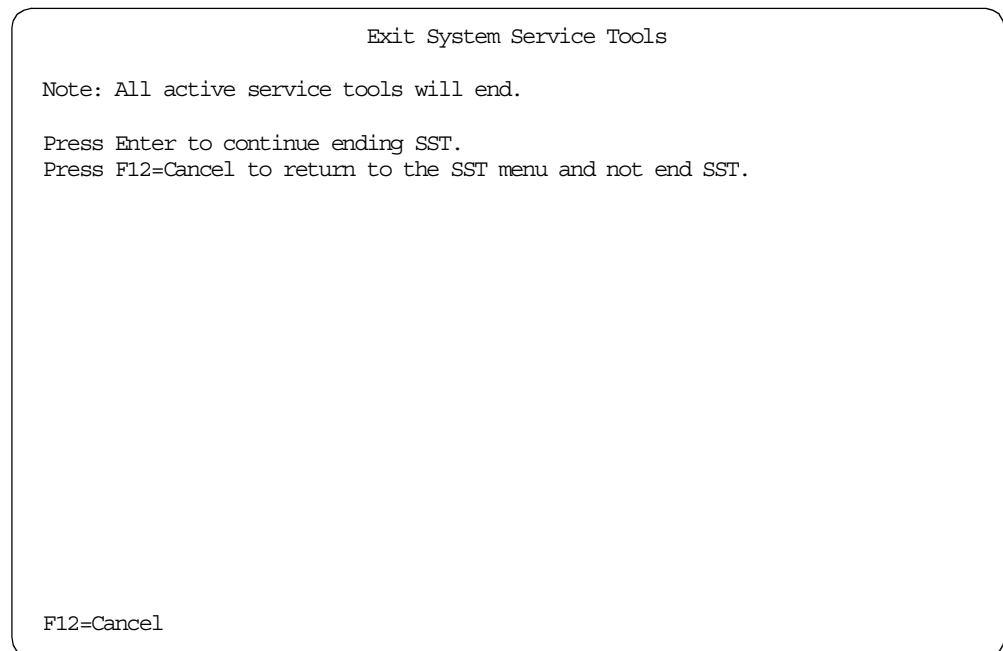


Figure 264. Exit System Service Tools display

Press the Enter key to end all service tools and SST, or press F12 (Cancel) to return to the SST main menu. Go to step 2 in 19.3.1, “Starting a Service Tool” on page 254, to continue working with SST.



---

## Chapter 20. Using Dedicated Service Tools (DST)

This chapter describes how to use the Dedicated Service Tools (DST). You use DST to run one or more Licensed Internal Code (LIC) service tools. DST can be used when System Service Tools (SST) are not available or before the operating system is loaded. See Chapter 19, "Using System Service Tools (SST)" on page 253, for information about SST.

---

### 20.1 Getting started

Before you use DST, verify that you have the following tools:

- A printer is needed by some DST service tools. The printer must be a System Network Architecture (SNA) character string (SCS) data stream printer. Intelligent printer data stream (IPDS) and ASCII printers are not supported by DST.
- A tape or diskette unit attached to the system is needed by some service tools.
- A tape that is free of defects, a new tape volume, or any previously initialized tape.
- A valid password to sign on to DST. You must have DST full, or security authority to work with the Licensed Internal Code (LIC) log or perform an IPL in debug mode. If you do not already have this authority, contact your security officer or system administrator.

You can find further details on security in *OS/400 Security - Reference*, SC41-5302.

#### Note

DST passwords are not related to the operating system passwords.

To access DST, follow this process:

1. When the system is powered down, complete the steps in the following section.
2. During an attended IPL, complete the steps in 20.1.2, "Bringing up DST during an attended IPL" on page 262.
3. Go to 20.2.1, "Bringing up DST using Function 21 on the control panel" on page 265. Press F21 to access DST during an IPL and after the operating system is loaded.

To begin using DST, follow the process described in the next section.

#### 20.1.1 Bringing up DST when the system is powered down

A keystick gives the operator security control over the control panel functions and control over data that is accessible from the control panel. The keystick for the electronic keylock activates the Mode-selection button.

1. Does the control panel have an electronic keylock (a keystick)?  
No

The IPL mode (M or N only) is displayed. Follow the procedures for Function 01 and 02 for system types that do not use a keystick.

If yes, proceed to step 2.

2. Insert the keystick.

Press the Mode-selection button to select the IPL mode. Follow the procedures for Function 01 and 02 for systems with an electronic keystick.

To select a function number, press the up arrow key or the down arrow key on the control panel. To activate the function, press Enter on the control panel while the desired function number is displayed.

The function that is displayed is not activated until you press Enter on the control panel.

**Note**

You can find details on performing functions on the control panel in *Service Functions*, SY44-5902.

Once the correct functions have been executed as explained in *Service Functions*, SY44-5902, a menu appears like the one shown in Figure 265.

IPL or Install the System

Select one of the following:

1. Perform an IPL

2. Install the operating system

3. **Use Dedicated Service Tools (DST)**

4. Perform automatic install of the operating system

5. Save licensed internal code

Selection

—

Licensed Internal Code is subject to the license  
granted in the Agreement for Purchase of IBM machines.

(C) COPYRIGHT IBM CORP. 1980,1992.

Figure 265. IPL or Install the System menu

Select option 3 (Use Dedicated Service Tools (DST)) from the IPL or Install the System menu to use DST. The display shown in Figure 266 appears.

```
Dedicated Service Tools (DST) Sign On

Type choice, press Enter.

DST user _____
DST password _____

F3=Exit F12=Cancel
```

Figure 266. Dedicated Service Tools (DST) Sign On display

Enter the DST user and password. Then press the Enter key. A menu appears like the one shown in Figure 267.

```
Use Dedicated Service Tools (DST)

Select one of the following:

1. Perform an IPL
2. Install the operating system
3. Work with Licensed Internal Code
4. Work with disk units
5. Work with DST environment
6. Select DST console mode
7. Start a service tool
8. Perform automatic install for operating system
9. Work with save storage and restore storage
10. Work with remote service support
11. Work with system partitions

Selection
—

F3=Exit F12=Cancel
```

Figure 267. Use Dedicated Service Tools menu

### Notes

- The Licensed Internal Code log and the Trace Licensed Internal Code options have limited functions. The main storage dump cannot be printed until you perform an IPL past storage management recovery. The size of the Product Activity Log is set automatically by default. However, it can also be set manually. All the tools and functions are available after you perform an IPL past the storage management recovery. The limits do not apply.
- If you need to copy a main storage dump to tape, follow the steps described in Chapter 10, “Main storage dumps” on page 135.

Go to 20.3, “Working with DST” on page 267, to use DST without the previously described limitations.

### 20.1.2 Bringing up DST during an attended IPL

Complete the following steps when the system is operating to perform an attended IPL and bring up DST:

1. Enter the following command to change the system value QIPLTYPE to “1” to perform an attended IPL using DST:

```
CHGSYSVAL SYSVAL(QIPLTYPE) VALUE('1')
```

2. Enter the following command to power down the system:

```
PWRDWN SYS OPTION(*IMMED) RESTART(*YES)
```

The system powers down and starts the IPL. The menu shown in Figure 268 appears.

IPL or Install the System

Select one of the following:

1. Perform an IPL

2. Install the operating system

3. Use Dedicated Service Tools (DST)

4. Perform automatic install of the operating system

5. Save licensed internal code

Selection

—

Licensed Internal Code - Property of IBM 5769-999 Licensed Internal Code (c) Copyright IBM Corp. 1980.1999. All rights reserved.US Government Users Restricted Rights - Use duplication or disclosure restricted by GSA ADP schedule Contract with IBM Corp.

Figure 268. IPL or Install the System menu

Continue with the process that is explained in 20.1.1, “Bringing up DST when the system is powered down” on page 259.

## 20.2 Keeping DST active during an IPL or performing an IPL in debug mode

Complete the following tasks to continue using DST service tools during an IPL or to perform an IPL in debug mode:

1. If you are not at the Use Dedicated Service Tools (DST) menu, follow the steps in 20.1.1, “Bringing up DST when the system is powered down” on page 259, or 20.1.2, “Bringing up DST during an attended IPL” on page 262.
2. Select option 6 (Select DST console mode) from the Use DST menu. A menu appears like the example shown in Figure 269.

```

Select DST Console Mode

Warning: Incorrect use of DST debug mode can cause damage to
data in this system. Contact your service representative
for assistance.

Select one of the following:

1. Exit Dedicated Service Tools (DST) on IPL
2. Start DST debug mode on IPL

Selection
—
F3=Exit F12=Cancel

```

Figure 269. Select DST Console Mode menu

3. Enter option 2 (Start DST debug mode on IPL) from the Select DST Console Mode menu. A menu appears like the example shown in Figure 270 on page 264.

Use Dedicated Service Tools (DST)

Select one of the following:

1. **Perform an IPL**
2. Install the operating system
3. Work with Licensed Internal Code
4. Work with disk units
5. Work with DST environment
6. Select DST console mode
7. Start a service tool
8. Perform automatic install for operating system
9. Work with save storage and restore storage
10. Work with remote service support
11. Work with system partitions

Selection

1

F3=Exit                      F12=Cancel

Figure 270. Use Dedicated Service Tools (DST) menu

4. Enter option 1 (Perform an IPL) from the Use Dedicated Service Tools (DST) menu. A menu appears like the example in Figure 271.

Select Type of IPL

Select one of the following:

1. **Normal IPL**
2. **Step mode IPL**

Selection

—

Figure 271. Select Type of IPL

5. Select option 2 (Step-mode IPL) from the Select Type of IPL menu to stop at each of the IPL steps. Otherwise, if you do not want to use a DST service tool during the IPL, select option 1 (Normal IPL).



#### Notes

- You can press F16 to access the Use Dedicated Service Tools (DST) menu after you select either option. However, if you want to use a DST service tool during an IPL, select option 2 (Step-mode IPL).
- If you press F16 (DST menu) while performing an IPL, the Use Dedicated Service Tools (DST) menu appears after the “Start the operating system” step of the IPL. Select option 6 (Select DST console mode) to access the Sign On display. If you do not press F16 (DST menu) during the IPL, the Sign On display for the operating system appears.

Continue with the steps in 20.3.1, “Starting a DST service tool” on page 267, to use Dedicated Service Tools.

### 20.2.1 Bringing up DST using Function 21 on the control panel

If you did not perform an IPL of the system in DST debug mode, the job that is running at the console workstation ends.

Do *not* attempt to start DST using Function 21 on the control panel:

- During an IPL or install, if you do not perform an IPL of the system in DST debug mode, you are forced to IPL or install again. Go to 20.2, “Keeping DST active during an IPL or performing an IPL in debug mode” on page 263, to perform an IPL or install in DST debug mode.
- If the system is in the restricted state, the system powers down. After the system powers down, perform an IPL.

To check whether the system is in the restricted state, follow these steps:

1. Enter the `WRKSBS` command.
2. Verify the status of the controlling subsystem (press F11 key). The system is in the restricted state if the status of the controlling subsystem is `*RSTD`.

Details on performing functions on the control panel are detailed in *Service Functions*, SY44-5902.

### Notes

- If you used Function 21 on the control panel to start DST and the primary console is powered off or not usable, one of the following reference codes appears on the control panel:

#### Reference

| code | Appears when the primary console is: |
|------|--------------------------------------|
| 5003 | An ASCII workstation                 |
| 5004 | A twinaxial workstation              |
| 5005 | A PC workstation                     |
| 5007 | A PC workstation                     |

If the alternate console is available, enter Function 21 on the control panel to use the alternate console.

- If you did not perform an IPL of the system using DST debug mode, the job that is running at the console is ended when you bring up DST.

If you did not perform an IPL of the system using the DST debug mode, a display appears like the example shown in Figure 272.

Otherwise, the Use Dedicated Service Tools (DST) menu appears. If the Use Dedicated Service Tools (DST) menu appears, follow the steps in 20.3.1, “Starting a DST service tool”.

Dedicated Service Tools (DST) Sign On

Type choice, press Enter.

DST user . . . . . \_\_\_\_\_

DST password . . . . . \_\_\_\_\_

F3=Exit    F12=Cancel

Figure 272. Dedicated Service Tools (DST) Sign On

Enter the DST user and password. Then press Enter. A menu appears as shown in Figure 273.

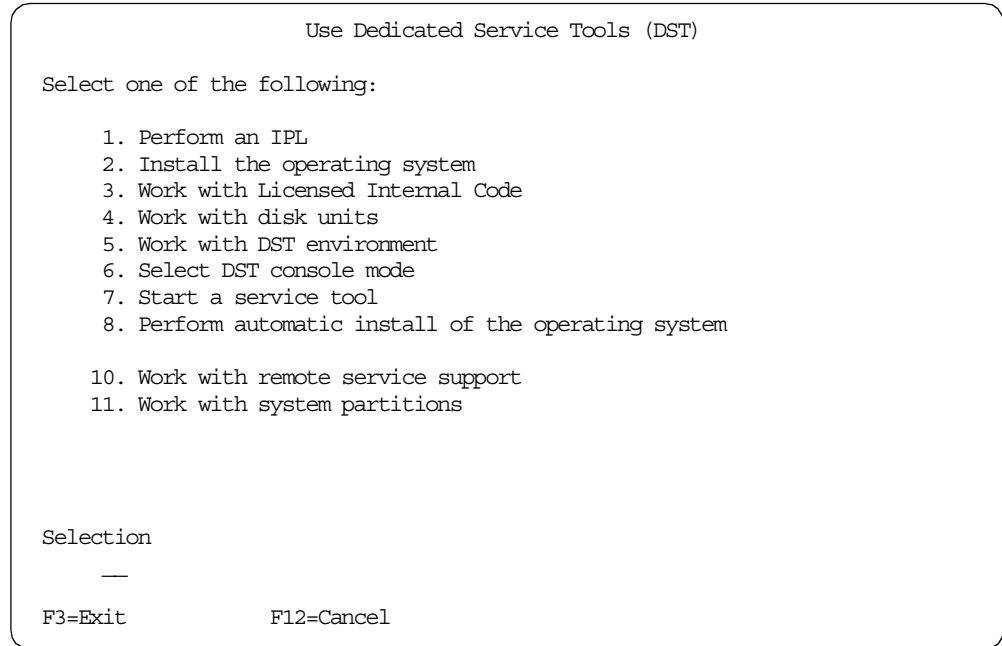


Figure 273. Use Dedicated Service Tools (DST) menu

Continue the process by following the steps in 20.3.1, “Starting a DST service tool”.

---

## 20.3 Working with DST

This section describes the various tasks you can perform when working with DST.

### 20.3.1 Starting a DST service tool

To start a DST, follow these steps:

1. If DST is not active or you are not at the Use Dedicated Service Tools (DST) menu, follow the steps in 20.1, “Getting started” on page 259. Otherwise, continue with the next step.
2. Select option 7 (Start a service tool) from the Use Dedicated Service Tools (DST) menu. A menu appears like the one shown in Figure 274 on page 268.

Start a Service Tool

Warning: Incorrect use of this service tool can cause damage to data in this system. Contact your service representative for assistance.

Select one of the following:

1. Display/Alter/Dump
2. Licensed Internal Code log
3. Trace Licensed Internal Code
4. Hardware Service Manager
5. Main Storage Dump Manger
6. Product Activity Log
7. Operator Panel Functions
8. Performance Data Collection

Selection

—

F3=Exit                      F12=Cancel

Figure 274. Start a Service Tool menu

**Note**

If any service tool is active, you return to the display from where F16 (DST menu) was pressed. This is true for DST only.

3. Select a service tool from the list of tools displayed in Figure 274.

**Note:** Options 1, 4, 7, and 8 shown in Figure 274 are not described in this redbook because they are more advanced tools. Please contact your IBM Service Provider for instructions on usage of these tools.

If you selected to work with:

- **Licensed Internal Code (LIC) logs:** Go to Chapter 18, “Collecting Licensed Internal Code (LIC) logs” on page 239.
  - **Trace Licensed Internal Code:** Go to Chapter 17, “Tracing the Licensed Internal Code (LIC)” on page 227.
  - **Input/output debug utility:** Go to Chapter 16, “Collecting an input/output processor (IOP) dump” on page 213.
- Note:** This option appears on some DST panels depending on the OS/400 release level of the system.
- **Main Storage Dump Manager:** Go to Chapter 10, “Main storage dumps” on page 135.
  - **Product Activity Log (PAL):** Go to Chapter 21, “Collecting the Product Activity Log” on page 277.
  - **None of these options:** Go to 20.3, “Working with DST” on page 267.

### 20.3.1.1 Temporarily leaving an active DST service tool

To temporarily leave an active DST service tool, press F16 (DST menu) to use another service tool or to temporarily leave DST. When you press F16 (DST menu), you go to the Use DST menu quickly while using a DST service tool.

#### Notes

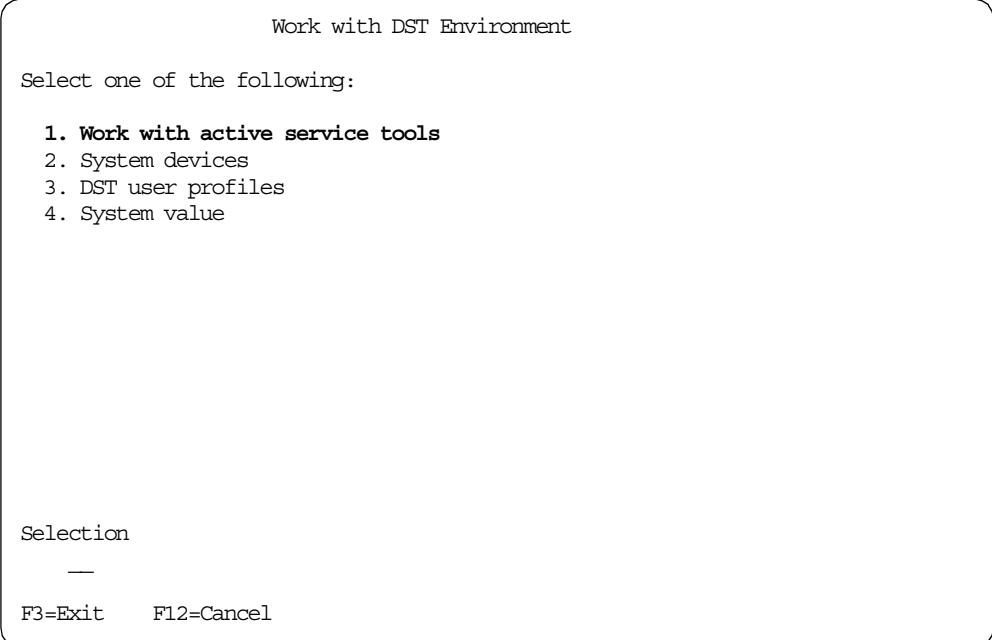
- The service tool you left is still active.
- You can press F16 from any DST service tool menu even though F16 (DST menu) may not appear on the menu. F16 (DST menu) has no other purpose when using DST service tools.

Go to 20.3.1, “Starting a DST service tool” on page 267, to continue working with DST.

### 20.3.1.2 Returning to an active DST service tool

To return to an active DST service tool, follow these steps:

1. Select option 5 (Work with DST environment) from the Use Dedicated Service Tools (DST) menu. A menu appears like the one shown in Figure 275.



```
Work with DST Environment

Select one of the following:

1. Work with active service tools
2. System devices
3. DST user profiles
4. System value

Selection
—
F3=Exit F12=Cancel
```

Figure 275. Work with DST Environment

2. Select option 1 (Work with active service tools) from the Work with DST Environment display. A display appears like the one shown in Figure 276 on page 270.

Work with Active Service Tools

Type option, press Enter.  
4=End service tool    5=Display

| Option | Service Tool                | Status |
|--------|-----------------------------|--------|
| —      | IPL service function        | Active |
| —      | Licensed Internal Code Log  | Active |
| —      | Display/Alter/Dump          | Active |
| —      | Performance Data Collection | Active |

Bottom

F3=Exit    F12=Cancel

Figure 276. Work with Active Service Tools

3. Type option 5 in the Option column next to the service tool with which you want to continue working. For example, if you want to continue performing the IPL, type 5 next to IPL service function. The display where F16 (DST menu) was pressed appears. If you were working with:

- **Trace Licensed Internal Code:** Go to Chapter 17, “Tracing the Licensed Internal Code (LIC)” on page 227.
- **Licensed Internal Code (LIC) logs:** Go to Chapter 18, “Collecting Licensed Internal Code (LIC) logs” on page 239.
- **Product Activity Logs (PAL):** Go to Chapter 21, “Collecting the Product Activity Log” on page 277.
- **Input/output debug utility:** Go to Chapter 16, “Collecting an input/output processor (IOP) dump” on page 213.
- **Main Storage Dump Manager:** Go to Chapter 10, “Main storage dumps” on page 135.

### 20.3.2 Temporarily leaving DST to access the operating system

To temporarily leave DST to go to the operating system while in DST, press F16 (DST menu). The Use Dedicated Service Tools (DST) menu appears.

Select option 6 (Select DST console mode) from the Use Dedicated Service Tools (DST) menu only if the system is operating and you have performed an IPL in debug mode.

Continue to the following section when you are ready to return to DST.

### 20.3.3 Returning to DST after temporarily leaving DST

A return to DST is successful only if DST is available. If an option was chosen to exit DST, then DST is not available. To return to the Use Dedicated Service Tools

(DST) menu during an IPL or install if DST was not ended, perform one of the following actions:

- Before the `Start the Operating System` message appears during an IPL, perform one of the following tasks:
  - Press F16 (DST menu) from a service tool to return to the Use DST menu.
  - Use Function 21 on the control panel to switch from the active IPL to the Use Dedicated Service Tools (DST) menu. If you need help, go to 20.2.1, “Bringing up DST using Function 21 on the control panel” on page 265, to bring up DST using Function 21.
- After the `Start the Operating System` message appears during an IPL, choose one of the following tasks:
  - Press F16 (DST menu) from a service tools menu in DST to return to the Use DST menu.
  - Use Function 21 on the control panel to switch from the active IPL to the Use Dedicated Service Tools (DST) menu. If you need help, go to 20.2.1, “Bringing up DST using Function 21 on the control panel” on page 265, to bring up DST using Function 21.
  - Press the System Request key, and type `DST` in *uppercase* letters on the system request line.
- After the operating system is loaded, use Function 21 on the control panel to bring up DST. If you need help, go to 20.2.1, “Bringing up DST using Function 21 on the control panel” on page 265.

Press the System Request key, and type `DST` in *uppercase* letters on the system request line. This is for *SSP only* systems. A display appears as shown in the example in Figure 277.

```

Command Entry
System: ITSOSYS1
Type command, press Enter.
> WRKJOB
====>

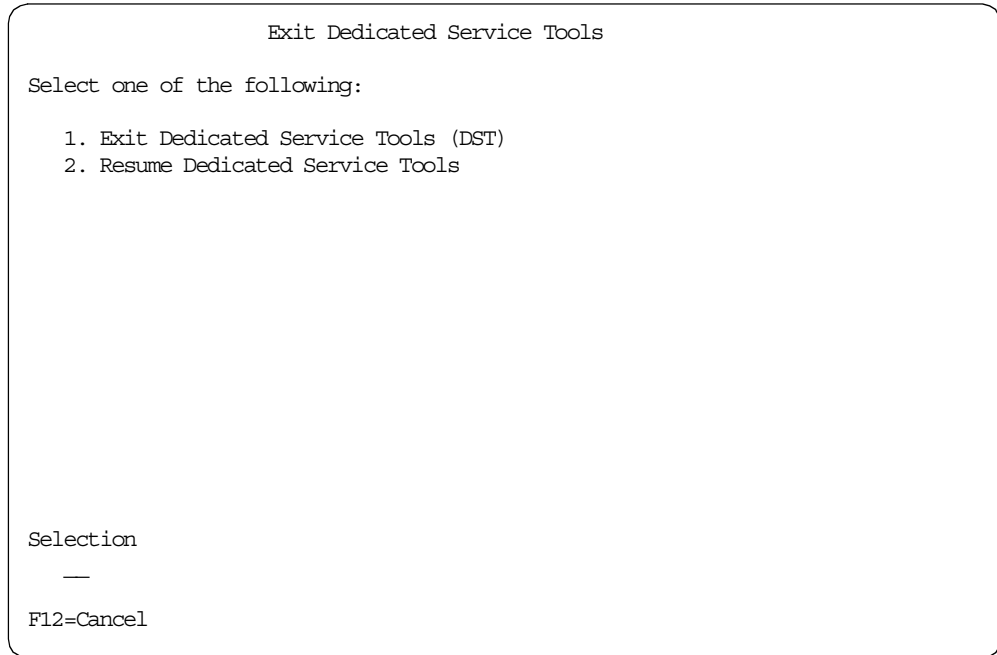
```

Figure 277. Command Entry

Go to 20.3.1, “Starting a DST service tool” on page 267, to continue working with DST.

#### 20.3.4 Ending DST

To end DST, press F3 (Exit) or F12 (Cancel) from any menu until a menu appears like the example shown in Figure 278.



```
Exit Dedicated Service Tools

Select one of the following:

1. Exit Dedicated Service Tools (DST)
2. Resume Dedicated Service Tools

Selection
——
F12=Cancel
```

Figure 278. Exit Dedicated Service Tools

Select option 1 (Exit Dedicated Service Tools (DST)) to exit DST, or select option 2 (Resume Dedicated Service Tools) to resume using DST. If you select option 1, all service tools or functions that started in DST end. If you are resuming DST, go to 20.3.1, “Starting a DST service tool” on page 267.

If you returned to the operating system from DST, enter the following command to vary on the tape unit that was used with DST tools:

```
VRYCFG CFGOBJ(device-name) CFGTYPE(*DEV)
 STATUS(*ON)
```

Replace *device-name* with the name of the tape unit.

---

## 20.4 Handling device intervention or tape error problems in DST

A device intervention or tape error can occur while you try to dump data to tape. When this occurs, a message appears at the bottom of the display. Most of the errors can be fixed, such as loading or formatting a tape. Others can be ignored, such as the notification that other active files are on the tape. If you need help correcting the tape or tape unit error, contact your service provider.

To handle device intervention or tape error problems in DST, read and interpret the message at the bottom of the display. For example, the Device Intervention display (Figure 279) appears with the `Wrong volume loaded` message.



Device Intervention Required

Volume found . . . . . : IBMIRD  
File found . . . . . :  
Sequence number found. . . . . : 0000

Volume requested . . . . . : MSDTAP  
File requested . . . . . : MSD004  
Sequence number requested. . . . . : 0001

Type choices, press Enter.

New volume name. . . . . MSDTAP \_\_\_\_\_  
New file name. . . . . MSD004 \_\_\_\_\_  
New sequence number. . . . . 0001

Action. . . . .      1=Cancel  
                         2=Ignore  
                         3=Retry  
                         4=Format

F3=Exit    F10=Display details      F12=Cancel  
**Wrong volume loaded.**

Figure 279. Device Intervention Required

The old Volume found IBMIRD and the New volume or file MSD004 do not match.

Select one of the actions to satisfy the condition. For this example, the wrong volume was loaded, so you need to select the Format (4) action, and press the Enter key. The tape is formatted, and the data is copied to tape.

**Note**

Actions appear on the Device Intervention display depending on the tape error. If you select ignore, retry, or format action, the data is copied to tape after the error is fixed or ignored.

If you select the *cancel* action, copying the data ends and must be started again from the beginning. If the *cancel* action is the only action available to select, a critical error occurred. In any case, copying the data to tape stops. If a critical error occurs, complete the following steps:

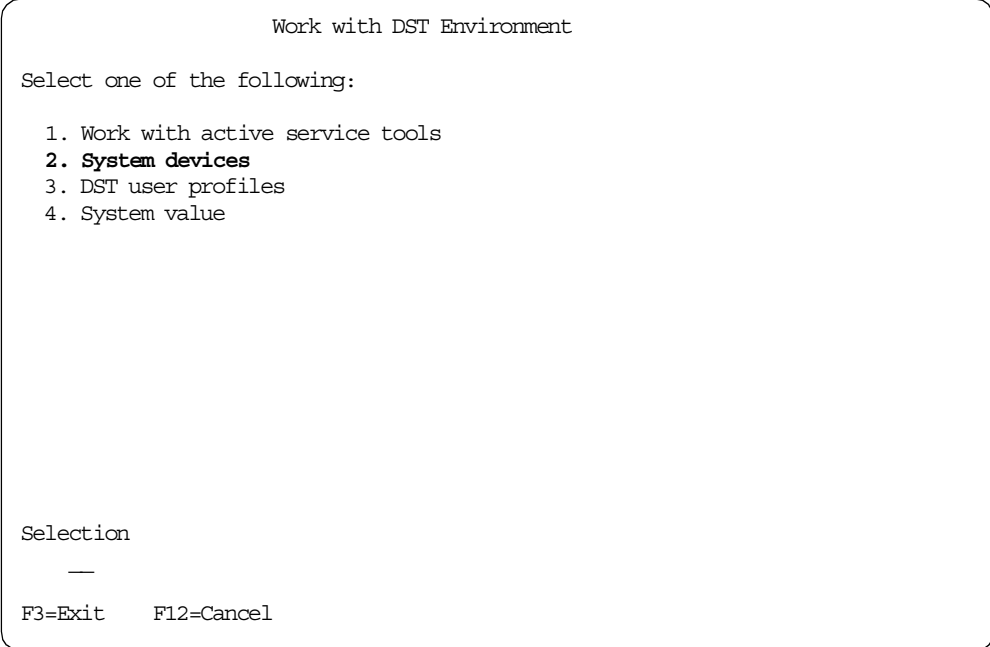
1. If you are on any intervention display, press F12 (Cancel) to return to the service tool with which you are working.
2. Correct the tape problem, for example, by replacing the tape. Or, go to 20.4.1, “Handling tape unit problems” on page 274, to select a new tape device.
3. After the error is corrected, start copying the data again beginning with the first tape. Select the option for copying the data to tape from the service tool you are working with, not from the device intervention display.

If another device intervention or tape error occurs, follow the same process that is explained at the beginning of this section. Otherwise, return to the next step in the procedure that sent you to this procedure.

### 20.4.1 Handling tape unit problems

After you select a tape unit in DST, DST uses that tape unit every time you attempt to copy data to tape. If the tape device selected is not usable, complete these steps:

1. Press F3 (Exit) to end the service tool and return to the Use Dedicated Service Tools menu.
2. Select option 5 (Work with DST environment) from the Dedicated Service Tools (DST) menu. A menu appears like the example shown in Figure 280.



```
Work with DST Environment

Select one of the following:

1. Work with active service tools
2. System devices
3. DST user profiles
4. System value

Selection
—

F3=Exit F12=Cancel
```

Figure 280. Work with DST Environment menu

3. Select option 2 (System devices). The menu shown in Figure 281 appears.

Work with System Devices

Select one of the following:

1. Printers

2. **Tape drives**

3. Diskette devices

4. Optical drives

5. Alternate installation device

6. Console mode

Selection \_

F3=Exit

F12=Cancel

Figure 281. Work with System Devices menu

4. Select option 2 (Tape drives), and press Enter. The display shown in Figure 282 appears.

Work with tape devices

Type option, press Enter.

1=Select

2=Deselect

5=Display details

| Option | Resource Name | Type | Model | Serial Number | Selected |
|--------|---------------|------|-------|---------------|----------|
| —      | TAP01         | 63A0 | 001   | 00-1234567    |          |

F3=Exit

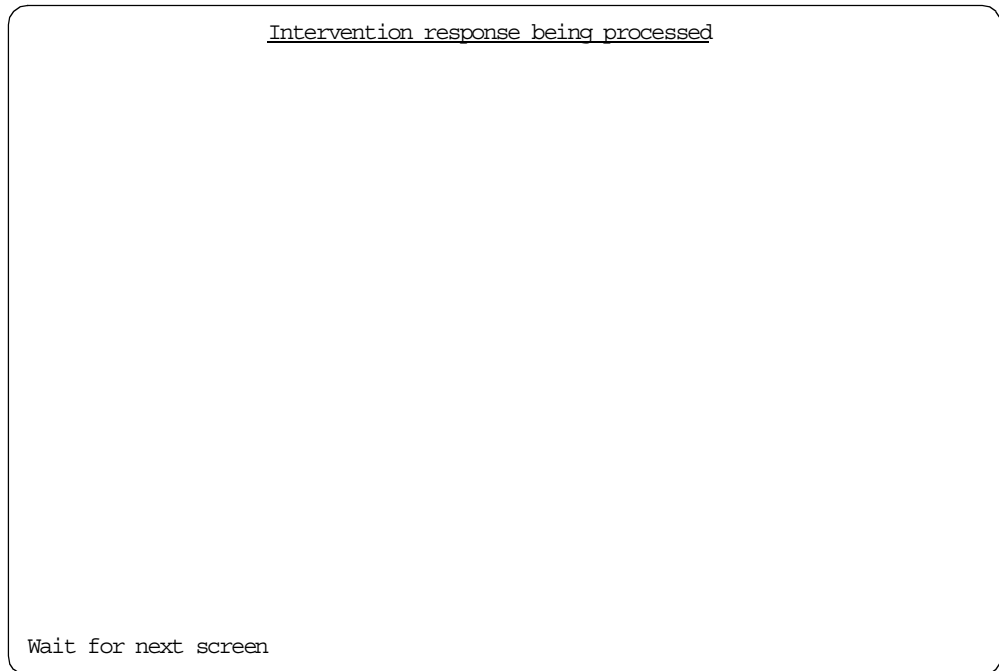
F5=Refresh

F12=Cancel

Figure 282. Selecting a tape or diskette unit

5. Type 1 in the Option column next to the tape unit you want to use. Make sure the tape device is ready.

The screen shown in Figure 283 on page 276 appears.



*Figure 283. Intervention response being processed*

If the tape device is available, the previous screen after a short while returns back to the service tool you originally selected, for example, copying a Main storage dump to a tape device. If the tape device is not available (the `Error no tape available` message appears), it may be that another job is running on the tape drive. In this case, deselect the tape drive to cancel the job. If there is still a problem with the tape device, call your service provider.

---

## Chapter 21. Collecting the Product Activity Log

The Product Activity Log (PAL) or previously known as Error Log is used by the Licensed Internal Code (LIC) to record errors with a processor, workstation, communications, and magnetic media. The Product Activity Log can be useful in determining the cause of intermittent errors. You can use the error log to obtain the history of an error.

Continue with the following section, to collect an error log using SST or DST, or 21.2, "Using PRTERLOG to print the Product Activity Log" on page 279.

If you do not have service authority to use SST or DST, contact the security officer or system administrator. This authority is necessary if you are using SST or DST.

---

### 21.1 Using SST or DST to print the Product Activity Log

This section outlines the steps to print a copy of the Product Activity Log using SST or DST. The steps are as follows:

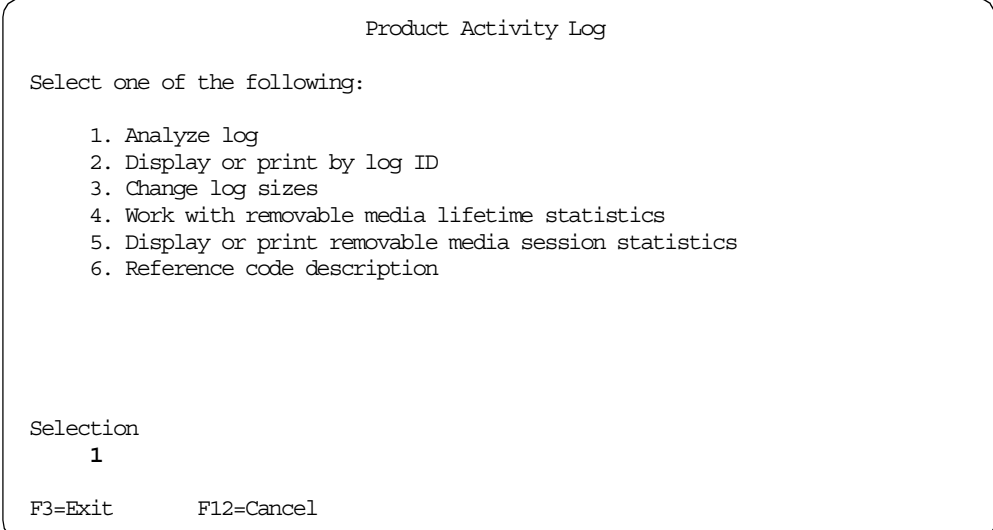
1. If you are at the Start a Service Tool menu, continue with the next step. Otherwise, if you are using:

- SST, go to 19.3.1, "Starting a Service Tool" on page 254.
- DST, go to 20.3.1, "Starting a DST service tool" on page 267.

Then, return here to continue.

2. Select option 1 (Product activity log) from the Start a Service Tool menu:
  - For DST, select option 6.
  - For SST, select option 1.

Press Enter. A display appears like the example shown in Figure 284.



```
Product Activity Log

Select one of the following:

1. Analyze log
2. Display or print by log ID
3. Change log sizes
4. Work with removable media lifetime statistics
5. Display or print removable media session statistics
6. Reference code description

Selection
 1

F3=Exit F12=Cancel
```

Figure 284. Product Activity Log menu

3. Select option 1 (Analyze log). Press Enter.

The Select Subsystem Data display appears as shown in Figure 285.

```

 Select Subsystem Data

Type choices, press Enter.

Log 1 1=All logs
 2=Processor
 3=Magnetic media
 4=Local work station
 5=Communications
 6=Power
 7=Licensed program
 8=Licensed Internal Code

From:
 Date 07/06/99 MM/DD/YY
 Time 09:45:08 HH:MM:SS

To:
 Date 07/07/99 MM/DD/YY
 Time 09:45:08 HH:MM:SS

F3=Exit F5=Refresh F12=Cancel

```

Figure 285. Select Subsystem Data display

4. Enter 1 in the Log prompt to gather all the error information that is in the log. Type the From and To date and time that includes the time at which the error occurred. Otherwise, the date and time defaults to the last 24 hours.
5. Press Enter. The Select Analysis Report Options display appears as shown in Figure 286.

```

 Select Analysis Report Options

Type choices, press Enter.

Report type 3 1=Display analysis, 2=Display summary,
 3=Print options

Optional entries to include:
 Informational Y Y=Yes, N=No
 Statistic N Y=Yes, N=No

Reference code selection:
 Option 1 1=Include, 2=Omit
 Reference codes
 *ALL *ALL...

Device selection:
 Option 1 1=Types, 2=Resource names
 Device types or Resource names
 *ALL *ALL...

F3=Exit F5=Refresh F9=Sort by ... F12=Cancel

```

Figure 286. Select Analysis Report Option display

6. Type 3 in the Report type prompt, and leave the other parameters as the default to print the Product Activity Log report.

7. Press Enter. The Select Options for Printed Report display appears as shown in Figure 287.

Select Options for Printed Report

Type choices, press Enter.

Report type . . . . . 4

1=Print analysis report  
2=Print summary report  
3=Print partial report  
4=Print full report

For report type 4:  
Include hexadecimal  
data . . . . . Y

Y=Yes  
N=No

F3=Exit

F5=Refresh

F12=Cancel

Figure 287. Select Options for Printed Report display

8. Type 4 in the Report type prompt, and type Y (Yes) in the Include hexadecimal data prompt to have the complete report. The hexadecimal data should be included because it provides useful information for problem determination.
9. Press Enter, and the Printing or spooling operation is complete message appears at the bottom of the display.
10. Press F3 three times to exit from the service tool.
11. If you are using:
- SST, press the Enter key to exit SST. Use the `WRKSPLF` command to locate your printout with the file name QPCSMPT.
  - DST, select the **Exit Dedicated Service Tools (DST)** option, and press the Enter key to exit DST. Your printout is sent to the service printer.

This ends the procedure to print a copy of the Product Activity Log using SST or DST.

---

## 21.2 Using PRTERLOG to print the Product Activity Log

This section outlines the steps to print the Product Activity Log using the PRTERLOG command. The steps are outlined here:

1. Type `PRTERLOG` on the command line, and press F4. The display shown in Figure 288 on page 280 appears.

```

Print Error Log (PTERRLOG)

Type choices, press Enter.

Type of log data to list *ALL *ALL, *ALLSUM, *ANZLOG...

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

```

Figure 288. Print Error Log display

2. Press Enter twice for the other parameters to be shown. A display appears like the example shown in Figure 289.

```

Print Error Log (PTERRLOG)

Type choices, press Enter.

Type of log data to list *ALL *ALL, *ALLSUM, *ANZLOG...
Output *PRINT *PRINT, *OUTFILE
Time period for log output:

Beginning time 00:00:00 Time, *AVAIL
Beginning date 07/01/99 Date, *CURRENT

Ending time 23:59:59 Time, *AVAIL
Ending date 07/07/99 Date, *CURRENT
Print format *HEX *CHAR, *HEX

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

```

Figure 289. Print Error Log display with more parameters

3. Type the From and To date and time that includes the time at which the error occurred. Otherwise, the date and time default to the current date.
4. Change the Print format option from \*CHAR to \*HEX to include hexadecimal data in the report.
5. Press Enter. Use the `WRKSPLF` command to locate the QPCSMPT spooled file.

This ends the procedure to print a copy of the Product Activity Log using the `PTERRLOG` command.



---

## Chapter 22. Service Director

The AS/400 Service Director is an IBM Service Value-Add application program offered to customers free of charge. It is available for systems on IBM Warranty or with an IBM Maintenance Service Agreement. The purpose of Service Director is to predict and prevent hardware errors by early detection of potential problems, download fixes, and automatically call IBM Service when needed.

This chapter describes the purpose and importance of using Service Director to maintain system availability.

---

### 22.1 What Service Director can do for you

The Service Director application automatically reports hardware-related problems to IBM for service using the Electronic Customer Support (ECS) link on the AS/400e server. Service Director also performs problem analysis on those hardware problems before you need to call for service.

Service Director aids IBM Service personnel in problem source identification. System and I/O errors are dynamically monitored and analyzed. No further intervention is required. Service Director further simplifies error analysis for some errors once the CE is on site. It provides a list of the most probable parts to be replaced or recommends another plan of action for the problem.

---

### 22.2 Automatic problem analysis

Service Director can perform some automatic problem analysis before it places a hardware service call to IBM. When a system logs a hardware error in the Problem Log, it attempts to process Problem Determination Procedures (PDPs) that exist for that particular system reference code (SRC).

Although Service Director does not complete the PDPs for every SRC on the AS/400e server, it will complete as much as possible in problem diagnosis so that you or the CE will have a better understanding of the problem. This means that when a service call is placed to IBM, the system problem report contains a reduced list of possible replacement parts.

---

### 22.3 Determining whether Service Director is installed on the server

To determine if the Service Director application is on the AS/400e server, display the software resources currently on the system. To do this, type the Display Software Resources (`DSPSFWRSC`) command on a command line, and press Enter. A display appears like the example shown in Figure 290 on page 282.

| Display Software Resources                        |        |         |                                          |
|---------------------------------------------------|--------|---------|------------------------------------------|
| Resource                                          |        |         |                                          |
| ID                                                | Option | Feature | Description                              |
| 5769999                                           | *BASE  | 5050    | AS/400 Licensed Internal Code            |
| 5769SS1                                           | *BASE  | 5050    | Operating System/400                     |
| 5769SS1                                           | *BASE  | 2924    | Operating System/400                     |
| 5769SS1                                           | 1      | 5050    | OS/400 - Extended Base Support           |
| 5769SS1                                           | 1      | 2924    | OS/400 - Extended Base Support           |
| 5769SS1                                           | 2      | 5050    | OS/400 - Online Information              |
| 5769SS1                                           | 2      | 2924    | OS/400 - Online Information              |
| 5769SS1                                           | 3      | 5050    | OS/400 - Extended Base Directory Support |
| 5769SS1                                           | 3      | 2924    | OS/400 - Extended Base Directory Support |
| 5769SS1                                           | 4      | 5050    | OS/400 - S/36 and S/38 Migration         |
| 5769SS1                                           | 4      | 2924    | OS/400 - S/36 and S/38 Migration         |
| 5769SS1                                           | 5      | 5050    | OS/400 - System/36 Environment           |
| 5769SS1                                           | 5      | 2924    | OS/400 - System/36 Environment           |
| 5769SS1                                           | 6      | 5050    | OS/400 - System/38 Environment           |
| More...                                           |        |         |                                          |
| Press Enter to continue.                          |        |         |                                          |
| F3=Exit F11=Display libraries/releases F12=Cancel |        |         |                                          |
| F19=Display trademarks                            |        |         |                                          |

Figure 290. Display Software Resources display

Continue to page down until Resource ID 5798RZG is visible. A display appears like the example in Figure 291.

| Display Software Resources                        |        |         |                                                 |
|---------------------------------------------------|--------|---------|-------------------------------------------------|
| Resource                                          |        |         |                                                 |
| ID                                                | Option | Feature | Description                                     |
| 5769XZ1                                           | *BASE  | 5050    | OS/2 Warp Server for AS400 (WS400)              |
| 5769XZ1                                           | *BASE  | 2924    | OS/2 Warp Server for AS400 (WS400)              |
| 5798RZG                                           | *BASE  | 5050    | AS/400 Service Director                         |
| 5798RZG                                           | *BASE  | 2924    | AS/400 Service Director                         |
| AJDGP01                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJDGP01 9400DGP |
| AJDG301                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJDG301 9400DG3 |
| AJEAA01                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJEAA01 9400EAA |
| AJEAR01                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJEAR01 9400EAR |
| AJEDA00                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJEDA00 9400EDA |
| AJEHL00                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJEHL00 9400EHL |
| AJEMM01                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJEMM01 9400EMM |
| AJENV00                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJENV00 9400ENV |
| AJEPO00                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJEPO00 9400EPO |
| AJEQU00                                           | *BASE  | 5050    | AS/400 Licensed Internal Code - AJEQU00 9400EQU |
| More...                                           |        |         |                                                 |
| Press Enter to continue.                          |        |         |                                                 |
| F3=Exit F11=Display libraries/releases F12=Cancel |        |         |                                                 |
| F19=Display trademarks                            |        |         |                                                 |

Figure 291. Display Software Resources display

To display the release level of the Service Director application, press the F11 key. A display appears like the one shown in Figure 292.

| Display Software Resources |              |             |              |                  |               |     |
|----------------------------|--------------|-------------|--------------|------------------|---------------|-----|
| Resource                   |              |             | Feature      |                  |               |     |
| ID                         | Option       | Feature     | Type         | Library          | Release       |     |
| 5769XZ1                    | *BASE        | 5050        | *CODE        | QXZ1             | V4R1M0        |     |
| 5769XZ1                    | *BASE        | 2924        | *LNG         | QXZ1             | V4R1M0        |     |
| <b>5798RZG</b>             | <b>*BASE</b> | <b>5050</b> | <b>*CODE</b> | <b>QSVCDRCTR</b> | <b>V4R1M0</b> |     |
| 5798RZG                    | *BASE        | 2924        | *LNG         | QSVCDRCTR        | V4R1M0        |     |
| AJDGP01                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJDG301                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJEAA01                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJEAR01                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJEDA00                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJEHL00                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJEMM01                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJENV00                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJEPO00                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |
| AJEQU00                    | *BASE        | 5050        | *CODE        | ##MACH#B         | V4R4M0        | L00 |

More...

Press Enter to continue.

F3=Exit    F11=Display descriptions    F12=Cancel    F19=Display trademarks

Figure 292. Display Software Resources

Alternatively, if you are using Operations Navigator, the display shown in Figure 293 appears.

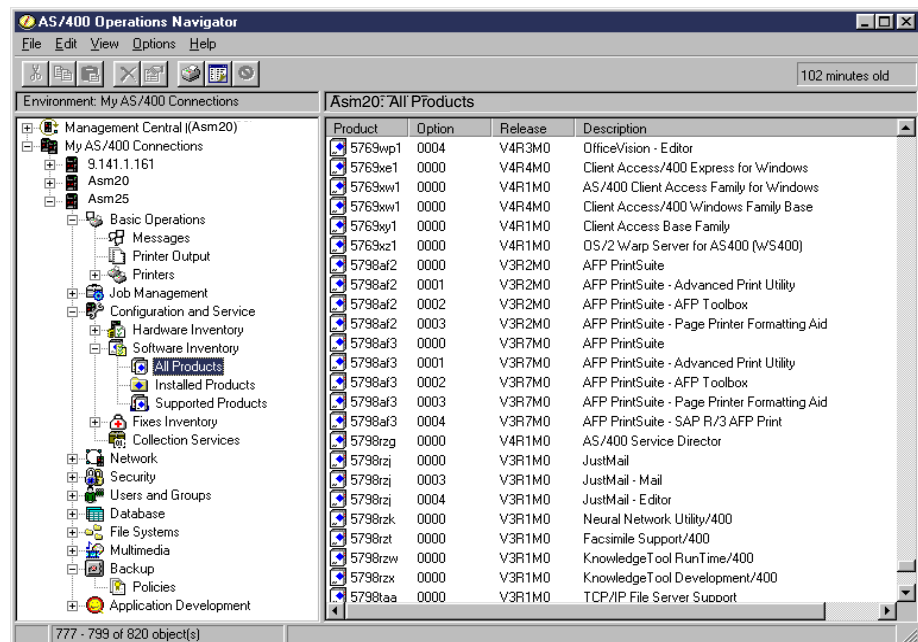


Figure 293. Operations Navigator display

If you do not have the Service Director application installed on the system, contact your service provider to arrange installation.

If Service Director is installed, refer to customer level documentation, form number SA38-0489. For further information on installing or configuring Service Director, visit the Web site at:

<http://publib.boulder.ibm.com:80/cgi-bin/bookmgr/LIBRARY>



---

## Chapter 23. Submitting a problem report

This chapter provides information about how to submit documentation for an authorized program analysis report (APAR) or problem report and how to include with the report the information collected from the chapters in this redbook.

---

### 23.1 Sending the problem report

To send a report, perform these steps:

1. Collect all information obtained from the chapters in this redbook as instructed by the service provider. See the following section for more information about what to include with your report.
2. Label all the material you submit with the problem management reference (PMR) or APAR number recorded.
3. Translate into English any information you submit. For example, translate displays, message, or references to user-created objects.
4. Add the PMR or APAR number to the outside of the package or envelope.
5. Mail the report and all related information and materials to your service provider.
6. After the report is completed, go to 23.4, "Cleaning up the system after collecting the data" on page 307.

---

### 23.2 What to include with the problem report

Include these items with the problem report:

- All the data saved in the APAR library associated with your problem log entry. See 23.2.1, "Saving your APAR library" on page 286.
- A program temporary fix (PTF) listing of all the PTFs on the system. See 23.2.2, "Collecting a list of program temporary fixes (PTFs)" on page 286, for more information about collecting a PTF listing.
- Spooled files collected. See 23.2.3, "Saving spooled files" on page 288.
- A detailed description of the sequence of events that lead up to the problem.
- Clear step-by-step instructions necessary to create the problem again.
- All materials necessary to support the instructions so that each step of the instructions can be followed without any error.
- Libraries of saved data. See 23.2.4, "Saving libraries to tape or diskette" on page 299.
- A list of the files contained on the tape or diskette and what each file contains. See 23.2.5, "Collecting a display of the contents of the tape" on page 300, and 23.2.6.1, "Labeling the tape or diskette" on page 303, for more information about labeling tapes and diskettes.
- System reference code (SRC) data, reported in Appendix A, "Quick reference to data collection commands" on page 309, or Chapter 10, "Main storage dumps" on page 135.

- A list of each item you are submitting with the report and an explanation as to why each item is being submitted.

Work with the service provider to determine whether the information collected for the problem is complete and that the problem report is ready to send.

### 23.2.1 Saving your APAR library

If you saved APAR data from the Save APAR Data display or SAVAPARDTA command described in Chapter 1, “Problem determination overview” on page 3, an APAR library exists. To save the APAR library, see the *Save APAR library* menu option, which is discussed in 7.6, “Using other APAR data options in the problem log” on page 114. If you ran service tools or collected other data to accompany your APAR and did not save the spooled files in the APAR library, return to 23.2, “What to include with the problem report” on page 285.

### 23.2.2 Collecting a list of program temporary fixes (PTFs)

To collect information for program temporary fixes (PTFs) for all licensed programs on the system, follow these steps:

1. If you have not created the library IBMLIB or output queue IBMOUTQ, enter the following commands:

```
CRTLIB LIB (IBMLIB)
CRTOUTQ OUTQ (IBMLIB/IBMOUTQ)
```

2. Enter the following commands to add the library IBMLIB to your library list and to change the output queue for your job to the output queue IBMOUTQ:

```
ADDLIBLE IBMLIB
CHGJOB * OUTQ (IBMLIB/IBMOUTQ)
```

3. Enter the following command to send the QPDSPPC spooled file containing the PTF listing to the IBMOUTQ output queue in the IBMLIB library:

```
OVERPRTF FILE(QPDSPPC) OUTQ (IBMLIB/IBMOUTQ)
```

The printer file overrides are not in effect after the job ends.

4. Enter the following command to create the QPDSPPC spooled file containing the PTF listing:

```
DSPPTF LICPGM(*ALL) SELECT(*ALL)
 OUTPUT(*PRINT)
```

5. Enter the following command to verify that the spooled file QPDSPPC was created successfully:

```
WRKOUTQ OUTQ (IBMLIB/IBMOUTQ)
```

For example, the display shown in Figure 294 appears.

Work with Output Queue

Queue: IBMOUTQ

Library: IBMLIB

Status: RLS

Type options, press Enter.

1=Send 2=Change 3=Hold 4>Delete 5=Display 6=Release 7=Messages

8=Attributes 9=Work with printing status

| Opt | File     | User    | User Data  | Sts | Pages | Copies | Form Type | Pty |
|-----|----------|---------|------------|-----|-------|--------|-----------|-----|
| —   | QPDSPPC  | PHKEMPF |            | RDY | 6     | 1      | *STD      | 5   |
| —   | QPJOBLOG | PHKEMPF | QPADEV0004 | RDY | 3     | 1      | *STD      | 5   |

Bottom

Parameters for options 1, 2, 3 or command

====>

F3=Exit

F11=View 2

F12=Cancel

F22=Printers

F24=More keys

Figure 294. Work with Output Queue display (Part 1 of 2)

- If “More...” appears on the display, page forward to continue searching for the QPDSPPC file.
- Press F11 (View 2) to view the date and time of the QPDSPPC file with which you want to work. The display shown in Figure 295 appears.

Work with Output Queue

Queue: IBMOUTQ

Library: IBMLIB

Status: RLS

Type options, press Enter.

1=Send 2=Change 3=Hold 4>Delete 5=Display 6=Release 7=Messages

8=Attributes 9=Work with printing status

| Opt | File     | File Nbr | Job        | User    | Number | Date     | Time     |
|-----|----------|----------|------------|---------|--------|----------|----------|
| —   | QPDSPPC  | 3        | QPADEV0004 | NISTLER | 002645 | 11/16/99 | 08:33:31 |
| —   | QPJOBLOG | 4        | QPADEV0004 | NISTLER | 002645 | 11/16/99 | 08:36:17 |

Bottom

Parameters for options 1, 2, 3 or command

====>

F3=Exit

F11=View 1

F12=Cancel

F22=Printers

F24=More keys

Figure 295. Work with Output Queue display (Part 2 of 2)

Make sure that the spooled file exists for the time you created it.

- Press F3 (Exit) to return to the Work with Output Queue display.

- Go to 23.2.3, “Saving spooled files” on page 288, to submit the spooled file QPDSPPC containing the PTF listing with the problem report.

### 23.2.3 Saving spooled files

The data collection procedures in this redbook instruct you to move spooled files to the IBMOUTQ output queue. Or you can override the print files using the Override Print File (OVRPRTF) command, which forces the spooled files created for your job to go to the IBMOUTQ output queue in the IBMLIB library.

To save spooled files on the IBMOUTQ output queue to tape, follow these steps:

- If there are spooled files on IBMOUTQ, continue with the next step. Otherwise, go to 23.2, “What to include with the problem report” on page 285.
- Enter the following command to create a physical file:

```
CRTPF FILE (IBMLIB/IBMAPAR) RCDLEN (133)
 SIZE (*NOMAX) MAXMERS (*NOMAX)
```

- Enter the following command to display all the spooled files that were sent to IBMOUTQ:

```
WRKOUTQ OUTQ (IBMLIB/IBMOUTQ)
```

The display shown in Figure 296 appears.

| Work with Output Queue                                   |          |                            |           |             |       |          |           |           |         |           |  |            |  |
|----------------------------------------------------------|----------|----------------------------|-----------|-------------|-------|----------|-----------|-----------|---------|-----------|--|------------|--|
| Queue: IBMOUTQ                                           |          | Library: IBMLIB            |           | Status: RLS |       |          |           |           |         |           |  |            |  |
| Type options, press Enter.                               |          |                            |           |             |       |          |           |           |         |           |  |            |  |
| 1=Send                                                   |          | 2=Change                   |           | 3=Hold      |       | 4=Delete |           | 5=Display |         | 6=Release |  | 7=Messages |  |
| 8=Attributes                                             |          | 9=Work with printer status |           |             |       |          |           |           |         |           |  |            |  |
| Opt                                                      | File     | User                       | User Data | Sts         | Pages | Copies   | Form Type | Pty       |         |           |  |            |  |
| —                                                        | QPCSMPT  | KKRICH                     | KKR6X665  | HLD         | 2346  | 1        | *STD      | 5         |         |           |  |            |  |
| —                                                        | QPTAPDMP | KKRICH                     |           | HLD         | 5     | 1        | *STD      | 5         |         |           |  |            |  |
| —                                                        | QPJOBLOG | KKRICH                     | QJSCCPY   | HLD         | 1     | 1        | *STD      | 5         |         |           |  |            |  |
| 3                                                        | QPJOBLOG | KKRICH                     | DSP11     | SAV         | 2     | 1        | *STD      | 5         |         |           |  |            |  |
| 3                                                        | QPDCLINE | KKRICH                     |           | RDY         | 4     | 1        | *STD      | 5         |         |           |  |            |  |
| —                                                        | QPDCTL   | KKRICH                     |           | HLD         | 3     | 1        | *STD      | 5         |         |           |  |            |  |
| —                                                        | QPDCEV   | KKRICH                     |           | HLD         | 1     | 1        | *STD      | 5         |         |           |  |            |  |
| 3                                                        | QPSRVTRC | KKRICH                     |           | RDY         | 1     | 1        | *STD      | 5         |         |           |  |            |  |
| 3                                                        | QPSRVTRC | KKRICH                     |           | RDY         | 5     | 1        | *STD      | 5         |         |           |  |            |  |
| —                                                        | QPJOBLOG | KKRICH                     | VRTDSP2   | HLD         | 1     | 1        | *STD      | 5         |         |           |  |            |  |
|                                                          |          |                            |           |             |       |          |           |           | More... |           |  |            |  |
| Parameters for options 1, 2, 3 or command                |          |                            |           |             |       |          |           |           |         |           |  |            |  |
| ====>                                                    |          |                            |           |             |       |          |           |           |         |           |  |            |  |
| F3=Exit F11=View 2 F12=Cancel F22=Printers F24=More keys |          |                            |           |             |       |          |           |           |         |           |  |            |  |

Figure 296. Work with Output Queue display (Part 1 of 2)

- Type 3 in the Opt column next to each spooled file that does not have a status (Sts) of HLD (held).
- If “More...” appears on the display, page forward to view more spooled files.
- Press the Enter key. The status in the Sts column should change to \*HLD.
- Check the Pages column to see how many pages the spooled file has.
- Perform one of the following actions:



- If spooled files exist that are about 10 pages or more, continue with the following section to save the spooled files.
- If spooled files exist that are about 10 pages or less, go to 23.2.3.2, “Saving, printing spooled files that are about ten pages or less” on page 293, to print the spooled files.
- If you have been directed by the service provider to print selected pages of a spooled file, go to 23.2.3.3, “Printing selected pages of a large spooled file” on page 293, to print the pages.

### 23.2.3.1 Saving spooled files that are about ten pages or more

If you are at the Work with Output Queue display, continue with the next step. Otherwise, go to 23.2.3, “Saving spooled files” on page 288.

1. Type 8 in the Opt column next to one file you want to save that is about 10 pages or more. For an example, see Figure 297.

Work with Output Queue

Queue: IBMOUTQ      Library: IBMLIB      Status: RLS

Type options, press Enter.

1=Send   2=Change   3=Hold   4=Delete   5=Display   6=Release   7=Messages  
8=Attributes      9=Work with printer status

| Opt | File     | User   | User Data | Sts | Pages | Copies | Form Type | Pty |
|-----|----------|--------|-----------|-----|-------|--------|-----------|-----|
| 8   | QPCSMPT  | KKRICH | KKR6X665  | HLD | 2346  | 1      | *STD      | 5   |
| —   | QPTAPDMP | KKRICH |           | HLD | 5     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | QJSCCPY   | HLD | 1     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | DSP11     | SAV | 2     | 1      | *STD      | 5   |
| —   | QPDCLINE | KKRICH |           | HLD | 4     | 1      | *STD      | 5   |
| —   | QPDCTL   | KKRICH |           | HLD | 3     | 1      | *STD      | 5   |
| —   | QPDCEV   | KKRICH |           | HLD | 1     | 1      | *STD      | 5   |
| —   | QPSRVTRC | KKRICH |           | HLD | 1     | 1      | *STD      | 5   |
| —   | QPSRVTRC | KKRICH |           | HLD | 5     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | VRTDSP2   | HLD | 1     | 1      | *STD      | 5   |

More...

Parameters for options 1, 2, 3 or command  
====>

F3=Exit   F11=View 2   F12=Cancel   F22=Printers   F24=More keys

Figure 297. Work with Output Queue display (Part 2 of 2)

Press the Enter key. The display shown in Figure 298 on page 290 appears.

Work with Spooled File Attributes

|                    |        |                     |         |
|--------------------|--------|---------------------|---------|
| Job . . . . . :    | DSP03  | File . . . . . :    | QPCSMPT |
| User . . . . . :   | KKRICH | File number . . . : | 4       |
| Number . . . . . : | 001941 |                     |         |

|                                      |          |
|--------------------------------------|----------|
| Status . . . . . :                   | HELD     |
| Output queue . . . . . :             | KKRICH   |
| Library . . . . . :                  | KKRICH   |
| Form type . . . . . :                | *STD     |
| Output priority . . . . . :          | 5        |
| Copies left to produce . . . . . :   | 1        |
| Total copies . . . . . :             | 1        |
| Maximum records . . . . . :          | *NOMAX   |
| Number of separators . . . . . :     | 0        |
| File becomes available . . . . . :   | *FILEEND |
| Hold file before written . . . . . : | *YES     |
| Save file after written . . . . . :  | *NO      |
| Device type . . . . . :              | PRINTER  |

More...

Press Enter to continue.

F3=Exit    F5=Refresh    F12=Cancel    F13=Change

Figure 298. Work with Spooled File Attributes display

2. Record the job, user, number, file, and file number from the header of the Work with Spooled File Attributes display as shown in the previous step.
3. Press F12 to return to the Work with Output Queue display.
4. Type CPYSPLF on a command line.
5. Press F4 (Prompt). The display shown in Figure 299 appears.

Copy Spooled File (CPYSPLF)

Type choices, press Enter.

|                                    |                 |                      |
|------------------------------------|-----------------|----------------------|
| Spooled file . . . . . >           | _____           | NAME                 |
| To data base file . . . . . >      | _____           | NAME                 |
| Library . . . . . >                | <b>*LIBL</b>    | NAME, *LIBL, *CURLIB |
| Job name . . . . . >               | *               | NAME, *              |
| User . . . . . >                   | _____           | NAME                 |
| Number . . . . . >                 | _____           | 000000-999999        |
| Spooled file number . . . . . >    | <b>*ONLY</b>    | 1-9999, *ONLY, *LAST |
| To member . . . . . >              | <b>*FIRST</b>   | NAME, *FIRST         |
| Replace or add records . . . . . > | <b>*REPLACE</b> | *REPLACE, *ADD       |

More...

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

Figure 299. Copy Spooled File display (Part 1 of 2)

6. Type in the information you recorded from the Work with Spooled File Attributes display. In this example, the spooled file is QPCSMPT, the job name is DSP03, the user is KKRICH, and the number is 001941.
7. Type **IBMAPAR** in the To data base file prompt.
8. Change **\*LIBL** in the Library prompt to **IBMLIB**.
9. Change **\*ONLY** in the Spooled file number prompt to the file number found in the Work with Spooled File Attributes display. In this example, the spooled file number is 4.
10. Change **\*FIRST** in the To member prompt to a name that describes the spooled file, such as: **DUMP1**, **QHST**, and so on.
11. Press **F10** to display additional parameters. Your display should look like the example shown in Figure 300.

Copy Spooled File (CPYSPLF)

Type choices, press Enter.

|                                  |                   |                      |
|----------------------------------|-------------------|----------------------|
| Spooled file . . . . .           | > <b>QPCSMPT</b>  | NAME                 |
| To data base file . . . . .      | > <b>IBMAPAR</b>  | NAME                 |
| Library . . . . .                | > <b>IBMLIB</b>   | NAME, *LIBL, *CURLIB |
| Job name . . . . .               | > <b>DSP03</b>    | NAME, *              |
| User . . . . .                   | > <b>KKRICH</b>   | NAME                 |
| Number . . . . .                 | > <b>001941</b>   | 000000-999999        |
| Spooled file number . . . . .    | > <b>4</b>        | 1-9999, *ONLY, *LAST |
| To member . . . . .              | > <b>DUMP1</b>    | NAME, *FIRST         |
| Replace or add records . . . . . | > <b>*REPLACE</b> | *REPLACE, *ADD       |

Additional Parameters

|                             |                |                          |
|-----------------------------|----------------|--------------------------|
| Control character . . . . . | > <b>*FCFC</b> | *NONE, *FCFC, *PRTCTL... |
|-----------------------------|----------------|--------------------------|

More...

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

Figure 300. Copy Spooled File display (Part 2 of 2)

12. Type **\*FCFC** in the Control character prompt.
13. Press the Enter key. For example, the display shown in Figure 301 on page 292 appears.

```

Work with Output Queue

Queue: IBMOUTQ Library: IBMLIB Status: RLS

Type options, press Enter.
 1=Send 2=Change 3=Hold 4=Delete 5=Display 6=Release 7=Messages
 8=Attributes 9=Work with printer status

Opt File User User Data Sts Pages Copies Form Type Pty
-- --
-- QPCSMFRT KKRICH KKR6X665 HLD 2346 1 *STD 5
-- QPTAPDMP KKRICH HLD 5 1 *STD 5
-- QPJOBLOG KKRICH QJSCCPY HLD 1 1 *STD 5
-- QPJOBLOG KKRICH DSP11 HLD 2 1 *STD 5
-- QPDCLINE KKRICH HLD 4 1 *STD 5
-- QPDCCCTL KKRICH HLD 3 1 *STD 5
-- QPDCDEV KKRICH HLD 1 1 *STD 5
-- QPSRVTRC KKRICH HLD 1 1 *STD 5
-- QPSRVTRC KKRICH HLD 5 1 *STD 5
-- QPJOBLOG KKRICH VRTDSP2 HLD 1 1 *STD 5
More...

Parameters for options 1, 2, 3 or command
=====
F3=Exit F11=View 2 F12=Cancel F22=Printers F24=More keys
132 records copied to file IBMAPAR in IBMLIB.

```

Figure 301. Work with Output Queue display

- 14.If a message appears at the bottom of the display verifying that the file was copied, continue with the next step. If an error message appears, move the cursor to the message and press the Help key. Correct the problem using the additional message information. Go to 23.2.3.1, “Saving spooled files that are about ten pages or more” on page 289, to start this procedure again.
- 15.If “More...” appears on the display, page forward or backward to continue looking for a spooled file that is about 10 pages or more.
- 16.If there are more spooled files that you want to save to tape, go to 23.2.3.1, “Saving spooled files that are about ten pages or more” on page 289, to select another spooled file. Otherwise, continue with the next step.
- 17.Enter the following command to verify that all the spooled files have been saved to a physical file:
 

```
DSPFD FILE (IBMLIB/IBMAPAR)
```
- 18.Page forward to see the Number of Members prompt. This prompt shows the number of members that were saved.
- 19.Go to the steps in 23.2.3.1, “Saving spooled files that are about ten pages or more” on page 289, if the value for Number of Members is not the same as the number of spooled files that were copied. Otherwise continue with the next step.
- 20.Perform one of the following actions:
  - If spooled files exist that are about 10 pages, go to 23.2.3.2, “Saving, printing spooled files that are about ten pages or less”, to save or print the spooled files.
  - If you have been directed by the service provider to print some pages of a spooled file, go to 23.2.3.3, “Printing selected pages of a large spooled file”, to print the pages.

- If no other spooled file needs to be saved or printed, go to 23.2.4, “Saving libraries to tape or diskette” on page 299, to save the IBMLIB library to tape or diskette.

### 23.2.3.2 Saving, printing spooled files that are about ten pages or less

Follow these steps to save and print spooled files that are about 10 pages or less:

1. If you are at the Work with Output Queue display, continue with the next step. Otherwise, enter the following command:

```
WRKOUTQ OUTQ (IBMLIB/IBMOUTQ)
```

2. Type 6 in the Opt column next to each spooled file that you want to print.
3. Press F5 (Refresh) to refresh the Sts column. The Sts column should be RDY.
4. Enter the following command to start the print writer:

```
STRPRTWTR WTR (printer) OUTQ (IBMLIB/IBMOUTQ)
 AUTOEND (*NO)
```

Replace *printer* with the printer name, for example, PRT01.

The printer should start printing. All spooled files that have the status of RDY will print.

5. If there is a problem printing the output, go to 23.3, “Why the spooled file is not printing” on page 304. Otherwise, collect the printed output, and label it with the problem or APAR number.
6. Perform one of the following tasks:
  - If you have been directed by the service provider to print selected pages of a spooled file, go to 23.2.3.3, “Printing selected pages of a large spooled file”, to print the pages.
  - If no other spooled file needs to be saved or printed, go to 23.2.4, “Saving libraries to tape or diskette” on page 299, to save the IBMLIB library to tape or diskette.

See 23.1, “Sending the problem report” on page 285, for more information about what to send.

### 23.2.3.3 Printing selected pages of a large spooled file

The following procedure shows how to print some of the pages of a very large spooled file. Use this procedure only as instructed by the service provider.

To print some of the pages in a large spooled file, complete these steps:

1. If you are at the Work with Output Queue display, continue with the next step. Otherwise, enter the following command to display all the spooled files that were sent to the IBMOUTQ output queue:

```
WRKOUTQ OUTQ (IBMLIB/IBMOUTQ)
```

For example, the display shown in Figure 302 on page 294 appears.

Work with Output Queue

Queue: IBMOUTQ

Library: IBMLIB

Status: RLS

Type options, press Enter.

1=Send 2=Change 3=Hold 4=Delete 5=Display 6=Release 7=Messages

8=Attributes 9=Work with printer status

| Opt | File     | User   | User Data | Sts | Pages | Copies | Form Type | Pty |
|-----|----------|--------|-----------|-----|-------|--------|-----------|-----|
| —   | QPCSMFRT | KKRICH | KKR6X665  | HLD | 2346  | 1      | *STD      | 5   |
| —   | QPTAPDMP | KKRICH |           | HLD | 5     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | QJSCCPY   | HLD | 1     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | DSP11     | SAV | 2     | 1      | *STD      | 5   |
| —   | QPDCLINE | KKRICH |           | HLD | 4     | 1      | *STD      | 5   |
| —   | QPDCTL   | KKRICH |           | HLD | 3     | 1      | *STD      | 5   |
| —   | QPDCEV   | KKRICH |           | HLD | 1     | 1      | *STD      | 5   |
| —   | QPSRVTRC | KKRICH |           | HLD | 1     | 1      | *STD      | 5   |
| —   | QPSRVTRC | KKRICH |           | HLD | 5     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | VRTDSP2   | HLD | 1     | 1      | *STD      | 5   |

More...

Parameters for options 1, 2, 3 or command

====>

F3=Exit

F11=View 2

F12=Cancel

F22=Printers

F24=More keys

Figure 302. Work with Output Queue display

- If “More...” appears on the display, page forward or backward to find the spooled file you want to print.
- If the spooled file does not show RDY in the Sts column, type 6 in the Opt column next to the spooled file you want to print.
- Press F5 (Refresh) to refresh the Sts column and confirm a status of RDY (ready).
- Type 8 in the Opt column next to the file you want to print. See the example in Figure 303.

Work with Output Queue

Queue: IBMOUTQ      Library: IBMLIB      Status: RLS

Type options, press Enter.

1=Send   2=Change   3=Hold   4=Delete   5=Display   6=Release   7=Messages  
8=Attributes      9=Work with printer status

| Opt | File     | User   | User Data | Sts | Pages | Copies | Form Type | Pty |
|-----|----------|--------|-----------|-----|-------|--------|-----------|-----|
| 8   | QPCSMPT  | KKRICH | KKR6X665  | HLD | 2346  | 1      | *STD      | 5   |
| —   | QPTAPDMP | KKRICH |           | HLD | 5     | 1      | *STD      | 5   |
| —   | QBJOBLOG | KKRICH | QJSCCPY   | HLD | 1     | 1      | *STD      | 5   |
| —   | QBJOBLOG | KKRICH | DSP11     | SAV | 2     | 1      | *STD      | 5   |
| —   | QPDCLINE | KKRICH |           | HLD | 4     | 1      | *STD      | 5   |
| —   | QPDCTL   | KKRICH |           | HLD | 3     | 1      | *STD      | 5   |
| —   | QPDCEV   | KKRICH |           | HLD | 1     | 1      | *STD      | 5   |
| —   | QPSRVTRC | KKRICH |           | HLD | 1     | 1      | *STD      | 5   |
| —   | QPSRVTRC | KKRICH |           | HLD | 5     | 1      | *STD      | 5   |
| —   | QBJOBLOG | KKRICH | VRTDSP2   | HLD | 1     | 1      | *STD      | 5   |

More...

Parameters for options 1, 2, 3 or command  
====>

F3=Exit   F11=View 2   F12=Cancel   F22=Printers   F24=More keys

Figure 303. Work with Output Queue display

6. Press the Enter key. For example, the display shown in Figure 304 appears.

Work with Spooled File Attributes

|                                    |            |                       |           |
|------------------------------------|------------|-----------------------|-----------|
| Job . . . . .                      | : DSP03    | File . . . . .        | : QPCSMPT |
| User . . . . .                     | : KKRICH   | File number . . . . . | : 4       |
| Number . . . . .                   | : 001941   |                       |           |
| Status . . . . .                   | : HELD     |                       |           |
| Output queue . . . . .             | : KKRICH   |                       |           |
| Library . . . . .                  | : KKRICH   |                       |           |
| Form type . . . . .                | : *STD     |                       |           |
| Output priority . . . . .          | : 5        |                       |           |
| Copies left to produce . . . . .   | : 1        |                       |           |
| Total copies . . . . .             | : 1        |                       |           |
| Maximum records . . . . .          | : *NOMAX   |                       |           |
| Number of separators . . . . .     | : 0        |                       |           |
| File becomes available . . . . .   | : *FILEEND |                       |           |
| Hold file before written . . . . . | : *YES     |                       |           |
| Save file after written . . . . .  | : *NO      |                       |           |
| Device type . . . . .              | : PRINTER  |                       |           |

More...

Press Enter to continue.

F3=Exit   F5=Refresh   F12=Cancel   F13=Change

Figure 304. Work with Spooled File Attributes display

7. Record the job, user, number, file, and file number from the header of the Work with Spooled File Attributes display.
8. Press F12 (Cancel) to return to the Work with Output Queue display.
9. Type 2 in the Opt column next to the spooled file. For example, the display shown in Figure 305 on page 296 appears.

Change Spooled File Attributes (CHGSPLFA)

Type choices, press Enter.

|                               |           |                            |
|-------------------------------|-----------|----------------------------|
| Spooled file . . . . .        | > QPCSMPT | Name, *SELECT              |
| Job name . . . . .            | > DSP03   | Name, *                    |
| User . . . . .                | > KKRICH  | Name                       |
| Number . . . . .              | > 001941  | 000000-999999              |
| Spooled file number . . . . . | > 4       | 1-9999, *ONLY, *LAST       |
| Printer . . . . .             | *OUTQ     | Name, *SAME, *OUTQ         |
| Print sequence . . . . .      | *SAME     | *SAME, *NEXT               |
| Form type . . . . .           | *STD      | Form type, *SAME, *STD     |
| Copies . . . . .              | 1         | 1-255, *SAME               |
| Restart printing . . . . .    | *STRPAGE  | Number, *SAME, *STRPAGE... |

Additional Parameters

|                        |         |                      |
|------------------------|---------|----------------------|
| Output queue . . . . . | IBMOUTQ | Name, *SAME, *DEV    |
| Library . . . . .      | IBMLIB  | Name, *LIBL, *CURLIB |

Bottom

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

Figure 305. Change Spooled File Attributes display (Part 1 of 2)

10. Press F10 (Additional parameters) to display more parameters.

11. Page forward to see the Page range to print prompts. The display shown in Figure 306 appears.

Change Spooled File Attributes (CHGSPLFA)

Type choices, press Enter.

Page range to print:

|                                  |              |                               |
|----------------------------------|--------------|-------------------------------|
| <b>Starting page</b> . . . . .   | 1            | Number, *SAME, *ENDPAGE       |
| <b>Ending page</b> . . . . .     | *END         | Number, *SAME, *END           |
| File becomes available . . . . . | *FILEEND     | *SAME, *JOBEND, *FILEEND...   |
| Save file . . . . .              | *NO          | *SAME, *NO, *YES              |
| Output priority . . . . .        | 5            | 1-9, *SAME, *JOB              |
| User data . . . . .              | 'QPADEV0004' | User data, *SAME              |
| Align page . . . . .             | *NO          | *SAME, *NO, *YES              |
| Print quality . . . . .          | *STD         | *SAME, *STD, *DEVD, *DRAFT... |
| Form feed . . . . .              | *DEVD        | *SAME, *DEVD, *CONT, *CUT...  |
| Print on both sides . . . . .    | *NO          | *SAME, *NO, *YES, *TUMBLE     |

Bottom

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

Figure 306. Change Spooled File Attributes display (Part 2 of 2)

12. Type the starting page number for the Starting page prompt. Type the ending page number in the Ending page prompt. The defaults cause all of the pages from page one onward to print.



13. Press F12 (Cancel) to return to the Work with Output Queue display.

14. Enter the following command to start the writer:

STRPRTWTR

15. Press F4 (Prompt). The display shown in Figure 307 appears.

Start Printer Writer (STRPRTWTR)

Type choices, press Enter.

|                                 |         |                               |
|---------------------------------|---------|-------------------------------|
| <b>Printer</b> . . . . .        |         | <b>Name, *ALL, *SYSVAL</b>    |
| Output queue . . . . .          | *DEV    | Name, *DEV                    |
| Library . . . . .               |         | Name, *LIBL, *CURLIB          |
| Queue for writer messages . . . | IBMOUTQ | Name, *DEVD, *REQUESTER       |
| Library . . . . .               | IBMLIB  | Name, *LIBL, *CURLIB          |
| Form type options:              |         |                               |
| Form type . . . . .             | *ALL    | Form type, *ALL, *STD, *FORMS |
| Message option . . . . .        | *NOMSG  | *NOMSG, *MSG                  |
| File separators . . . . .       | *FILE   | 0-9, *FILE                    |

Bottom

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

Figure 307. Start Printer Writer display (Part 1 of 3)

16. Type the name of the printer. PRT01 is the name of the printer used in this example. Do not press the Enter key.

17. Press the F10 key. The display shown in Figure 308 on page 298 appears.

```

 Start Printer Writer (STRPRTWIR)

Type choices, press Enter.

Printer > PRT01 Name, *ALL, *SYSVAL
Output queue *DEV Name, *DEV
 Library Name, *LIBL, *CURLIB
Queue for writer messages . . . *DEVD Name, *DEVD, *REQUESTER
 Library Name, *LIBL, *CURLIB
Form type options:
 Form type *ALL Form type, *ALL, *STD, *FORMS
 Message option *NOMSG *NOMSG, *MSG
File separators *FILE 0-9, *FILE

 Additional Parameters

Writer *DEV Name, *DEV
Auto-end options:
 Automatically end writer . . . *NO *NO, *YES
 If yes, when to end *NORDYF *NORDYF, *FILEEND
More...

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

```

Figure 308. Start Printer Writer display (Part 2 of 3)

18. Page forward. The display shown in Figure 309 appears.

```

 Start Printer Writer (STRPRTWIR)

Type choices, press Enter.

Align page *WTR *FILE, *WTR
Spooled file *NONE Name, *NONE
Job name * Name, *
 User _____ Name
 Number _____ 000000-999999
Spooled file number *ONLY 1-9999, *ONLY, *LAST
Starting page *BEGIN Number, *BEGIN

 Bottom

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

```

Figure 309. Start Printer Writer display (Part 3 of 3)

19. Type in the spooled file name.

20. Type the file in the Spooled file prompt, the job in the Job name prompt, the user in the User prompt, the number in the Number prompt, and the file number in the Spooled file number prompt from the information recorded from the Work with Spooled File Attribute display (Figure 304 on page 295).

21. Press the Enter key. Printing starts on the page you specified.
22. Enter the following command to end the writer after the file is printed:

```
ENDWTR WTR(printer-name) OPTION(*IMMED)
```

Replace *printer-name* with the printer name, for example, PRT01.

23. Perform one of the following actions:

- Collect the printed output, and label it with the problem or APAR number.
- If no other spooled file needs to be saved or printed, go to the following section to save the library IBMLIB to tape or diskette.

#### 23.2.4 Saving libraries to tape or diskette

To save libraries to a tape or diskette, follow these steps:

1. Load a new tape or diskette.
2. On a command line, type SAVLIB
3. Press F4 (Prompt).
4. Press F9 (All parameters).
5. Type the library name and the device used for the save. In this example, the library name is IBMLIB, and the tape device is TAP01. The display should look like the example in Figure 310.

Save Library (SAVLIB)

Type choices, press Enter.

|                                |          |                           |
|--------------------------------|----------|---------------------------|
| Library . . . . .              | IBMLIB   | NAME, *NONSYS             |
| + for more values              |          |                           |
| Device . . . . .               | TAP01    | NAME, *SAVF               |
| + for more values              |          |                           |
| Volume identifier . . . . .    | *MOUNTED | Character value, *MOUNTED |
| + for more values              |          |                           |
| Sequence number . . . . .      | *END     | 1-9999, *END              |
| Label . . . . .                | *LIB     |                           |
| File expiration date . . . . . | *PERM    | Date, *PERM               |
| End of tape option . . . . .   | *REWIND  | *REWIND, *LEAVE, *UNLOAD  |
| Save file . . . . .            |          | Name                      |
| Library . . . . .              | *LIBL    | Name, *LIBL, *CURLIB      |
| Update history . . . . .       | *YES     | *YES, *NO                 |

Bottom

F3=Exit   F4=Prompt   F5=Refresh  
F13=How to use this display

F10=Additional parameters   F12=Cancel  
F24=More keys

Figure 310. Save Library display

6. Press the Enter key.
7. Press the System Request key if the following message appears at the bottom of the display. Otherwise, go to step 10 on page 300.

Waiting for reply to message on message queue QSYSOPR.

8. Select option 6 (Display the System Operator Messages) on the System Request Menu to display the system operator messages. For example, the

display in Figure 311 may appear if the user's assistance level is set to intermediate.

```

 Display Messages
 System: ITSOSYS1
Queue : QSYSOPR Program : *DSPMSG
Library : QSYS Library :
Severity : 00 Delivery : *HOLD

Type reply, press Enter.
Contact unsuccessful on controller TRRCHAS374. Probable internal system
failure. (C R)
Reply . . .
Controller TRRCHAS374 contacted on line TRNLINE.
Controller TRRCHAS374 contacted on line TRNLINE.
Controller TRRCHAS374 contacted on line TRNLINE.
Controller TRRCHAS374 contacted on line TRNLINE.
Controller TRRCHAS374 contacted on line TRNLINE.
Controller TRRCHAS374 contacted on line TRNLINE.
Controller TRRCHAS374 contacted on line TRNLINE.
Controller TRRCHAS374 contacted on line TRNLINE.
Active file found on this volume (C I R).
Reply . . .

 Bottom
F3=Exit F10=Display all F11=Remove a message
F12=Previous F13=Remove all

```

Figure 311. Display Messages display

9. Reply to the message, and press the Enter key.
10. The following message should appear indicating that the save is complete:
 

```
2 objects saved from library IBMLIB.
```

The two objects in this example are the library and the physical file in the library. There may be more objects saved.
11. Continue with the following section or with 23.2.6, "Collecting a display of the contents of a diskette" on page 302.

### 23.2.5 Collecting a display of the contents of the tape

To collect a display of the contents of the tape containing the collected data, follow these steps:

1. Load a tape with the collected data.
2. Enter the following commands to send the spooled file containing the display of the tape to the IBMOUTQ output queue:
 

```
OVRPRTF FILE(QPTAPDSP) OUTQ(IBMLIB/IBMOUTQ)
OVRPRTF FILE(QPSRODSP) OUTQ(IBMLIB/IBMOUTQ)
```
3. Type `DSPTAP` on a command line.
4. Press F4 (Prompt). The display shown in Figure 312 appears for tape.

Display Tape (DSPTAP)

Type choices, press Enter.

|                    |           |         |                  |
|--------------------|-----------|---------|------------------|
| <b>Tape device</b> | . . . . . | > _____ | <b>Name</b>      |
| File label         | . . . . . | > *ALL  |                  |
| Sequence number    | . . . . . | 1       | 1-9999           |
| Data type          | . . . . . | *LABELS | *LABELS, *SAVRST |
| Output             | . . . . . | > *     | *, *PRINT        |

Bottom

F3=Exit   F4=List   F5=Refresh   F11=Keywords   F12=Previous  
F13=How to use this display

Figure 312. Display Tape (Part 1 of 2)

5. In the Tape device prompt, type the name of the tape device.
6. Change the asterisk (\*) in the Output prompt to \*PRINT
7. Press the Enter key. The QPTAPDSP spooled file is created and includes a display of the tape labels.
8. Type DSPTAP on a command line again.
9. Press F4 (Prompt). The display shown in Figure 313 appears for tape.

Display Tape (DSPTAP)

Type choices, press Enter.

|                    |           |         |                  |
|--------------------|-----------|---------|------------------|
| <b>Tape device</b> | . . . . . | > _____ | <b>Name</b>      |
| File label         | . . . . . | > *ALL  |                  |
| Sequence number    | . . . . . | 1       | 1-9999           |
| <b>Data type</b>   | . . . . . | *LABELS | *LABELS, *SAVRST |
| Output             | . . . . . | > *     | *, *PRINT        |

Bottom

F3=Exit   F4=List   F5=Refresh   F11=Keywords   F12=Previous  
F13=How to use this display

Figure 313. Display Tape (Part 2 of 2)

10. In the Tape device prompt, type the name of the tape device.
11. Change \*LABELS to \*SAVRST in the Data type prompt.
12. Change the asterisk (\*) in the Output prompt to \*PRINT.
13. Press the Enter key. The QPSRODSP spooled file is created and includes a display of the tape.
14. Remove the tape from the tape unit.
15. Go to 23.2.6.1, "Labeling the tape or diskette", to print the files.

### 23.2.6 Collecting a display of the contents of a diskette

To collect a display of the contents of the diskette containing the collected data, complete these steps:

1. Load a diskette with the saved data.
2. Enter the following commands to send the spooled files containing the display of the diskette to the IBMOUTQ output queue:

```
OVRPRTF FILE(QPDSPDKT) OUTQ(IBM LIB/IBMOUTQ)
OVRPRTF FILE(QPSRODSP) OUTQ(IBM LIB/IBMOUTQ)
```

3. On a command line, type: DSPDKT
4. Press F4 (Prompt). The display shown in Figure 314 appears for a diskette.

Display Diskette (DSPDKT)

Type choices, press Enter.

| Diskette device . . . . . | Name                          |
|---------------------------|-------------------------------|
| Diskette label . . . . .  | *ALL                          |
| Data type . . . . .       | *LABELS      *LABELS, *SAVRST |
| Output . . . . .          | *              *, *PRINT      |

Bottom

F3=Exit   F4=List   F5=Refresh   F11=Keywords   F12=Previous

F13=How to use this display

Figure 314. Display Diskette (Part 1 of 2)

5. In the Diskette device prompt, type the name of the diskette unit.
6. Change the asterisk (\*) in the Output prompt to \*PRINT.
7. Press the Enter key. The spooled file QPDSPDKT is created containing a display of the diskette.
8. Type DSPDKT on a command line again.
9. Press F4 (Prompt). The display shown in Figure 315 appears for a diskette.

Display Diskette (DSPDKT)

Type choices, press Enter.

|                           |         |                  |
|---------------------------|---------|------------------|
| Diskette device . . . . . | > _____ | Name             |
| Diskette label . . . . .  | > *ALL  |                  |
| Data type . . . . .       | *LABELS | *LABELS, *SAVRST |
| Output . . . . .          | > *     | *, *PRINT        |

Bottom

F3=Exit   F4=List   F5=Refresh   F11=Keywords   F12=Previous  
F13=How to use this display

Figure 315. Display Diskette (Part 2 of 2)

10. In the Diskette device prompt, type the name of the diskette unit.
11. Change \*LABELS to \*SAVRST in the Data type prompt.
12. Change the asterisk (\*) in the Output prompt to \*PRINT.
13. Press the Enter key. The QPSRODSP spooled file is created containing a display of the diskette.
14. Remove the diskette from the diskette drive.
15. Go to the following section.

### 23.2.6.1 Labeling the tape or diskette

To label the tapes or diskettes, complete the following steps:

1. Enter the following command to print the display of the contents of the tape or diskette:

```
STRPRIWTR WTR(printer-device) OUTQ(IBMLIB/IBMOUTQ)
```

Replace *printer-device* with the printer name, for example, PRT01.

2. The printer starts, and all spooled files print.
3. If there is a problem printing the output, go to 23.3, “Why the spooled file is not printing” on page 304. Otherwise, continue with the next step.
4. Write on the label of each tape or diskette the number and order of the tapes and diskettes. Use, for example, 1 of 5, 2 of 5, ... 5 of 5, etc. if there is more than one tape or diskette.
5. Write on the printed output the tape or diskette number.
6. Write the APAR or problem number on the printed output.
7. Package the printout with the tape or diskette.

8. Go to 23.2.5, “Collecting a display of the contents of the tape” on page 300, to repeat the procedure for each tape you are submitting with the problem report.
9. If you have everything you need for the problem report, go to 23.4, “Cleaning up the system after collecting the data” on page 307. Otherwise, go to 23.1, “Sending the problem report” on page 285, for more information about what to send.

## 23.3 Why the spooled file is not printing

To determine why the spooled file report is not printing, follow these steps:

1. Enter the following command to check the printer writer:

```
WRKWTR *ALL
```

The display shown in Figure 316 appears.

Work with All Writers

Type options, press Enter.

2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display messages  
8=Work with output queue

| Opt | Writer  | Type | Device  | Queue   | Library | Status | Form Type |
|-----|---------|------|---------|---------|---------|--------|-----------|
| —   | PRT01   | PRT  | PRT01   | IBMOUTQ | QUSRSYS | STR    | *ALL      |
| —   | PRT5219 | PRT  | PRT5219 | MAR     | MAR     | STR    | *ALL      |

Bottom

Parameters for options 2, 3, 4, 6 or command  
====> \_\_\_\_\_

F3=Exit F4=Prompt F12=Cancel F21=Start F24=More keys

Figure 316. Work with All Writers display

2. If “More...” appears on the display, page forward to continue searching for the writer in question.
3. Follow the instructions in Table 26 if the status is not STR (start). Otherwise, continue with the next step.

Table 26. Instructions when status is not STR

| If status is: | Do the following:                                                                                                                     |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------|
| END           | Wait for the writer to end completely, and then enter the command:<br>STRPRTWTR WTR(writer)<br>OUTQ (IBMLIB/IBMOUTQ)<br>AUTOEND (*NO) |
| JOBQ          | Enter the command:<br>RLSJOBQ JOBQ(QSPL)                                                                                              |



| If status is: | Do the following:                                                                                                                                                                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HLD           | Type 6 in the Opt column, next to the writer, to release the writer. Press the Enter key.                                                                                                                                                                               |
| MSGW          | Type 7 in the Opt column next to the writer, and reply to the messages. After you reply to the messages, press F5 (Refresh) to refresh the Sts column. The status should change to <i>STR</i> . If the status does not change, see your service provider for more help. |

4. Type 5 in the Opt column next to the writer if the writer is in the list, the status is *STR*, and the writer is still not printing.
5. Press the Enter key. The display shown in Figure 317 appears.

Work with Printer Writer

```

Writer : PRT01 User : QSPLJOB
Number : 008623

Started by user : KKRICH
Status:
 Writing : N
 Waiting on message : N
 Held : N
 End pending : N
 Hold pending : N
 Between files : Y
 Between copies : N
 Waiting for data : N
 On job queue : N
 File being written :
 File number :

More...

Press Enter to continue.

F3=Exit F5=Refresh F6=Messages F10=Release F11=Hold F12=Cancel
F14=Queue F24=More keys

```

Figure 317. Work with Printer Writer display

6. Check the Between files prompt.
7. Continue with the next step if this prompt is Y. Otherwise, verify all the other prompts on the Work with Printer Writer display.
8. Press F14 to display the writer output queue. The display shown in Figure 318 on page 306 appears.

Work with Output Queue

Queue: IBMOUTQ      Library: IBMLIB      Status: RLS

Type options, press Enter.

1=Send   2=Change   3=Hold   4=Delete   5=Display   6=Release   7=Messages  
8=Attributes      9=Work with printer status

| Opt | File     | User   | User Data | Sts | Pages | Copies | Form Type | Pty |
|-----|----------|--------|-----------|-----|-------|--------|-----------|-----|
| —   | QPCSMFRT | KKRICH | KKR6X665  | HLD | 2346  | 1      | *STD      | 5   |
| —   | QPTAPDMP | KKRICH |           | HLD | 5     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | QJSCCPY   | HLD | 1     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | DSP11     | SAV | 2     | 1      | *STD      | 5   |
| —   | QPDCLINE | KKRICH |           | HLD | 4     | 1      | *STD      | 5   |
| —   | QPDCCCL  | KKRICH |           | HLD | 3     | 1      | *STD      | 5   |
| —   | QPDCEV   | KKRICH |           | HLD | 1     | 1      | *STD      | 5   |
| —   | QPSRVTRC | KKRICH |           | HLD | 1     | 1      | *STD      | 5   |
| —   | QPSRVTRC | KKRICH |           | HLD | 5     | 1      | *STD      | 5   |
| —   | QPJOBLOG | KKRICH | VRTDSP2   | HLD | 1     | 1      | *STD      | 5   |

More...

Parameters for options 1, 2, 3 or command  
====>

F3=Exit    F11=View 2    F12=Cancel    F22=Printers    F24=More keys

Figure 318. Work with Output Queue display

9. Look for a file that has a status of RDY or WTR.
10. If “More...” appears on the display, page forward to continue checking for a file status of RDY or WTR.
11. Refer to Table 27 to determine how to change the status of a spooled file to RDY and start printing.

Table 27. Changing the status of a spooled file

| If the status is: | Perform the following step:                                                                                                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CLO               | Wait for the job to end, or type 2 in the Opt column next to the file that you want to print that is closed, and change the File becomes available to *FILEEND<br><b>Note:</b> For spooled files created by using SCHEDULE(*JOBEND), printing starts after the job ends.                           |
| HLD or SAV        | Type 6 in the Opt column next to the spooled file to release the file. Press F5 (Refresh) to refresh the status. The status should change to RDY                                                                                                                                                   |
| OPN               | Wait for the file to close, or type 2 in the Opt column next to the opened file you want to print, and change File becomes available to *IMMED.<br><br>Printing occurs when the file is closed if you used SCHEDULE(*FILEEND).<br>Printing occurs when the job ends if you used SCHEDULE(*JOBEND). |
| MSGW              | Type 7 in the Opt column next to the writer, and reply to the messages. After you reply to the messages, press F5 (Refresh) to refresh the Sts column. The status should change to RDY                                                                                                             |

Return to the procedure that sent you here.

### 23.3.1 Printing tips

To avoid printing problems, you can follow this printing tip:

1. Enter the following command when running predominately in the System/36 Environment to set the QDEVNAMING system value to S36:

```
CHGSYSVSVAL QDEVNAMING(*S36)
```

2. Use the “G” reply instead of the “I” reply when you receive the Load Form Type `xyz` message. The G reply tells the system to recall the new form type. This message does not appear again until a new form type is used. The I reply tells the system not to recall the new form type. In this case, this message continues to appear for every spooled file.
3. Enter a page number as a reply to a message when a printer error recovery message, such as “End of Forms”, is received on the operator's message queue. The print writer automatically begins printing on that page. It is not necessary to cancel the printer writer and start it again. Follow the directions in the message help text of the error recovery message.
4. Enter the following command if you do not want to reply to the printer error recovery messages. In this example, the printer is PRT01.

```
CHGDEVPRT DEVD(PRT01) PRTERMSG(*INFO)
```

This command changes the printer's device description to specify that you would like informational error recovery messages instead of inquiry error recovery messages.

## 23.4 Cleaning up the system after collecting the data

Use Table 28 to restore the system and delete files, output queues, libraries, and data areas that are no longer needed after you collect all the requested information.

Table 28. Cleaning up the system scenarios

| If you                                                                                | Perform the following step:                                                                                                                                                            |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Used the Save APAR Data display or SAVAPARDTA command to save data in an APAR library | Enter the following command:<br>DLTAPARDTA PRBID(problem_ID)<br>ORIGIN(network_id control_point_name)<br><br>or<br><br>See 11.5, “Verifying the trace contains the error” on page 152. |
| Created the output queue IBMOUTQ in the library IBMLIB                                | Enter the following command to delete the output queue:<br>CLROUTQ OUTQ (IBMLIB/IBMOUTQ)<br>DLTOUTQ OUTQ (IBMLIB/IBMOUTQ)                                                              |
| Created the IBMAPAR physical file in the library IBMLIB                               | Enter the following command to clear and delete the file:<br>DLTF FILE (IBMLIB/IBMAPAR)                                                                                                |
| Override printer files                                                                | The overrides end when the job ends. Otherwise, enter the following command to delete all printer files overrides:<br>DLTOVR FILE (*PRTF)                                              |

| If you                                                                           | Perform the following step:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Created the library IBMLIB                                                       | Enter the following command to delete the library:<br>DLTLIB LIB (IBMLIB)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Created the data area QGPL/IBMDTAARA                                             | Enter the following command to delete the data area:<br>DLTDTAARA DTAARA (QGPL/IBMDTAARA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Created the data area QSYS/QPATRACE for tracing pass-through communications jobs | Enter the following command to delete the data area:<br>DLTDTAARA DTAARA (QSYS/QPATRACE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Created the data area to trace an RJE session                                    | Enter the following command to delete the data area:<br>DLTDTAARA DTAARA (RJE-session-description)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Changed the message logging level for a job                                      | <p>Locate the level, severity, and text information recorded on the Problem Summary Form in 5.2, "Setting the message logging level" on page 52.</p> <p>Enter the following command to restore the recorded values for your job:<br/>CHGJOB JOB (job-name)<br/>LOG(level severity text)</p> <p>Replace <i>level</i>, <i>severity</i>, and <i>text</i> with the information that was recorded on the Problem Summary Form. Enter the following command to restore the recorded values for a job description:<br/>CHGJOB JOB (library/job-description)<br/>LOD(level severity text)</p> <p>Replace <i>level</i>, <i>severity</i>, and <i>text</i> with the information that was recorded on the Problem Summary Form.</p> |

Save any and all information that remains from these procedures to refer to them again.

## Appendix A. Quick reference to data collection commands

Refer to Table 29 to determine which commands to use to collect the respective data.

Table 29. Data collection commands reference table

| Selection                         | Command used     | Information saved                                                         |
|-----------------------------------|------------------|---------------------------------------------------------------------------|
| History log                       | DSPLOG           | History log for the time range specified                                  |
| Program temporary fixes           | DSPPTF           | All PTFs in the system                                                    |
| System values                     | WRKSYSVAL        | All the system values                                                     |
| Job information                   | DSPJOB           | All job information, job log                                              |
| System job information            | DSPJOB           | List of the active jobs in the system, performance and status information |
| Active job                        | WRKACTJOB        | List of the active jobs in the system, performance and status information |
| Object (library/object)           | SAVLIB or SAVOBJ | Save of library or object                                                 |
| Object (path name)                | SAV              | Integrated file system object                                             |
| System object                     | DMPSYSOBJ        | Object dump information                                                   |
| Hardware resources                | DSPHWRSC         | Hardware configuration and resource information of the system             |
| Software resources                | DSPSWRSC         | Software resource information                                             |
| Document or folder                | SAVDLO           | Document or folder                                                        |
| Error log entry by ID             | PRTERLOG         | Error log ID with hex data                                                |
| Error log entries by time range   | PRTERLOG         | Error log entries with hex data                                           |
| LIC log entry by ID               | PRTINIDTA        | LIC log with dump data                                                    |
| LIC log entries                   | PRTINIDTA        | LIC log entries with dump data                                            |
| Problem log entry by ID           | DSPPRB           | Problem log entry                                                         |
| Problem log entries by time range | DSPPRB           | Problem log entries                                                       |
| Internal configuration            | PRTINTDTA        | SLIC link map and LIC alter log                                           |



---

## Appendix B. Start Remote Support (STRRMTSPT)

Remote support allows a support organization to access your system from a remote workstation using the Electronic Customer Support (ECS) modem. This enables the service provider faster access to diagnostic tools and information and, in some cases, eliminates the delay of travel time for on-site assistance.

The Start Remote Support (STRRMTSPT) command creates and varies on all configuration objects needed for remote support. If any existing remote support configuration objects are found, they are deleted and then re-created.

An example of a start remote support network is shown in Figure 319.

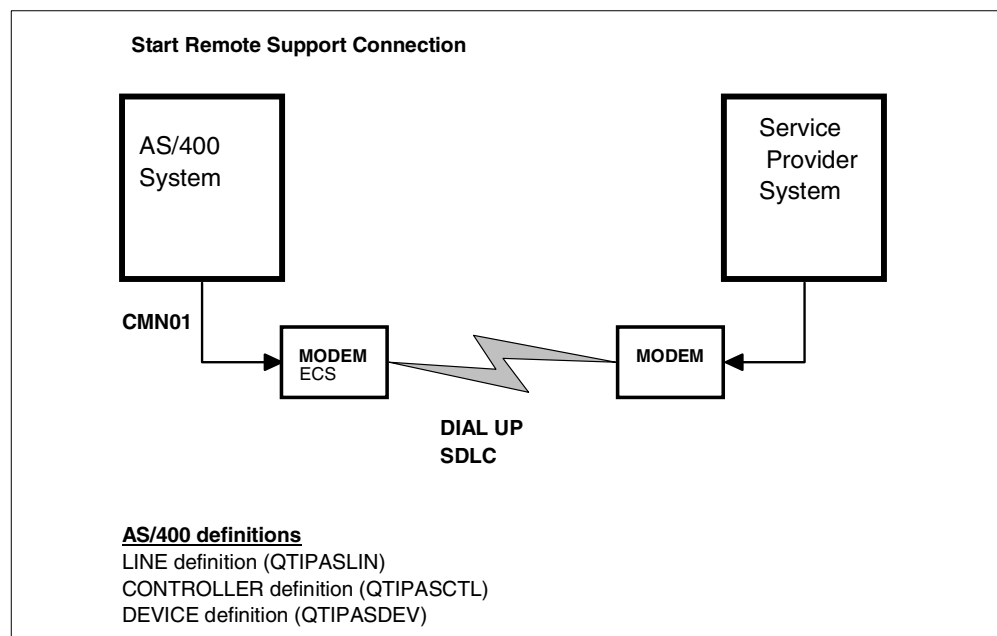


Figure 319. Start Remote Support network

---

### B.1 Checklist for Start Remote Support (STRRMTSPT)

The following items must be obtained or performed by the customer for Remote Support to be successful:

- ECS telephone number
- Resource name used for QESLINE

To determine the resource name of the line to be used as QESLINE, on any command line, type:

```
DSPLIND QESLINE
```

- QESLINE must be varied off

To vary off QESLINE, on any command line, enter:

```
VRYPFG CFGOBJ(QESLINE) CFGTYPE(*LIN) STATUS(*OFF)
```

- A user profile for your service provider to sign on to your system

## B.2 Getting ready for remote support

The configuration objects required for remote support are provided with OS/400. To activate the connection between the two systems, follow these steps:

1. From any command line, type `STRRMTSPT` and press F4. A display appears like the example shown in Figure 320.

Start Remote Support (STRRMTSPT)

Type choices, press Enter.

|                           |                |                               |
|---------------------------|----------------|-------------------------------|
| Device class . . . . .    | > <b>*VRT</b>  | *RMT, *VRT, *IPS              |
| Display type . . . . .    | > <b>5251</b>  | 3179, 3180, 3196, 3197...     |
| Display model . . . . .   | > <b>11</b>    | 1, 2, 11, A1, A2, B1, B2...   |
| Station address . . . . . | > <b>F1</b>    | 01, 02, 03, 04, 05, 06, 07... |
| User profile . . . . .    | <b>QPGMR</b>   | User profile                  |
| Resource name . . . . .   | > <b>CMN01</b> | Resource name                 |

Bottom

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

Figure 320. Start Remote Support display

2. Enter the following values as shown in Figure 320:

- Device class: `*VRT`
- Display type: `5251`
- Display Model: `11`
- Station address: Provided by your service provider
- User profile: `QPGMR`
- Resource name: Resource name of the QESLINE

Refer to B.1, “Checklist for Start Remote Support (STRRMTSPT)” on page 311, for details about how you can obtain the information.

Press Enter. The display refreshes with more options as shown in Figure 321.



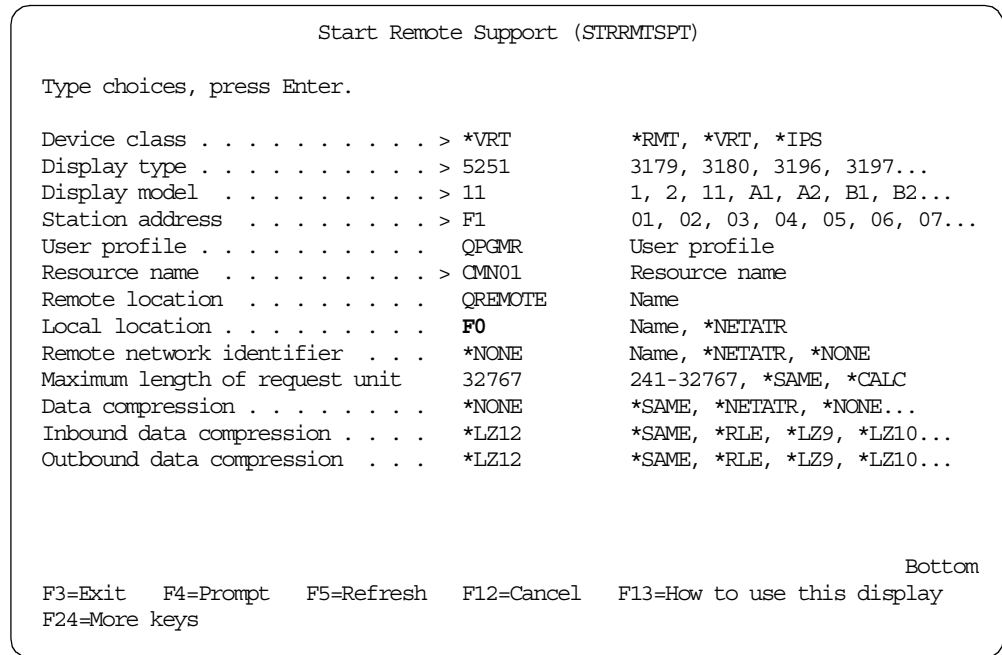


Figure 321. Start Remote Support display with more options

### 3. The values to be typed are:

```

Remote location.....QREMOTE
Local location.....provided by service provider

```

Leave the rest of the settings as the default unless advised by your service provider. Press Enter.

Inform your service provider once the Remote Support Enabled message appears. Your system is now ready for remote support. Your service provider dials into your system and signs on with the user profile that you provided.

After they issue the STRRMTSPT command, the following objects are created:

- **QTIJOBQ:** Job queue
- **QTIOUTQ:** Output queue
- **QTIJOBQD:** Job description
- **QTICLS:** Class
- **QTISBS:** Subsystem
- **QTIPARMS:** Parameter
- **QTIPASLIN:** Line description
- **QTIPASCTL:** Controller description
- **QTIPASDEV:** Device description

These objects are used to provide the environment for the start remote support connection.

After your service provider has completed their service action, run the ENDRMTSPT command to disable the remote support. Before you delete the QTILIB library, check with your service provider as to whether they still need it.



---

## Appendix C. E-mailing document collections

In the majority of cases, documentation that is collected relating to a problem is either saved to a tape cartridge (or reel) or faxed to your service provider. In some cases, this is not practical (or possible) due to the size of the files.

Many of us now use e-mail to communicate facts. The following examples show how to send smaller files if your service provider requests them. On most occasions, the quality of the document sent by e-mail is far better than the faxed output from a line printer or laser printer.

---

### C.1 Sending a spooled file using Operations Navigator

Using Operations Navigator is the simplest method to send smaller documents to your service provider. This section explains how to use Operations Navigator to send a spooled file.

For the purpose of this exercise and in the example described, communications entries from the Product Activity Log (PAL) are collected and created in a spooled file named QPCSMprt. Follow these steps:

1. Start Operations Navigator, and sign on to the system.
2. Select **Basic Operations->Printer Output**.
3. Click **QPCSMprt** under the Output name column, and drag and drop it into a folder on the C: drive.
4. Attach the text file to an e-mail message to your service provider.

An example of the Operation Navigator display is shown in Figure 322.

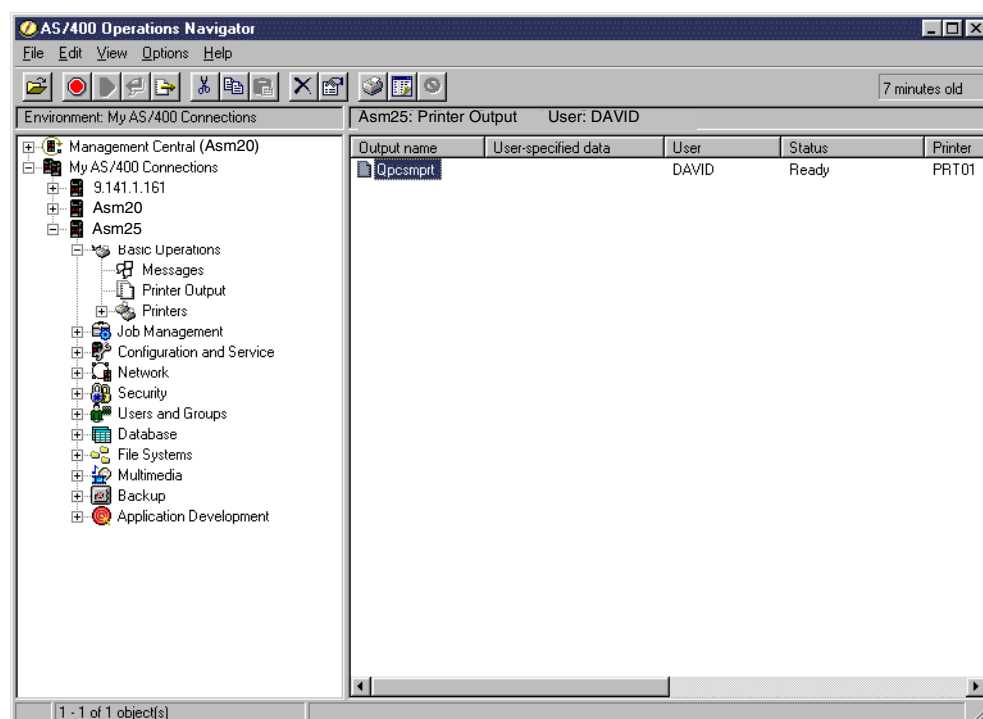


Figure 322. Operations Navigator display

## C.2 Sending a spooled file using FTP (ASCII)

For the purpose of this exercise and in the example described, communications entries from the Product Activity Log (PAL) are collected and created in a spooled file named QPCSMPT. Follow these steps:

1. Create a physical file if you are sending an ASCII file:

```
CRTPF FILE(MYLIB/QPCSMPT) RCDLEN(132)
```

Create a save file if you are sending a binary file:

```
CRTSAVF FILE(ITSOTEST)
```

The difference between ASCII and binary files is that the binary file can be reloaded onto another AS/400e server and can be searched and viewed using search string arguments. The first method discussed in this section is for ASCII files only.

2. Type `WRKSPLF` on the command line, and press Enter. A display appears like the example shown in Figure 323.

| Work with All Spooled Files                                         |         |        |                 |           |     |             |          |        |
|---------------------------------------------------------------------|---------|--------|-----------------|-----------|-----|-------------|----------|--------|
| Type options, press Enter.                                          |         |        |                 |           |     |             |          |        |
| 1=Send 2=Change 3=Hold 4=Delete 5=Display 6=Release 7=Messages      |         |        |                 |           |     |             |          |        |
| 8=Attributes 9=Work with printing status                            |         |        |                 |           |     |             |          |        |
| Opt                                                                 | File    | User   | Device or Queue | User Data | Sts | Total Pages | Cur Page | Copy   |
|                                                                     | QPCSMPT | ITSO01 | PRT01           |           | RDY | 4           |          | 1      |
|                                                                     |         |        |                 |           |     |             |          | Bottom |
| Parameters for options 1, 2, 3 or command                           |         |        |                 |           |     |             |          |        |
| ====>                                                               |         |        |                 |           |     |             |          |        |
| F3=Exit F10=View 4 F11=View 2 F12=Cancel F22=Printers F24=More keys |         |        |                 |           |     |             |          |        |

Figure 323. Work with All Spooled Files display

3. Press F11 key twice. The Work with All Spooled Files display appears as shown in Figure 324.

Work with All Spooled Files

Type options, press Enter.

1=Send

2=Change

3=Hold

4=Delete

5=Display

6=Release

7=Messages

8=Attributes

9=Work with printing status

| Opt | File     | File Nbr | Job        | User   | Number | Queue | Library |
|-----|----------|----------|------------|--------|--------|-------|---------|
|     | QPCSMFRT | 1        | QPADEV000L | ITSO01 | 081295 | PRT01 | QUSRSYS |

Bottom

Parameters for options 1, 2, 3 or command

====>

F3=Exit

F10=View 2

F11=View 4

F12=Cancel

F22=Printers

F24=More keys

Figure 324. Work with All Spooled Files display

Take note of the file name, job name, user, and number. This information is required in the next step.

- On the command line, type `CPYSPLF` and press the F4 key. The Copy Spooled File (CPYSPLF) display appears as shown in Figure 325.

Copy Spooled File (CPYSPLF)

Type choices, press Enter.

|                                  |            |                      |
|----------------------------------|------------|----------------------|
| Spooled file . . . . .           | > QPCSMFRT | Name                 |
| To data base file . . . . .      | qpcsmprt   | Name                 |
| Library . . . . .                | mylib      | Name, *LIBL, *CURLIB |
| Job name . . . . .               | QPADEV000L | Name, *              |
| User . . . . .                   | ITSO01     | Name                 |
| Number . . . . .                 | 081295     | 000000-999999        |
| Spooled file number . . . . .    | *ONLY      | 1-9999, *ONLY, *LAST |
| To member . . . . .              | *FIRST     | Name, *FIRST         |
| Replace or add records . . . . . | *REPLACE   | *REPLACE, *ADD       |

Bottom

F3=Exit

F4=Prompt

F5=Refresh

F10=Additional parameters

F12=Cancel

Figure 325. Copy Spooled File display

- Enter the spooled file name, job name, user, and number noted in step 4. Also enter the database file name and library created in step 1. Once the fields are complete, press Enter.

You receive a message at the bottom of the screen similar to this one:

86 records copied to file QPCSMPT in MYLIB.

---

### C.3 Transferring files from the AS/400e server to the PC

With the methods described in the previous sections, the information resides on the AS/400 disk storage. To transfer the file to a PC, use either Client Access file transfer or File Transfer Protocol (FTP).

To use the FTP method, perform the following steps:

1. Open a DOS prompt from Windows 95/98/NT. Type:

```
ftp
```

Press Enter.

The prompt should now look like this:

```
ftp>
```

2. Type `open` and press Enter.

The next line displays “(to)”.

3. Type the IP address of the system, and press Enter.

4. Three lines will appear similar to the following examples:

```
Connected to 5.43.21.0
220-QTCP at sysname.location.company.com
220 Connection will close if idle more than 5 minutes.
```

5. On the next line, type your user name, and press Enter.

6. You are then prompted for your password. Type your password, and press Enter.

7. The next line informs you that the logon was successful.

8. At the `ftp>` prompt, type: `ascii` and press Enter.

9. At the next `ftp>` prompt, type `get MYLIB/QPCSMPT` and press Enter.

10. The next four lines inform you that the transfer is taking place:

```
200 PORT subcommand request successful.
150 Retrieving member QPCSMPT in file QPCSMPT in library MYLIB.
250 File transfer completed successfully.
6335 bytes received in 0.00 seconds (6335000.00 Kbytes/sec)
```

11. At the last `ftp>` prompt, type: `bye`. Press Enter.

Figure 326 shows the sequence of events in the FTP process as it would appear on the DOS session that was opened from Windows 95, Windows 98, or Windows NT.

```

C:\>ftp
ftp> open
(to) 5.43.21.0
Connected to 5.43.21.0
220-QTCP at sysname.location.company.com
220 Connection will close if idle more than 5 minutes.
User (5.43.21.0:(none)): ITS001
331 Enter password.
Password:
230 ITS001 logged on.
ftp> ascii
200 Representation type is ASCII nonprint.
ftp> get mylib/qpcsmprt
200 PORT subcommand request successful.
150 Retrieving member QPCSMPT in file QPCSMPT in library MYLIB.
250 File transfer completed successfully.
6335 bytes received in 0.00 seconds (6335000.00 Kbytes/sec)
ftp> bye
221 QUIT subcommand received.

C:\>

```

Figure 326. DOS screen session

12. At the `c:\>` prompt, type: `dir filename`. This lists the file that will be attached to the e-mail to be sent to your service provider.

---

## C.4 Sending a spooled file using FTP (binary)

For the purpose of this exercise and in the example described, we send communications entries from the Product Activity Log (PAL), collected and created in a spooled file named QPCSMPT:

1. Create a save file by entering:

```
crtsave file(qpcsmprt)
```

2. Perform steps 1 through to 7 in the sending a spooled file (ASCII), as explained in C.2, “Sending a spooled file using FTP (ASCII)” on page 316.
3. Save the physical file to a save file. Type `saveobj` and press the F4 key and then the F10 key. Enter the file name, library, device, save file, and library as shown in Figure 327 on page 320. Press Enter.

```

 Save Object (SAVOBJ)

Type choices, press Enter.

Objects > QPCSMPRT Name, generic*, *ALL
 + for more values
Library > MYLIB Name, generic*
 + for more values
Device > *SAVF Name, *SAVF, *MEDDFN
 + for more values
Object types *ALL *ALL, *ALRTBL, *BNDDIR...
 + for more values
Save file > QPCSMPRT Name
 Library > QGPL Name, *LIBL, *CURLIB

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

```

Figure 327. Save Object display

4. At the bottom of the screen, a message appears stating:

1 objects saved from library MYLIB.

Now transfer the save file to your PC.

5. Follow the same procedures outlined in C.3, “Transferring files from the AS/400e server to the PC” on page 318, with one change as shown in Figure 328.

```

DOSKey installed

C:\>ftp
ftp> open
(to) 5.43.21.0
Connected to 5.43.21.0
220-QTCP at sysname.location.company.com
220 Connection will close if idle more than 5 minutes.
User (5.43.21.0:(none)): ITSO01
331 Enter password.
Password:
230 ITSO01 logged on.
ftp> bin
200 Representation type is binary IMAGE.
ftp> get mylib/qpcsmprt
200 PORT subcommand request successful.
150 Retrieving member QPCSMPRT in file QPCSMPRT in library MYLIB.
250 File transfer completed successfully.
13596 bytes received in 0.06 seconds (226.60 Kbytes/sec)
ftp> bye
221 QUIT subcommand received.

C:\>

```

Figure 328. DOS session screen



6. At the `c:\>` prompt, type: `dir filename`. This lists the file that will be attached to the e-mail to be sent to your service provider.

---

## C.5 Service providers

When the size of the file to be sent exceeds the limit set by the corporate firewall, other methods of transferring the file are required.

IBM has provided a server called TESTCASE for customers to send large files for the service provider. Service providers can set up an account with Software Delivery and Fulfilment (SDF) to enable them to receive and exchange files, traces, dumps, and so on with their customers.

For further information, service providers need to obtain access to the SDF server Web site at:

<http://w3sms.boulder.ibm.com/w3sms.nsf/c00134a213f178748725642e007fcce3/cbbe0d039334ebf5872564cd0071d123?OpenDocument>



---

## Appendix D. Client Access console

AS/400 Client Access console support enables a personal computer (PC) to function as the AS/400 console. Using a Client Access console eliminates the need for a dedicated dependent workstation. It also eliminates the need for a twinaxial or ASCII workstation processor to connect the dependent workstation to the AS/400e server.

The PC connects directly to the AS/400 communication port using a special cable manufactured by IBM. Refer to Table 31 for the required part number.

For more information, refer to *AS/400 Client Access Console*, G325-6337.

---

### D.1 Hardware and software requirements

Table 30 shows the hardware and software needed to use a personal computer as the AS/400 console.

Table 30. Requirements for the Client Access console

| Personal computer requirements                                                                                                                                                                                                            | AS/400 requirements                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>– Pentium 100 (or later model) personal computer with a disk drive</li><li>– Windows or OS/2 operating system</li><li>– Minimum 16 MB of Random Access Memory (RAM)</li><li>– Serial port</li></ul> | <ul style="list-style-type: none"><li>– AS/400 Advanced Series* or newer</li><li>– OS/400 Version 3, Release 1 (or later)</li><li>– #2609, #2612 or #2721 adapter for the Multiple Function Input/Output Processor (MFIOP)</li><li>– Special communication cable (see Table 31)</li></ul> |
| *AS/400 Advanced Portable Model P01 or P02 do not support asynchronous console.                                                                                                                                                           |                                                                                                                                                                                                                                                                                           |

Table 31. Communication cable information

| Communication IOP type | Cable length | Part number |
|------------------------|--------------|-------------|
| PCI                    | 6 m (20 ft)  | 44H7504     |
| SPD                    | 6 m (20 ft)  | 46G0450     |
| SPD                    | 2.5 m (8 ft) | 46G0479     |

---

### D.2 Checklist for Client Access console

When you encounter a problem during installation of the Client Access console, use this section for a problem analysis checklist.

On the personal computer:

- If the IBM Personal Communication software product is installed on the PC, uninstall the software before you install the 5250 component of the Client Access for Windows 95/NT.
- The latest service pack for Client Access should be installed.

On the AS/400e server:

- Ensure the communications adapter, which is used for the Client Access console, is attached to the multiple function input/output processor (MFIOP).

- The special cable used is the correct one. Refer to Table 31 on page 323 for the correct part number. There is a similar cable for Operations Console with a different part number. For more information on Operations Console, refer to *AS/400 Operations Console Setup V4R4*, SC41-5508.

## Appendix E. Using the control panel

The control panel is a service and operator interface to the operating system, main storage, program instructions, and other internal structures. This appendix explains how to use the control panel to stop the CPU. This procedure is useful to help you identify and diagnose a program loop.

More detailed information is found in *System Operation*, SC41-4203.

### E.1 Stopping the CPU

To stop the CPU, follow these steps:

1. Set the keylock switch **4** on the system control panel to the **Manual** position.

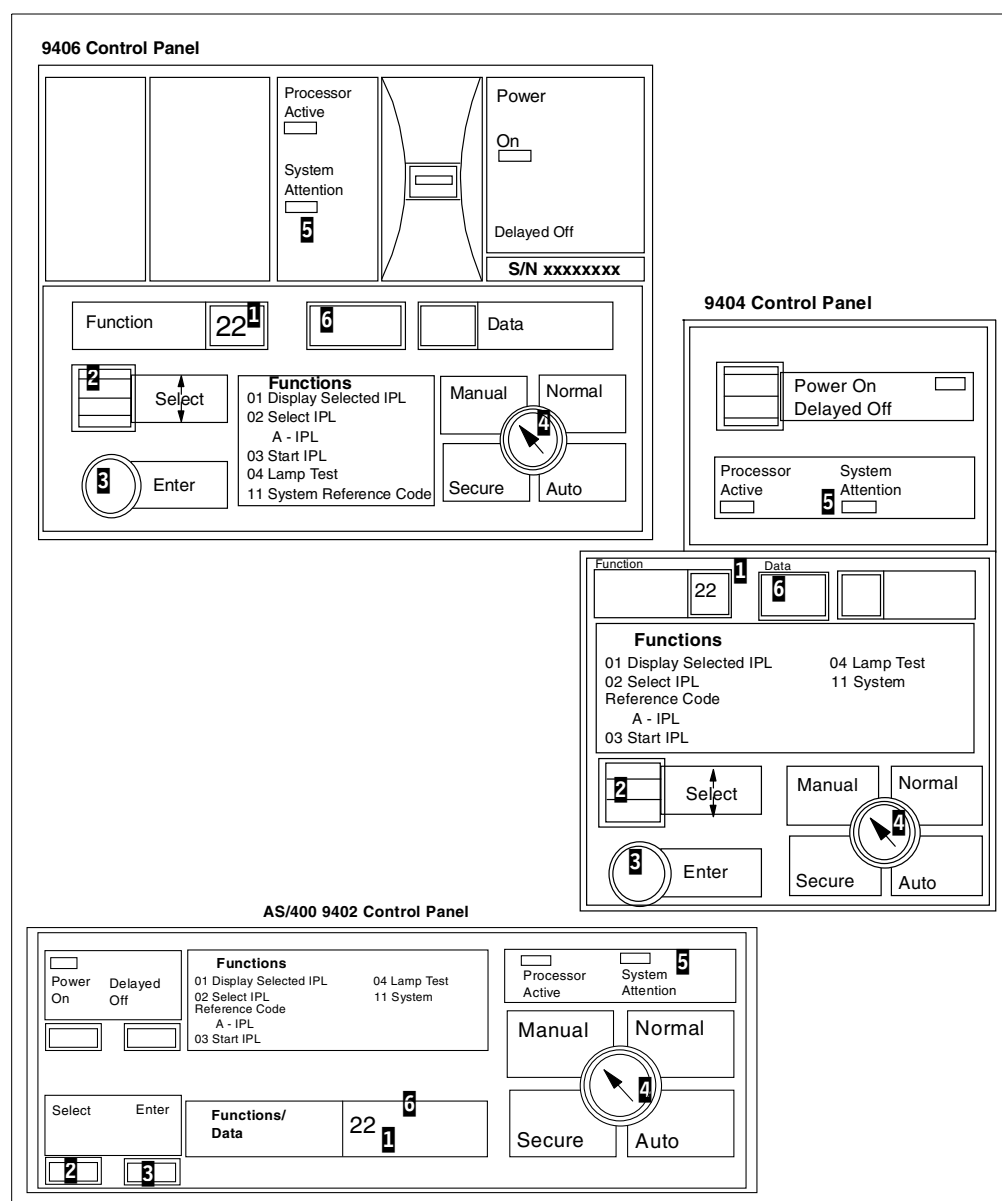


Figure 329. System control panel

2. Press the Select switch **2** until Function 25 **1** is shown in the Function display **1**.
3. Press the Enter switch **3**. The following information appears in the data panel **6**:
  - On the 9404 System Unit and 9406 System Unit: 25 0000 0000
  - On the AS/400 9402 System Unit: '25      00'
4. Press the Select switch **2** until Function 26 is shown in the Function display **1**.
5. Press the Enter switch **3**.
 

After Function 26 is selected and entered, Function 01 and the IPL mode (A through D) are displayed.
6. Press the Select switch **2** until Function 50 is shown in the Function display **1**.
7. Press the Enter switch **3**.
 

The following information appears in the data panel **6**:

D100 900F      or      D100 9016

These SRCs indicate IMPI processor was successfully stopped.
8. Press the Select switch **2** until Function 51\*\* is shown in the Function display **1**.
9. Press the Enter switch **3**.
10. Press the Select switch **2** until Function 5100 is shown in the Function display **1**.
11. Press the Enter switch **3**.
12. Record the information on the data panel.
13. Press the Select switch **2** until Function 5101 is shown in the Function display **1**.
14. Press the Enter switch **3**.
15. Record the information on the data panel.
16. Press the Select switch **2** until Function 5102 is shown in the Function display **1**.
17. Press the Enter switch **3**.
18. Record the information on the data panel.
19. Press the Select switch **2** until Function 5103 is shown in the Function display **1**.
20. Press the Enter switch **3**.
21. Record the IMPI status information that you can view on the data panel.

Table 32 shows an example of the information that can be collected and the data that is shown in step 3 in this process.

*Table 32. An example of subfunction data shown on the control panel*

| Example for Function 51 and subfunctions on the 9406 system unit | Data display             | Information                                                                    |
|------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------|
| 51**                                                             | Subfunction mode entered |                                                                                |
| 5100                                                             | 01EF C100                | 01EF is the instruction number. C100 is the first part of the program address. |
| 5101                                                             | 1A00 80B1                | 1A0080B1 is the rest of the program address.                                   |
| 5102                                                             | 1004 EE3B                | This is the first part of the current TDE.                                     |
| 5103                                                             | 54C1 0101                | 54C1 is the rest of the current TDE.<br>0101 is not important.                 |

## E.2 Starting the CPU

Start the CPU only after it has been stopped using Function 50. To start the CPU, follow these steps:

1. Press the Select switch **2** until Function 51\*\* is shown in the Function display **1**.
2. Press the Enter switch **3** or data panel **6**.
3. Press the Select switch **2** until Function 52 is shown in the Function display **1**.
4. Press the Enter switch **3** or data panel **6**.

The CPU is started, and your system is now running.

Your service provider will use the information you recorded to determine whether there is a problem on your system.





---

## Appendix F. Using system flight recorders

A *flight recorder* is an object that stores trace information to record a history of what has happened in system programs. The flight recorder contains only information that will help identify the flow of system programs and certain status information.

### Note

A flight recorder should be used only under the direction of your service provider.

---

### F.1 Getting started

Before you start to work with flight recorders, follow these steps:

1. If you have not created the IBMLIB library or IBMOUTQ output queue, enter the following commands:

```
CRTLIB LIB (IBMLIB)
CRTOUTQ OUTQ (IBMLIB/IBMOUTQ)
```

2. Enter the following commands to add the IBMLIB library to your library list and to change the output queue for your own job to the IBMOUTQ output queue:

```
ADDLIBLE IBMLIB
CHGJOB * OUTQ (IBMLIB/IBMOUTQ)
```

3. Enter the following commands to send the spooled files created to the output queue IBMOUTQ in the library IBMLIB:

```
OVRPRTF FILE (QPSRVDMP) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QPJOBLOG) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QPDSPOLK) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QPDCCCTL) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QPDCEDEV) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QSYSPT) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QPDSPLOG) OUTQ (IBMLIB/IBMOUTQ)
```

The printer file overrides are not in effect after your job ends.

---

### F.2 Dump Flight Recorder API (QWTDMPFR)

The Dump Flight Recorder API (QWTDMPFR) dumps the contents of the flight recorders for jobs that have them.

The following types of jobs have flight recorders:

- Subsystem monitors
- System jobs

When the QWTDMPFR API is called, it causes the contents of the jobs' flight recorders to be dumped.

To dump the flight recorders, type the following command:

```
CALL QWTDMPFR
```

The QPSRVDMP spooled file is created for each job dumped.

---

### F.3 Dump VLIC Lock Flight Recorder API (QWTDMPPLF)

The Dump VLIC Lock Flight Recorder API (QWTDMPPLF) performs the following tasks:

- Dumps the VLIC Lock Flight Recorders for the device that is specified in the parameter passed to the program
- Collects job logs for QSYSARB and QLUS
- Collects job logs for all active jobs that have touched the device
- Collects the history log (QHST)
- Collects the line, controller, and device descriptions
- Collects a WRKOBJLCK of the device
- Collects a WRKCFGSTS of the controller
- Collects subsystem descriptions of active subsystems that have touched the device
- Dumps associated internal system objects

To use the VLIC Lock Flight Recorder, follow these steps:

1. Turn on the flight recorder, and type the following command:

```
CALL QWTSETLF (*ON)
```

2. Recreate the steps that caused the error.

3. Type the following command:

```
CALL QWTDMPPLF (device)
```

**Note**

*(device)* is the name of the device with the lock problem.

4. To turn off the flight recorder, on a command line, type:

```
CALL QWTSETLF (*OFF)
```

---

## Appendix G. PTF delivery over the Internet

One of the recent productivity enhancements in AS/400e serviceability is the ability to access IBM-supplied program temporary fixes (PTFs) over the Internet. This facility is known as iPTF and provides the ability to select, order, and download PTFs directly to an AS/400e server. The new facility is named iPTF to distinguish it from the traditional method of ordering PTFs for the AS/400e server, over the Electronic Customer Support (ECS) line.

This appendix introduces this iPTF facility and explains the connections and the requirements to configure and operate the connection. It assumes you are familiar with ordering PTFs using an ECS connection.

Refer to *AS/400 Basic System Operation, Administration, and Problem Determination*, SC41-5206, for information on PTFs and operating the ECS connection. You can find more information on iPTF delivery on the Web at: <http://as400service.ibm.com>

---

### G.1 Connection options

Two connection topologies are used for iPTF:

- A dial-up connection to the Internet from the client workstation
- A direct connection to the Internet using a firewall from the local area network

The two connection topologies are illustrated in Figure 330 and Figure 331 on page 332.

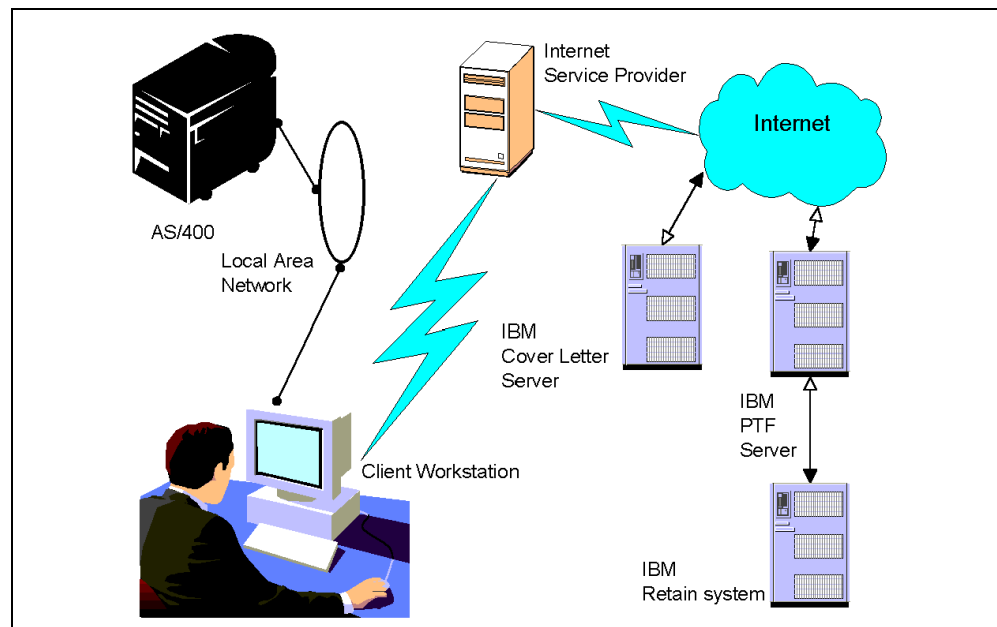


Figure 330. Dial-up Internet connection

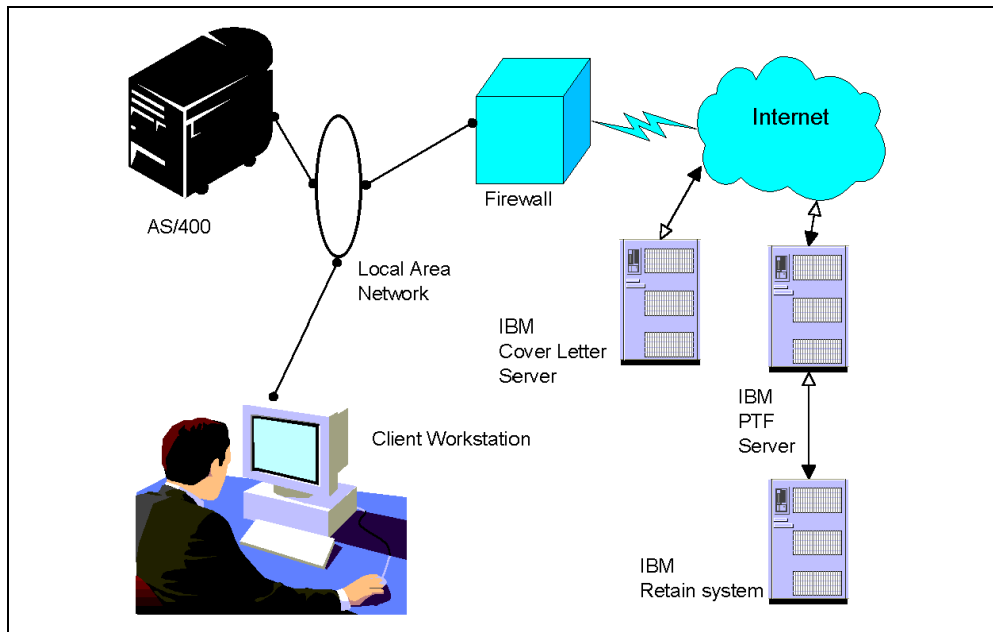


Figure 331. Direct Internet connection

## G.2 Requirements for Internet PTF delivery

The delivery of PTFs over the Internet to an AS/400e server requires a number of distinct logical connections. Requirements that must be in place to operate an iPTF connection are:

- A sign-on to the IBM Cover Letter server
- A client workstation with a supported Web browser
- A LAN connection between the client workstation and the AS/400e server
- An Internet connection

The following sections provide further details on each of the required components.

### G.2.1 The IBM Cover Letter server

A sign-on registration to the IBM Cover Letter server is obtained by completing the registration request form, which is available on the Internet. The request form requires name and address details, an IBM customer number, and an AS/400e machine serial number. The request is typically processed the next business day. The sign-on details are returned to the e-mail address specified on the registration request form.

The iPTF Registration page is shown in Figure 332.

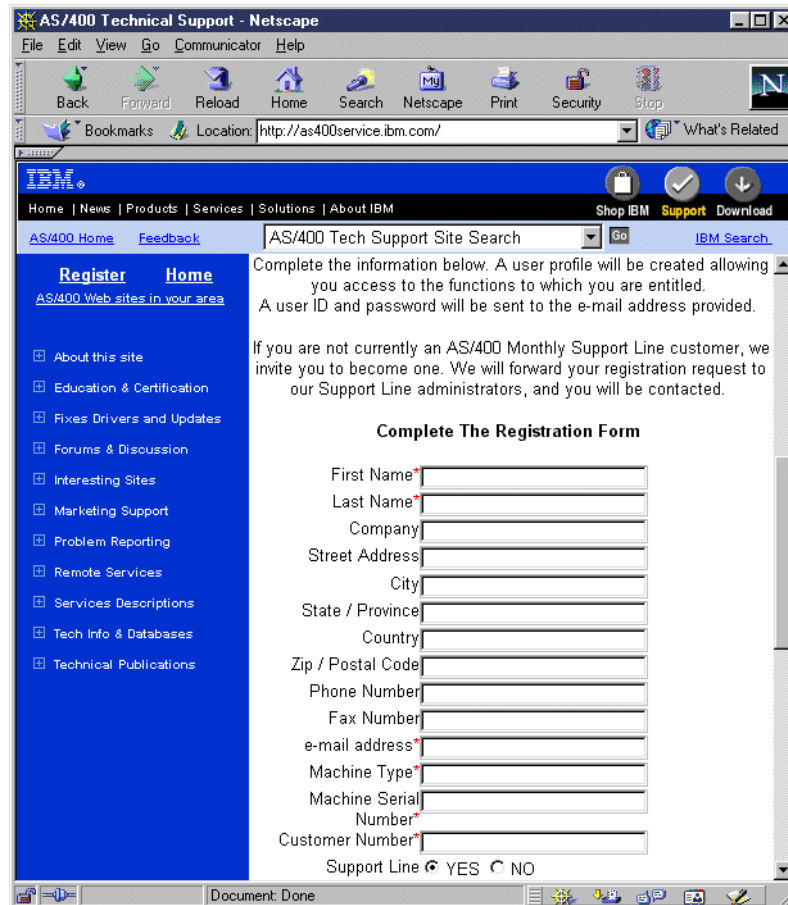


Figure 332. iPTF registration

You can locate the registration request form on the Web at:  
<http://as400service.rochester.ibm.com>

## G.2.2 The client workstation

The client workstation is a PC that uses Windows 95, Windows 98, or Windows NT. Windows 95 and Windows 98 client workstations are used in the direct connection scenario illustrated in Figure 331. The workstation is required to be “SOCKSified”, when the client is located inside a firewall. “SOCKSified” involves loading software that directs the client to use a TCP/IP sockets server when interfacing with Internet locations outside the local network or domain.

There are different methods for configuring the implementation of a TCP/IP sockets server. The configuration within each network varies. When you set up the socks definitions on the client workstation, obtain the unique list of local network definitions from your local network administrator.

A useful socks tool that is readily available and free of charge from the Internet is found at: <http://www.hummingbird.com>

The IBM Web page at <http://as400service.ibm.com> provides a link to an application to test your socks configuration.

Refer to Figure 334 on page 337 for an display of the iPTF Web page.

Windows NT is required in the dial-up Internet connection scenario, illustrated in Figure 330 on page 331. This is due to the fact that Windows 95 and Windows 98 have difficulty in managing two separate TCP/IP profiles required for the AS/400e and dial-up Internet connections.

Windows NT may also be used in the Direct Internet scenario in Figure 331 on page 332.

The client workstation is required to have a supported version of an Internet browser and Java Virtual Machine. Refer to the online documentation on the Internet for details on these requirements.

Setup, configuration, and requirements information is found on the iPTF Web page at: <http://as400service.ibm.com>

### G.2.3 The AS/400e environment

AS/400e requirements to implement the iPTF function include:

- The AS/400e server must be at V4R2 of OS/400 or a later release.
- The AS/400e server must have a local area network connection to the client workstation. This facilitates a TCP/IP connection to the client workstation and the firewall or gateway.
- The Host Servers option of OS/400 must be installed, and TCP/IP must be running.
- The QUSER user profile must be enabled.
- The user requesting PTFs over the Internet requires \*USE authority to the SNDPTFORD command.

Refer to the *Setup, Configuration and Requirements* information on the iPTF Web page at: <http://as400service.ibm.com>

---

## G.3 Internet PTF delivery rules

In addition to the hardware and software requirements necessary for the iPTF function (outlined in G.2, "Requirements for Internet PTF delivery" on page 332), there are several rules that apply to the PTF process that are also enforced in this connection.

The permission to download PTFs from the IBM PTF Server is based on the same rules that apply to an ECS request. Contact your local IBM Service Representative to verify your entitlement to use ECS.

The iPTF connection has a maximum download limit, currently set to 15 MB. This is higher than the limit set for the ECS connection. Because the download throughput is significantly higher on an Internet connection, a higher volume of data is transferred over the Internet link in a similar time frame as compared to an ECS connection.

---

## G.4 Three logical connections

When the user visits the IBM Cover Letter server, and selects the desired PTFs, a digitally signed Java applet is downloaded to the client workstation. This applet controls three logical connections:

- **A local connection:** A connection is established between the client workstation and the AS/400e server. The server contact information is retrieved and packaged as part of the PTF request.
- **A remote connection:** A connection is established between the client workstation and the IBM PTF Server. This is the connection over which the applet passes the details of the request into the IBM Retain system, which acts as the repository for all available PTFs for both iPTF and ECS requests.
- **A download connection:** A connection is established between the AS/400e server and the IBM Retain system as a conduit for the PTF download. The PTF cover letters and the PTF save files are downloaded to AS/400 disk storage over this connection and moved into the QGPL library. The end result of the iPTF and ECS connections is identical from an AS/400e point of view.

---

## G.5 Order options

The options presented to the user making the request are the same as those given to an ECS request. The user has the following choices:

- Order cover letters only
- Request delivery on media, if the transmit limit is exceeded
- Request required PTFs to be included with the order
- Re-order PTFs

---

## G.6 Eastern or Western hemisphere

An additional selection must be made when ordering PTFs using the iPTF function. To identify the Retain system node that is physically closest to your location, you are asked to select either:

- Eastern Hemisphere
- Western Hemisphere

The Western Hemisphere option selects the USA-based Retain system node for the USA, Canada, and Latin America.

The Eastern Hemisphere option selects the European-based Retain system node for Europe, Asia, and Pacific regions.

---

## G.7 Java Console

The Java Console can be displayed by selecting the appropriate pull-down menu item, depending on your browser. The Java Console window provides a log of the events recorded when running the Java applet downloaded from the IBM Cover Letter server.

Check the Java Console to ensure that the client workstation has a supported level of the Java Virtual Machine code and can be used in problem determination regarding the iPTF functions.

An example Java Console window prior to starting an iPTF request is shown in Figure 333. Note that the version of the Java Virtual Machine is recorded as the first message.

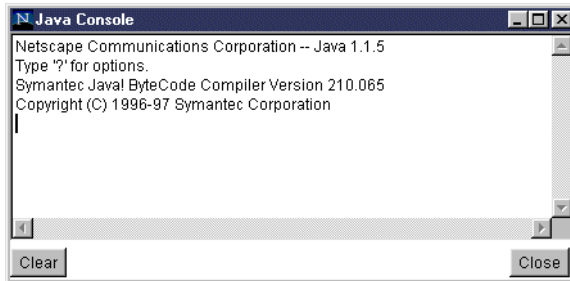


Figure 333. Java Console window

---

## G.8 Applet certification

Before the Java applet is downloaded to the client workstation, the user is prompted to accept a Java certificate, which grants IBM permission to download the Java applet to the client workstation.

This display identifies the IBM server as the source of the applet and requests the user to grant permission for the download to proceed. This is simply a matter of Internet etiquette. The IBM server is asking your permission to copy the Java applet to your PC before attempting to do so.

---

## G.9 IBM Retain system

The IBM Retain system is a worldwide database that includes AS/400e problem management reports (PMRs), authorized problem analysis reports (APARs), and PTF images.

---

## G.10 Contact information

The Java applet that runs on the client workstation initiates a connection to the AS/400e server. This link is used to retrieve the information from the AS/400e contact information. Use the Work with Contact Information (WRKCONTINF) command on the server to change the data that is automatically retrieved. Refer to *AS/400 Basic System Operation, Administration, and Problem Handling*, SC41-5208, for further information.

The connection between the AS/400e server and the client workstation is also used to create an entry in the problem log to retrieve attributes about the system (such as the machine serial number) and the levels of system software and cumulative PTF package currently installed.



---

## G.11 A problem number

In the same manner as an ECS request, the problem log has an entry created that contains the details of the transaction with the IBM PTF server, including the service number assigned to the transaction. There is a record of each iPTF transaction, on both the AS/400e server and the IBM Retain system.

---

## G.12 PTF application

The PTF application process remains unchanged when iPTFs are involved. PTFs are applied using the same methods as obtaining PTFs using ECS.

Refer to *AS/400 Basic Operations, Administration and Problem Handling*, SC41-5208, for further information about applying the PTFs once they are downloaded to your AS/400e server from the IBM PTF server.

---

## G.13 The iPTF Web page

The main Internet site for the iPTF function is shown in Figure 334.

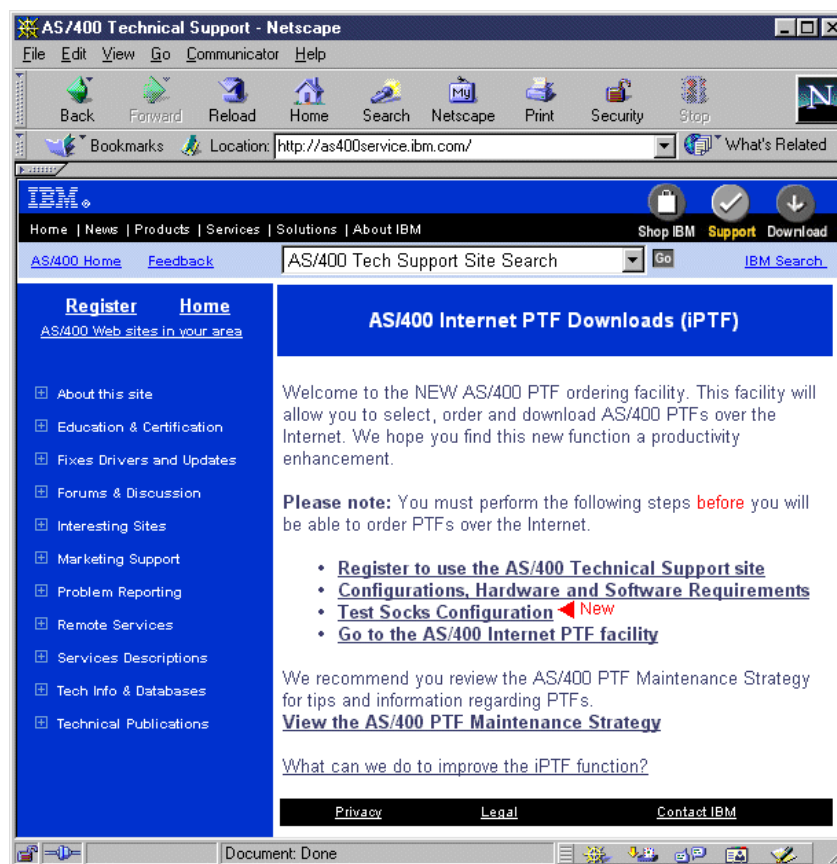


Figure 334. iPTF Internet page

The site to access the iPTF function is: <http://as400service.ibm.com>

---

## G.14 iPTF problem determination checklist

Ordering PTFs from the Internet involves processes that are not routine for the system operator on a daily basis. To assist in this process, a checklist is useful when problems occur. Check the areas shown in Table 33 when problems are encountered with the iPTF connection.

Table 33. iPTF problem determination checklist

| Problem area                                        | Check ...                                                                                                                                                                                            |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection to the IBM Cover Letter server           | This is a standard HTTP connection and should be available if you can connect to other Internet sites. Contact your network administrator.                                                           |
| Local connection to the AS/400e server              | Check the AS/400e TCP/IP configuration.                                                                                                                                                              |
|                                                     | Check the definition for the AS/400e server on the client workstation.                                                                                                                               |
|                                                     | Check for possible interference from the Java Toolbox on the PC.                                                                                                                                     |
|                                                     | Verify if there is a firewall between the AS/400e server and the client workstation.                                                                                                                 |
|                                                     | Check the Internet for the latest fixes for your Web browser.                                                                                                                                        |
| Client workstation connection to the IBM PTF server | When the connection is made to the IBM PTF server and to the IBM Retain system, the client workstation displays the contact information screen. Check the Java Console log if this is not presented. |
|                                                     | Check for possible interference from the Java Toolbox on the PC.                                                                                                                                     |
|                                                     | Check the client workstation SOCKSification.                                                                                                                                                         |
|                                                     | Verify that an FTP connection can be made to another location outside the firewall, for example <code>FTP CDROM.COM</code>                                                                           |
| Client workstation socksification                   | Contact your local network administrator. Contact your firewall administrator.                                                                                                                       |

Where the problem appears to be with the IBM server, you can report problems with connectivity to the IBM iPTF Internet locations to your local IBM support organization.

Comments and suggestions regarding the functionality of the iPTF facility are welcome. The IBM iPTF site <http://as400service.ibm.com> has a facility to feed comments back to the Web master for this site.

---

## G.15 An example Java Console log

The following partial Java Console log was generated from a successful iPTF download. This example is supplied as a reference. The specific entries in your log may vary from those shown in the example. However, the overall flow follows this form:

```

Ptfapplet -- in Init().. with the button start....!
L
N
N
Y
N
SF49767
1
the country code is 00
Ptfapplet -- in Init().. end of init method..!
Ptfapplet -- in action method..!
Ptfapplet -- in action method button pushed...!
 from the thread ...initdata()....
Ptfapplet -- in action() method..after thread is run..!
Ptfapplet -- in action() method.thread result is!
null
Ptfapplet -- in action() method..returning from action()..!
 from the thread ...PtfappletThread.
 from the thread ...printing parms read in
L
N
N
Y
N
SF49767
1
 from the thread ..endprinting parms read in
starting to assert permissions!
asserting permissions for aa !
asserting permissions for aa is done!
starting to assert permissions for ssssssss!
enabling dummy privileges for ssssssss!
asserting permissions for ssssssss is over!
Asserting permissions finished !!
completed asserting permissions!!
AS400 SIGNON!
java.io.FileNotFoundException:
as400service.rochester.ibm.com:80//javasrc/com/ibm/as400/access/MRI_en_US.class
java.io.FileNotFoundException:
as400service.rochester.ibm.com:80//javasrc/com/ibm/as400/access/MRI_en.class
java.io.FileNotFoundException:
as400service.rochester.ibm.com:80//javasrc/com/ibm/as400/access/MRI_en_US.class
java.io.FileNotFoundException:
as400service.rochester.ibm.com:80//javasrc/com/ibm/as400/access/MRI_en.class
java.io.FileNotFoundException:
as400service.rochester.ibm.com:80//javasrc/com/ibm/as400/access/MRI.class
enabling dummy privileges for ssssssss!
enabling dummy privileges for ssssssss!
enabling dummy privileges for ssssssss!
enabling dummy privileges for ssssssss!
enabling dummy privileges for ssssssss!
i am going to attempt a connect to 400 now !
enabling dummy privileges for ssssssss!
enabling dummy privileges for ssssssss!
i just attempted connection !
ready to do a program call !
just did a program call !
program ran OK !!!!
0
0

here is the port number!
nnnn
 opening socket to RETAIN
 here1....
 here2....
 US retain connection requested...
 hey we have nn from retain
 writing to RRRRRR the SECURE token
 reading confirmation token from RRRRRR
 confirmation token from RRRRRR received
 opening socket to 400
 connected port on 400
nnnn
 building Ao record
 in parser ---uid is..??????
 in parser ---token is...."??????"
 writing to socket

```

```

reading from socket
length received on B0 is
building A1 record
from parser .. numptfs is1
timeout on 400 socket is300000
timeout on retain socket is330000
reading from socket.. response to A1
hey we have ITS0 here
hey we have 70 from RRRRRR
hey we have 00 from 400
hey we have 70 from RRRRRR
hey we have 35 record...from 400
08
pad_string length is 42
hey we have 60 from rrrrrr
hey we have 61 from 400
hey we have 66 from RRRRRR
debug line parseutil
debug line parseutil..compute_cumulative_ptf_size
hey we have 51 from RRRRRR
hey we have 51 from RRRRRR
hey we have 51 from RRRRRR
hey we have 51 from RRRRRR
hey we have 74 from RRRRRR
hey we have 76 from 400
hey we have 75 from RRRRRR
hey we have 76 from 400
hey we have 72 from RRRRRR
hey we have 78 from 400
debug line parseutil
in the try block of finally
closed both sockets...
stealth
opening a good page

```

## Appendix H. Copying displays to another display

OS/400 allows you to copy display images from one user display (the source) to another user display (the target). This allows the second user to view the problem as it occurs.

The following requirements must be met to copy display images to another display station:

- Both display stations are defined to the system.
- Both displays are color, or both are monochrome, but one cannot be color when the other is monochrome.
- Both displays have the same number of character positions horizontally and vertically.

### H.1 Starting copy screen

To copy screen images from one user to another, follow these steps:

1. Type `STRCPYSCN`, and then press the F4 key. A display appears like the one shown in Figure 335.

**DSP01**

File Edit Transfer Appearance Communication Assist Window Help

Start Copy Screen (STRCPYSCN)

Type choices, press Enter.

|                                  |                 |                         |
|----------------------------------|-----------------|-------------------------|
| Source device . . . . .          | _____           | Name, *REQUESTER        |
| Output device . . . . .          | _____           | Name, *REQUESTER, *NONE |
| Job queue . . . . .              | <u>QCTL</u>     | Name                    |
| Library . . . . .                | <u>*LIBL</u>    | Name, *LIBL, *CURLIB    |
| File to receive output . . . . . | <u>*NONE</u>    | Name, *NONE             |
| Library . . . . .                | _____           | Name, *LIBL, *CURLIB    |
| Output member options:           |                 |                         |
| Member to receive output . . .   | <u>*FIRST</u>   | Name, *FIRST            |
| Replace or add records . . . .   | <u>*REPLACE</u> | *REPLACE, *ADD          |

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

Bottom

05/037

Figure 335. Start Copy Screen (STRCPYSCN) display

2. Type the identification (ID) of the display station that is sending the copied displays in the source device parameter field. The ID can be found in the top right-hand corner of the sign-on menu screen.
3. Type the ID of the display station that will receive the copied displays, and press Enter.

The source device receives a message as shown in Figure 336 on page 342.

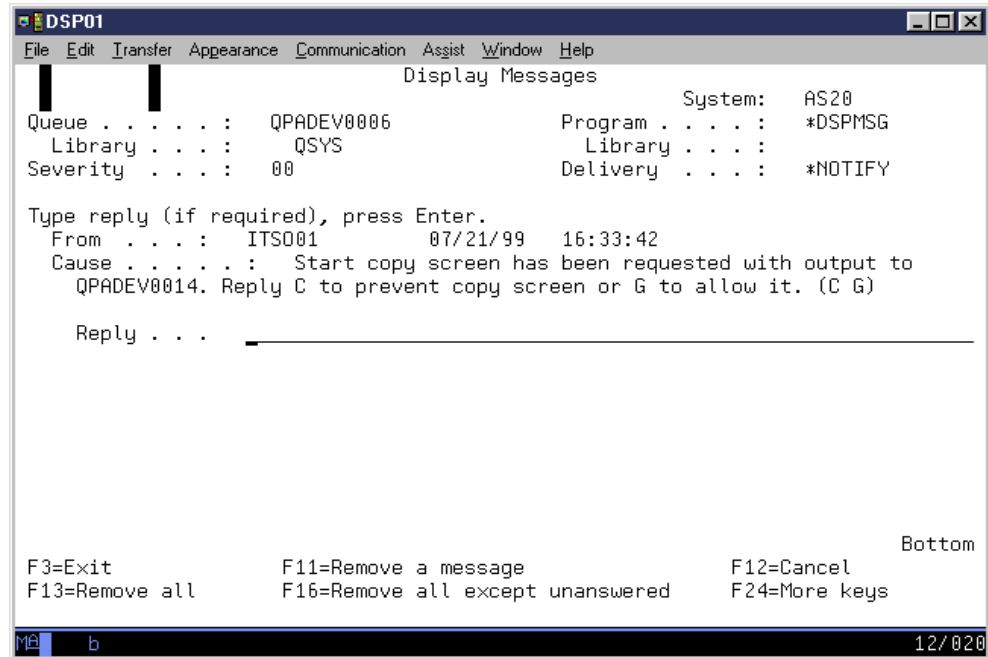


Figure 336. Display Messages

4. Type **G** in reply to the message, and press Enter. The sending display station's screens are copied to the other display station.

The image shown on the receiving display trails the sending display station by one display. The next example shows the sending display on the Start a Service Tool screen (Figure 337) and the receiving display station on System Service Tools (Figure 338).

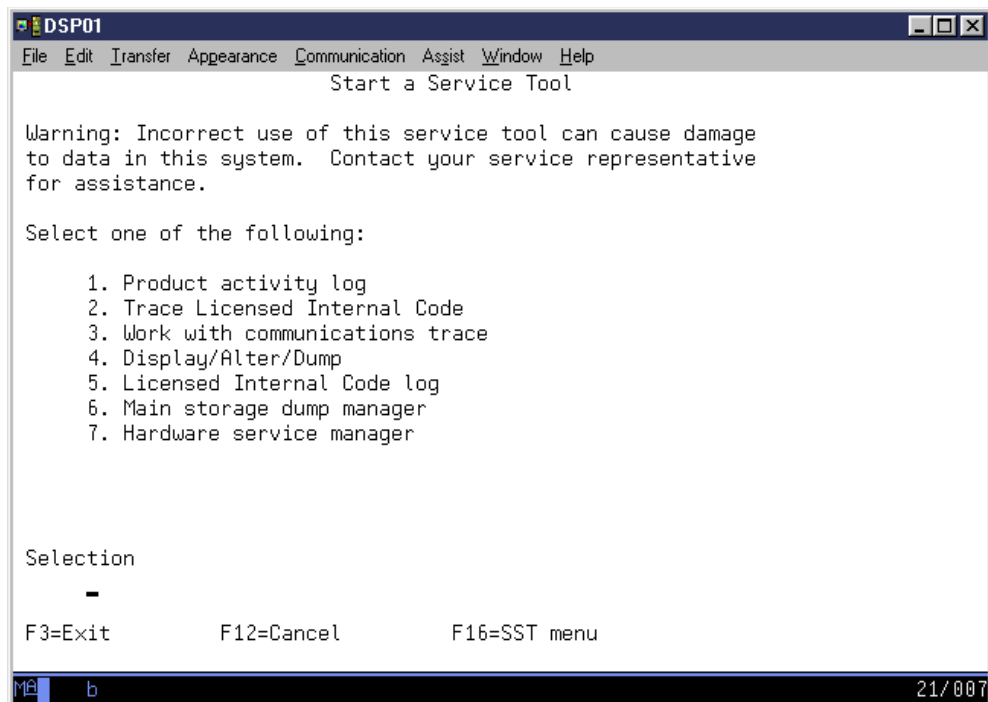


Figure 337. Start a Service Tool menu

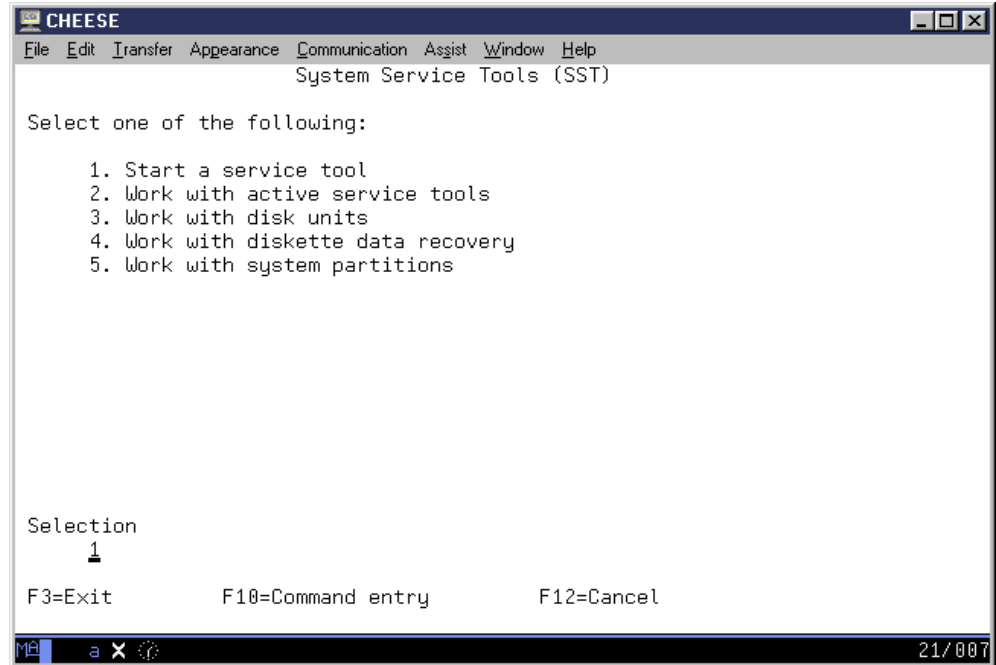


Figure 338. System Service Tools menu

---

## H.2 Ending copy screen

While you are copying screens, the operator of the receiving display station cannot do any other work at that display station until the copying of screens is ended.

To end the copy screen function from the sending display station, complete these steps:

1. Type `ENDCPYSCN` and then press Enter. The message shown in Figure 339 on page 344 appears a few moments later.

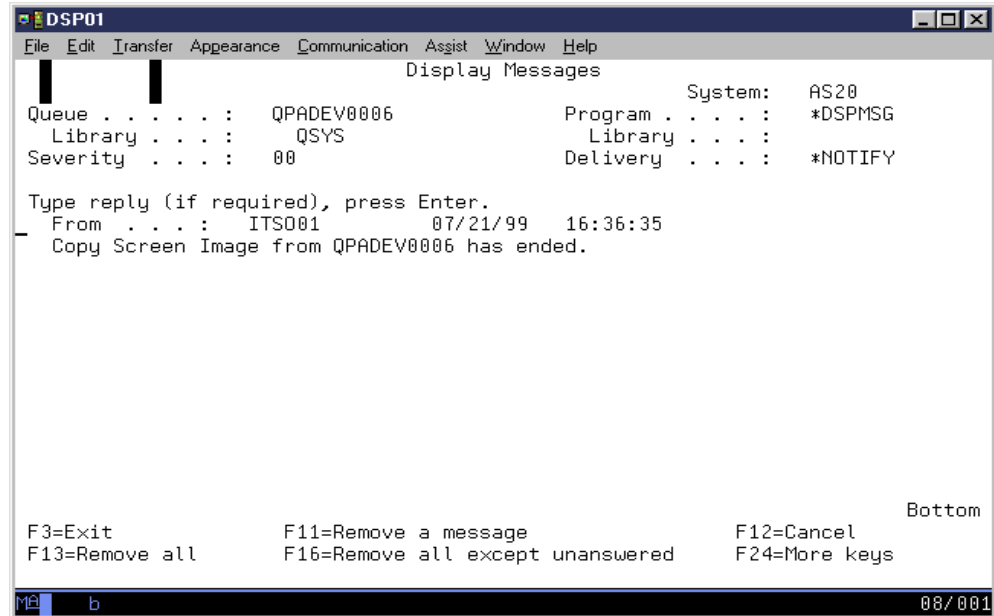


Figure 339. Display Messages display

2. To end copy screen function from the receiving display station, perform the following steps:
  - a. Press and hold the Alt or Shift key and press the System Request (SysRq) key, or right-click and click **SysRq**.
  - b. Type `ENDCPYSCN`, and press Enter.



---

## Appendix I. Damaged objects

One of the most frequently misunderstood topics within the AS/400e environment is damaged objects. The objective of this appendix is to provide an understanding of what is meant by the term *damaged object*, how to recognize a damaged object, and what actions are available to recover them.

---

### I.1 Object damage

A damaged object is an object whose internal structure is not as expected by the software that uses the object. AS/400e software (in specific, the Licensed Internal Code (LIC)) and the operating system (OS/400) determine how extensive the damage is. The software indicates to the system operator that a damage condition has been encountered. The cause of the encountered damage, in many cases, remains unknown.

#### I.1.1 Degrees of damage

There are two main levels or degrees of damage, partial and full, as described in the following section.

##### I.1.1.1 Partial damage

An object that is said to have partial damage is in a state that some, but not all, operations with the object can still be performed. For example, it may be possible to read the data from a damaged file, but not possible to perform operations on the object, such as a save.

Partial damage is also referred to as *soft damage*.

##### I.1.1.2 Full damage

An object that is said to be fully damaged is unusable. It is not possible to access the object using any of the standard system interfaces such as commands or system APIs. It may still be possible to access the object or part of the object by using the System Service Tools (SST).

Full damage to an object is marked in the header of the object as such.

---

### I.2 Suspended object

An object can be in what is referred to as a *suspended state*. This means that the object is not usable, but the object is not damaged.

When an object is saved, an option can be chosen to free most of the storage associated with that object (for example, the \*STGFREE parameter to free storage). The object is addressable in this state. It retains its virtual address within the system. However, before the content of the object is used, the object needs to be restored from backup. Because the object maintains the same virtual address when it is restored, existing pointers to the object are functional.

For example, when trying to display the member of a physical file that has been saved with a storage \*FREE option, the following message is displayed:

PDM0367 - File TESTFILE in library TESTLIB saved with STG(\*FREE) specified.  
Restore the file and try the request again.

---

### I.3 Causes of damage

An object can become damaged when there is a malfunction to prevent an operation from completing. Examples include:

- An unscheduled system power outage
- Equipment failure
  - A disk fails to read an object from auxiliary storage (read error)
  - A hardware problem causes data to become corrupt
  - A requested operation is not completed within the required time limit

As well, it is possible for user action or an application to cause an object to become unusable. In this situation, while the objects affected are in an invalid state from an application perspective, the objects are rarely damaged from an OS/400 view.

---

### I.4 Indications of damage

At the time that a damage condition is initially encountered by software, the system issues a message that the object concerned has sustained damage. This is frequently accompanied by a Licensed Internal Code log (LIC log) entry that is written. Subsequent requests to use the object also cause a message to be issued. Users encounter a message that the object concerned has been previously marked as damaged, and as such, the operation cannot continue.

The usual indications of hard damage seen by the user, includes one or more of the following symptoms.

- Unable to save the object
- Unable to use the object
- Unable to examine the object

In each case, the fact that an operation on an object is not possible due to object damage is reported in a message. The message is issued to the history log (QHST) and to the system operator message queue (QSYSOPR).

When an IPL is performed, the system attempts to locate damaged objects and add them to the object recovery list. The system issues messages to the history log, and logs message CPF8197 to the system operator message queue to indicate that damaged objects were found during the IPL. Some damage may not be detected until the object is used.

The text of CPF8197 is shown in Figure 340.

```

Message ID : CPF8197
Message file : QCPFMSG
Library : QSYS

Message : Damaged objects found during IPL, &1 message(s) sent.
Recovery . . . : Use the DSPLOG command to see the history log for damage
 message(s) .

```

Figure 340. CPF8197 message

**Note**

Damage to the contents of a database file is not indicated during IPL.

The recovery component of OS/400 monitors for messages from the LIC (such as MCH1604) and reflects these in the history log as CPF81xx messages. LIC issues MCHxxxx messages to indicate a machine check condition. MCHxxxx messages signify the writing of an LIC log entry. In some cases, you need the service provider's assistance to determine which object the system identifies as damaged.

#### I.4.1 Locating messages about object damage

When you are not certain if there are any instances of damage, use the steps suggested in *OS/400 Backup and Recovery*, SC41-5304. For easy reference, the steps are listed here:

1. Enter the `DSPLOG` command to produce a spooled file of the messages from the history log.
2. If appropriate, use the date and time range parameters to limit the search.
3. Locate and display the spooled file.
4. Use the F16 (Find) function to locate messages in the log that contain character strings of "damage" or "sync". This is shown in Figure 342 on page 348.
5. For the object found in the history log spooled file, note the names and the associated object's type of the object.
6. Based on the object type, as noted in Table 35 on page 350, select the correct recovery.

Figure 341 on page 348 shows an example of a message relating to a damaged object.

```

Additional Message Information

Message ID : CPF3763 Severity : 20
Message type : Diagnostic
Date sent : 07/17/99 Time sent : 15:44:17

Message : FILE TESTFILE in library QGPL previously damaged.
Cause : FILE TESTFILE in library QGPL was damaged on the system
before the save or restore operation. One of the following occurred:
-- If this is a save operation, the object was not saved.
-- If this is a restore operation and the object can be deleted by the
system, it will be restored automatically.
-- If this is a restore operation and the object cannot be deleted by the
system, message CPF3819 will appear, and the object will not be restored.
Recovery : Do one of the following:
-- If you are saving the object and the object has recently been saved,
delete the object and restore it from the previous save operation (RSTOBJ
command).
-- If you are restoring the object and it can be deleted by the system, no
action is necessary.
-- If you are restoring the object and message CPF3819 appears, you must
delete FILE TESTFILE in library QGPL and restore it (RSTOBJ command).
For more information about handling damaged objects, see the Backup and
Recovery book, SC41-5304.

Press Enter to continue.

F3=Exit F6=Print F9=Display message details F12=Cancel
F21=Select assistance level

```

Figure 341. Previous damage encountered

```

Display Spooled File

File : QPDSPLOG
Control
Find : damage
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8...+..
 QPADEV0004 OPER01 004552 07/17/99 15:41:12
CPF3763 20 DIAGNOSTIC FILE TESTFILE in library QGPL previously damaged.
 QPADEV0004 OPER01 004552 07/17/99 15:44:17
CPF3770 30 ESCAPE No objects saved or restored for library QGPL.
 QPADEV0004 OPWE01 004552 07/17/99 15:44:17

```

Figure 342. Using F16 to find a string

Refer to Chapter 4, “Collecting messages” on page 29, 4.5, “Messages in the system operator message queue (QSYSOPR)” on page 41, and Chapter 6, “Collecting the history log (QHST)” on page 69, for information on:

- Messages
- The system operator message queue
- The history log

These chapters and section can help you determine where the messages are and provide guidance to capture the information for your service provider.

## I.4.2 LIC logs

A common source for information on damage encountered is LIC logs. Table 34 shows the type of LIC logs associated with damage. Information in the LIC logs is analyzed to understand the object or objects in question, and at times, the operation involved. Refer to Appendix C, “E-mailing document collections” on page 315, for information on an efficient method to forward LIC logs to your service provider so they can be analyzed.

Table 34. LIC log entries associated with damage

| Damage          | LIC log major/minor | Description                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Full or Partial | 0300 01xx           | Damage is set in the system object. The dump data portion of the LIC log specifies the related system object. An xx of 01 indicates all, full, hard, or complete damage. If xx is 02, partial damage is indicated. If xx is 00, the object is unreadable or no information is known. In the exception header include, <i>tt</i> indicates the type code of the damaged object. |
| Full or Partial | 0300 02xx           | Damage is set in the system object. The dump data portion of the LIC log specifies the related system object. An xx of 01 indicates all, full, hard, or complete damage. If xx is 02, partial damage is indicated. If xx is 00, the object is unreadable or no information is known. In the exception header include, <i>tt</i> indicates the type code of the damaged object. |
| Full or Partial | 0301 00xx           | Request made to set damage. However, damage is already set, or the damaged object is not accessible. An xx of 01 indicates all, full, hard, or complete damage. If xx is 02, partial damage is indicated. If xx is 00, the object is unreadable or no information is known. In the exception header include, <i>tt</i> indicates the type code of the damaged object.          |
| Partial         | 0600 1AFA           | Data segment identifier (SID) of the data space has an unreadable header. The header is repaired. The data space incurs soft damage.                                                                                                                                                                                                                                           |
| Partial         | 0600 46B5           | A data space entry with an invalid data space entry (DENT) status byte (REFERENCE error) has been found during an inappropriate spanner recovery delete operation. The data space is soft damaged.                                                                                                                                                                             |

## I.5 Detecting damage

There are a number of ways that damage is detected on an AS/400e server, by the operator and by the system.

As discussed in I.4, “Indications of damage” on page 346, the most common way for an operator to become aware of the existence of a damaged object on the system is to receive a message. This occurs either at the time that the system first detects damage or on a subsequent attempt to use an object flagged as damaged.

There is a phase of the IPL dedicated to detecting some forms of damage. When damaged objects are detected during an IPL, a CPF8197 message indicating

object damage is detected is sent to the system operator message queue. See Figure 340 on page 347 to view the example message text.

When you use the following operations or commands, information is relayed to the operator that an object has previously sustained damage:

- Performing a save that includes the damaged object
- Using the Display Object Description (DSPOBJD) command
- Using the Display File Description (DSPFD) command
- Using the Display File Field Description (DSPFFD) command
- Using the Display Physical File Member (DSPPFM) command
- Using Create Duplicate Object (CRTDUPOBJ) command
- Using the Check Object (CHKOBJ) command

A common misconception is that the Reclaim Storage (RCLSTG) command is designed to detect object damage. The reclaim storage procedure, by touching every object on the system, is likely to detect certain types of damage. However, RCLSTG is not designed exclusively for this purpose. While the RCLSTG command alerts the operator to some forms of damage, not all damaged objects are detected.

Refer to the information on RCLSTG in *System Operation*, SC41-4203, and in *OS/400 Backup and Recovery*, SC41-5304. Additional information is also found on the Software Knowledge Base on the Internet at:

<http://www.as400service.ibm.com/supporthome.nsf/home/Software+Knowledge+Base>

## I.6 Recovering damaged objects

Table 35 has been reproduced from the *OS/400 Backup and Recovery*, SC41-5304, to complete the overview of handling damaged objects.

Table 35. Recovery by object type

| Type of object                                                                                          | Recovery procedure                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating system (OS/400) object in QSYS                                                                | Contact your service provider. You may need to reinstall the operating system.                                                                                                                        |
| IBM-supplied user profile                                                                               | Perform an abbreviated install of the operating system.                                                                                                                                               |
| Job description that is specified on the workstation entry for the console in the controlling subsystem | If no other workstation entries exist for the controlling subsystem, the system is not usable. Contact your service provider.                                                                         |
| Job queue                                                                                               | Perform an IPL. Restore or recreate the damaged job queue. All job queue entries are lost.                                                                                                            |
| Output queue                                                                                            | Perform an IPL. If the output queue is the default queue for a printer, it is recreated and its entries rebuilt. Other output queues must be restored or recreated. Entries on these queues are lost. |
| Damaged file whose name starts with QAOSS                                                               | Delete the file. Restore it from backup. Run:<br>RCLDLO DLO(*DCODTL)                                                                                                                                  |

| Type of object   | Recovery procedure                                                                                                        |
|------------------|---------------------------------------------------------------------------------------------------------------------------|
| Database files   | Refer to the procedure in <i>OS/400 Backup and Recovery</i> , SC41-5304, on “Recovering Damaged Database Files”.          |
| Journal          | Refer to the procedure in <i>OS/400 Backup and Recovery</i> , SC41-5304, for “Recovering Damaged Journals”.               |
| Journal receiver | Refer to the procedure in <i>OS/400 Backup and Recovery</i> , SC41-5304, for “Recovering Damaged Journal Receivers”.      |
| Journalled file  | Refer to the procedure in <i>OS/400 Backup and Recovery</i> , SC41-5304, for “Recovering Journalled Files”.               |
| PTF              | If a PTF save file or PTF is damaged, the PTF must be reloaded and re-applied.                                            |
| All others       | Refer to the procedure in <i>OS/400 Backup and Recovery</i> , SC41-5304, for “Recovering Other Types of Damaged Objects”. |

Refer to *OS/400 Backup and Recovery*, SC41-5304, for specifics on performing the recovery procedures.

## I.7 Reclaim storage function

Unexpected failures, such as power failures or equipment checks, can create unusual conditions in auxiliary storage. The reclaim storage function is designed to verify that objects residing in auxiliary storage can be accessed and the ownership and authority of each object is in tact.

### I.7.1 Functions of reclaim storage

During the reclaim storage process, the system checks every object on the system, including objects in the integrated file system. The major functions of the reclaim storage process are described in the following sections.

#### I.7.1.1 Object functions

The system is checked to identify objects that are not addressable through a context (or library). Any object that is not addressable through a context is moved to a library created by the reclaim storage process (library QRCL). Objects without names, or having duplicate names, are given a default name as they are moved to the QRCL library. Default names take the form QRCLnnnnn, where *nnnnn* is a unique number.

Any object that resides in the root file system of the integrated file system, and is not linked to a directory, is moved to the /QReclaim directory. Any object that resides in the QOpenSys file system of the integrated file system, and is not linked to a directory, is moved to the /QOpenSys/QReclaim directory. Any space that is occupied by an unrecoverable object is returned to free space. The structure of complex objects (multi-part objects) is validated to ensure that all the parts are connected correctly.

All objects are checked for proper ownership, and a default owner (user profile QDFTOWN) is assigned where necessary. Similarly, a default authorization list (QRCLAUTL) is assigned if required.

#### **I.7.1.2 Library functions**

Reclaim storage examines the physical structure of a library and corrects it if required. Entries for objects that no longer exist are removed. Partially created libraries are destroyed, and duplicate library names are deleted.

#### **I.7.1.3 Office functions**

Additional checks are performed by reclaim storage, beyond those run during the Reclaim Document Library Object (RCLDLO) command. All DLOs are checked to ensure that they reside in the QDOC library. Object ownership is validated and invalid DLOs are deleted.

Reclaim storage also checks mail objects, verifies mail logs, and ensures all mail resides in a mail log. All mail documents are verified as being attached to a mail item.

#### **I.7.1.4 Database functions**

A number of functions specific to database objects are performed during the reclaim storage process. The same code path used in the IPL is followed to ensure that database and commit recovery criteria are satisfied.

Many types of OS/400 objects are composed of multiple pieces. These are referred to as composite objects. Composite objects are examined, and unattached sub-components (remaining portions of a database object or “danglers”) are deleted if they are not needed.

The database cross-reference files are rebuilt when the \*DBXREF option is selected on the RCLSTG command.

### **I.7.2 Running reclaim storage**

Consider the following points when you decide to run the RCLSTG command:

- The AS/400e server must be in a restricted state to run RCLSTG.
- Add the QRCL library to the QALWUSRDMN system value before you run the RCLSTG command. Alternatively, set the QALWUSRDMN system value to \*ALL. Return this system value to its original value when the reclaim storage process has completed.
- Reclaim storage requires some free auxiliary storage to run. In situations where disk space is critically short, it may be necessary to back up some objects and delete them from disk before you run the RCLSTG command. This helps ensure the process has sufficient disk space to complete the task. If this is not done, the system may terminate with a system reference code (SRC) on the front panel, indicating an auxiliary storage full condition exists.
- Although we do not recommend it, the reclaim storage process can be interrupted by using the system request function (SYSREQ) on the console device where the RCLSTG command is initiated. To help ensure the system is usable, re-run the rebuild of the cross-reference file when the process is cancelled with a SYSREQ.



- There is no way to predict the length of time that the reclaim storage will take. Past performance of running the RCLSTG command gives an indication as to how long the process may take, but the actual time taken can differ dramatically from the last reclaim run on the same system.
- Because this process is a long running process, schedule a reclaim storage based on necessity. There is no justification for running reclaim storage as a regular cleanup tool. Refer to the possible alternatives listed in this chapter for other processes to assess the need to run reclaim storage.
- The reclaim storage process cannot be check pointed (re-started from the step it is stopped at). If the process is terminated, it starts again from the beginning. It cannot be broken down and run in small segments, other than selecting either the core function, or the database cross-reference function options on the RCLSTG command.

Factors affecting the amount of time that the reclaim storage will take include:

- The number of objects on the system
- The type of objects (simple or complex)
- The amount of damage that the reclaim storage has to process
- The amount of auxiliary storage configured on the system
- The percentage of storage in use
- The amount of main storage on the system

While the reclaim storage process is running, the console displays the percentage of objects scanned. However, 50% of objects processed does not indicate that if the process has run two hours to that point; it will take another two hours to complete.

### I.7.3 Reclaim storage parameters

Reclaim storage has two sections: the core function and the database cross-reference function. Each is selected using the RCLSTG command, as shown in Figure 343.

Reclaim Storage (RCLSTG)

Type choices, press Enter.

|                  |       |                |
|------------------|-------|----------------|
| Select . . . . . | *ALL  | *ALL, *DBXREF  |
| Omit . . . . .   | *NONE | *NONE, *DBXREF |

Figure 343. RCLSTG command prompt

Table 36 shows the parameters to run the various functions.

Table 36. RCLSTG command parameters

| Function                          | RCLSTG command parameters          |
|-----------------------------------|------------------------------------|
| Full function                     | RCLSTG SELECT(*ALL) OMIT(*NONE)    |
| Database cross reference function | RCLSTG SELECT(*DBXREF) OMIT(*NONE) |
| Core function                     | RCLSTG SELECT(*ALL) OMIT(*DBXREF)  |

#### **I.7.4 When to run the Reclaim Storage command**

Run the Reclaim Storage command in the following situations:

- Database cross-reference files are in error:

Run RCLSTG with an option for the database cross-reference function, as shown in Table 36 on page 353.

- Objects are secured by a damaged or destroyed authorization list:

The RCLSTG command assigns the objects to the default authorization list (QRCLAUTL).

- ASP recovery:

If the data in an ASP is lost due to a disk failure, RCLSTG scans all the auxiliary storage on the system and places the lost objects into the QRCL library.

- Objects are found that are not associated with a library:

This is the prime function of the RCLSTG process. RCLSTG re-establishes addressability of the objects through the default library (QRCL) if possible. The object is deleted if it cannot be recovered.

#### **I.7.5 When not to run reclaim storage**

The Reclaim Storage command can be recommended inappropriately. In addition, the first line of the command help text can be taken out of context to assume that the Reclaim Storage command can be used as either a general database cleanup tool or a universal cure for many non-specific problems. The help text for the Reclaim Storage command gives the information shown in Figure 344.

## Reclaim Storage - Help

**The Reclaim Storage (RCLSTG) command is used to perform a general cleanup of auxiliary storage.** This command should be considered after an unexpected failure occurs (such as a power or equipment failure) to correct abnormal conditions on objects in auxiliary storage that may be affected by the failure. The command corrects, where possible, objects that were incompletely updated (such as database files, libraries, device descriptions, directories and stream files) and user profiles containing incorrectly recorded object ownership information. Any unusable objects or fragments are deleted. This command reclaims all objects secured by an authorization list that is damaged or destroyed and assigns the objects to the authorization list QRCLAUTL. Because the amount of time required to run this command varies with the number of objects in auxiliary storage, the system periodically sends messages to the work station where the command was specified. The RCLSTG command can also be used to reclaim storage when, during an IPL, not enough storage is available to make the system fully operational. In that case, the system operator can specify the command immediately after receiving the message about insufficient storage. If very little additional auxiliary storage is available, the system overhead required to run the RCLSTG command may need more than the remaining storage; in that case, the RCLSTG command fails.

Note: The RCLSTG command can be a long-running function, depending on the number and type of objects in the system, the amount of damage to them, the amount of auxiliary storage configured to the system, and the percentage of that storage in use. If database file objects are damaged, the keyed access paths may need to be rebuilt; that operation takes a substantial amount of time. If the RCLSTG command can be run at the user's discretion, the user may want to avoid the operation until the required time can be scheduled.

### Restrictions:

1. This command is shipped with public \*EXCLUDE authority and the QPGMR, QSYSOPR, QSRV, and QSRVBAS user profiles have private authorities to use the command.
2. All subsystems must be inactive before the RCLSTG command can be specified. The End System (ENDSYS) or End Subsystem (ENDSBS) command with \*ALL specified on the SBS parameter can be used to make the subsystems inactive. You must have job control (\*JOBCTL) authority to use the ENDSYS or the ENDSBS command.
3. This job must be in the controlling subsystem and must be the only job active in the system.
4. Before running the RCLSTG command after an IPL, you may need to wait several minutes for the IPL to complete. Use the Work with Active Jobs (WRKACTJOB) command to verify that no jobs are running.
5. Only permanent objects in auxiliary storage are reclaimed; temporary objects are reclaimed by running a system initial program load (IPL).

Figure 344. RCLSTG help text

Due to the length of time in which the reclaim storage procedure runs, be sure there is a strong indication that the reclaim storage is appropriate for the situation before recommending a recovery procedure.

Examples of circumstances that (in isolation) do not constitute a sound reason for running reclaim storage include:

- System power outage
- Incomplete create or delete of objects
- User profile is deleted, but objects remain showing the user profile as the object owner (use CHGOBJOWN first)
- Multiple system (abnormal) terminations since the last RCLSTG
- RCLSTG has not been run for six months (or any time period)

In all of the above situations, perform more problem determination before running RCLSTG. If further investigation shows that there are problems (as indicated in I.7.4, “When to run the Reclaim Storage command” on page 354), then it is appropriate to run the Reclaim Storage command.

### **I.7.6 After reclaim storage**

After the reclaim storage procedure has completed, examine these places to determine what happened during the process:

- The system operator message queue (QSYSOPR)  
Look for messages about damaged objects or rebuilt files.
- The history log (QHST)
- The QRCL library

For objects in QRCL, perform the following actions as needed:

- Delete unusable or unnecessary objects
- Move (and rename) objects to other libraries
- Grant authority for objects
- Transfer ownership of objects
- Copy data from rebuilt files
- The /QReclaim directory in the integrated file system
- The /QOpenSys/QReclaim directory in the integrated file system
- Objects owned by the QDFTOWN user profile
- Objects secured by the QRCLAUTL authorization list

#### **Tip**

You may see messages indicating that objects were deleted by the reclaim storage process. Typically, these are internal system objects that are no longer needed.

The only objects named that you need be concerned about are those that are explicitly mentioned by name and those placed in the QRCL library (or other reclaim repositories).

Refer to *Backup and Recovery*, SC41-5304, for further information on recovering individual object types found during the reclaim storage process.

### I.7.7 Reclaim storage data area

Reclaim storage creates a data area in the QUSRSYS library at the end of its processing. The data area, whose format is shown in Figure 345, records the start and end date and time, system name and release, as well as the system serial number of the system on which RCLSTG was run. Use the Display Data Area (DSPDTAARA) command to display the data area.

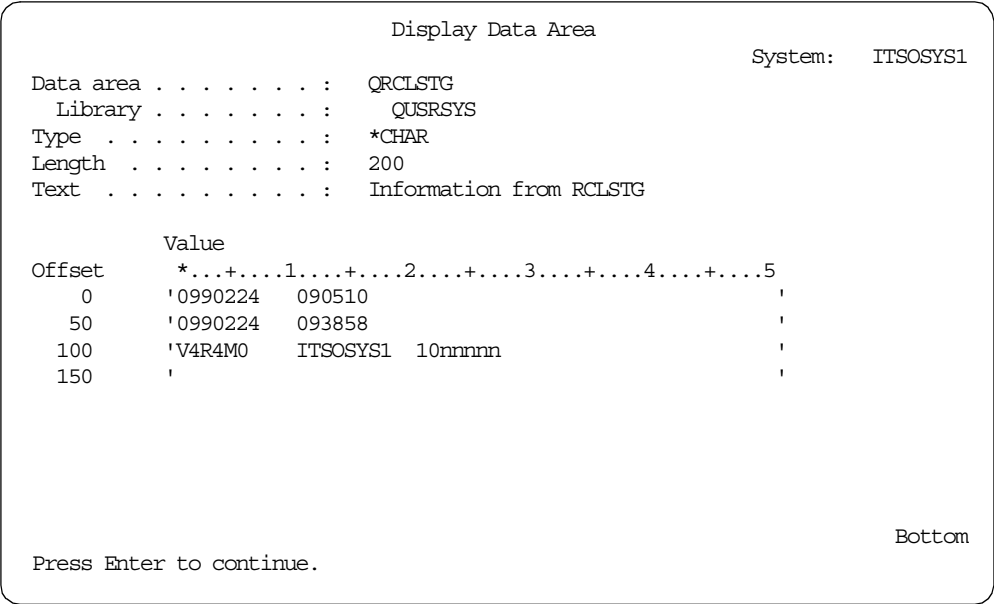


Figure 345. QRCLSTG data area

The QRCLSTG data area is 200 characters in length and contains the following information:

- Start date: Positions 1-7 (CYYMMDD)
- Start time: Positions 11-16 (HHMMSS)
- End date: Positions 51-57
- End time: Positions 61-66
- System release level: Positions 101-106
- System name: Positions 111-118
- System serial number: Positions 121-127

Check the reclaim storage data area to ensure that the dates and times shown match what you expect to see. If the system has been restored from backup media, the reclaim storage data area will have been restored as it was when the backup was done. A reclaim storage that is run in the period between the backup and the restore is not reflected. Similarly, if the data area has been restored from a backup made on another system, the information contained in the data area is not correct. In the latter case, the serial number in the data area does not agree with the system value QSRLNBR.

### I.7.8 Reclaim storage status messages

The status messages shown in Figure 346 relate to the reclaim storage process. They are listed in numeric order.

```
*STATUS Messages
CPI8201 Reclaim of system cross reference files required
CPI8202 Database cross reference files processed successfully
CPI8206 &l% of objects processed.
CPI8210 Processing data base relationships.
CPI8212 Data base/library/directory recovery in progress.
CPI8213 Processing objects on the system.
CPI8214 All permanent objects have valid owners.
CPI8215 Object description verification in progress.
CPI8216 Final clean up in progress.
CPI8217 Mail Server Framework cleanup in progress.
CPI8218 Directory recovery in progress.
CPI8219 Directory cleanup in progress.
CPI8220 Message queue QSYSOPR in *HOLD delivery mode.
```

Figure 346. RCLSTG status messages

The escape messages shown in Figure 347 relate to the reclaim storage process and are listed in numeric order.

```
*ESCAPE Messages
CPF2119 Library &l locked.
CPF2120 Cannot delete library &l.
CPF2126 Attempt to recover library &l failed.
CPF2127 User profile &2 damaged.
CPF8201 User profile &l does not exist or is damaged.
CPF8204 Commitment control cannot be active during reclaim storage.
CPF8205 Library &l does not exist or is damaged.
CPF8209 System not in proper state to reclaim storage.
CPF8211 Library &l damaged. RCLSTG command ended.
CPF8224 Duplicate object found while moving or renaming member.
CPF8251 RCLSTG command ended. Library &l damaged.
CPF8252 Error occurred during rebuild of damaged library &l.
```

Figure 347. RCLSTG escape messages

During the reclaim storage processing, the following messages appear in the order shown:

```
CPI8220 QSYSOPR message queue set to *HOLD
CPI8212 Data base/library recovery in progress
CPI8213 Processing objects on the system (start of processing)
CPI8206 % of objects processed (percentage of objects processed)
CPI8210 Processing data base relationships
CPI8218 Directory recovery in progress
CPI8219 Directory cleanup in progress
CPI8215 Object description verification in progress
CPI8217 Mail server framework in progress
CPI8216 Final cleanup in progress
CPC8208 RCLSTG processing complete. % objects processed
```

## **I.7.9 Alternatives to reclaim storage**

There are no direct substitutes for the reclaim storage process. In the majority of cases, there are other methods of problem determination to consider that are less intrusive.

The facilities listed in this section allow the system owner to maintain maximum system availability, while gathering information to help determine if the reclaim storage process is appropriate.

### **I.7.9.1 Messages**

Refer to the chapters in this publication for further information regarding the system operator message queue, locating messages in job logs, and the history log to assist in locating damaged objects. See 4.5, “Messages in the system operator message queue (QSYSOPR)” on page 41, Chapter 5, “Job information, job logs, and spooled files” on page 51, and Chapter 6, “Collecting the history log (QHST)” on page 69, respectively.

### **I.7.9.2 IPL**

The IPL process does a lot of processing designed to ensure the integrity of the system. The specific objects and structures checked during the IPL are those that are necessary for the system to remain operational or cannot be manipulated while the system is running.

IPL times are much shorter than running reclaim storage and can usually be scheduled by a system operator in such a way that the effect on the users is minimized. Depending on the nature of the circumstances surrounding the need for the IPL, it can be necessary to change the IPL settings with the Change IPL Attributes (CHGIPLA) command.

### **I.7.9.3 Saving the entire system**

To ensure that every object is in a condition to be saved, save the objects suspected to have encountered damage. If the extent of the damage is not known, use option 21 from the GO SAVE menu to perform a save of the entire system. Review the messages in the history log and the job log at the end of the save for evidence of object damage.

### **I.7.9.4 Checking a database file**

The ability to save an object to backup media does not guarantee that a database file is free from corruption. The save process assures that the composite structures of the object are intact and able to be manipulated. An application may be required to verify that the contents of each of the records in a database file are valid.

The save function uses blocking techniques that can result in saving partial or logical damage to tape. To verify that a particular file is not damaged, copy the data to a new file, record by record, in arrival sequence. Use the following commands to perform this operation:

```
OVRDBF FILE(x) SEQONLY(*YES 1)
CPYF FROMFILE(LIBa/x) TOFILE(QTEMP/x) CRTFILE(*YES)
```

Check that the CPYF completes without error.

#### **I.7.9.5 Checking for damage in physical files**

A tool is available by creating a command and procedure to check for damage on physical files. It is the Check Damage on Physical Files (CHKPF) command.

The Check Damage on Physical Files (CHKPF) command checks each physical file or table of a library for data integrity errors or damage. The command runs over a specific library or all libraries on the system. CHKPF checks only the objects and reports errors. It does not perform recovery.

The CHKPF command uses the system cross-reference file (QADBXREF in the QSYS library) to determine the physical files to check for each library. If the system cross-reference file is damaged, this command does not run. You must run the Reclaim Storage command to correct the system cross-reference files prior to running CHKPF (RCLSTG SELECT(\*DBXREF)).

The CHKPF command runs in batch or interactively. Physical files found to have data integrity errors or damage are identified by a message sent to the message queue of the user profile who runs or submits the CHKPF command. Prior to performing any damage recovery, review individual physical files identified with data integrity errors or damage. Complete this review using CPYF on the physical file and review the job log.

To locate further information on the CHKPF tool and the source needed to create the tool on an AS/400e server, refer to the Support Line Knowledge Base on the Internet at: <http://as400service.rochester.ibm.com>

#### **I.7.9.6 PRTDSKINF disk space report**

Use the Retrieve Disk Information (RTVDSKINF) command to collect disk space information. This task is submitted as a batch job to collect data about the objects on disk. Information is written to the QAEZDISK file in the QUSRSYS library.

Once this data is collected, use the PRTDSKINF command to produce a spooled file output based on the QAEZDISK data file. Producing a report by using the \*SYS option gives the system's estimate of the amount of disk storage that can be reclaimed by running the reclaim storage procedure. The percentage listed as *Storage affected by RCLSTG* is the approximate size of all the objects that are expected to be reclaimed when RCLSTG is run.

Similarly, after running the RCLSTG command, run the RTVDSKINF and PRTDSKINF commands to identify the size of all objects reclaimed and placed into the QRCL library.



---

## Appendix J. Web sites related to AS/400e problem determination

This appendix offers a list of suggested IBM Web sites related to AS/400e problem determination:

- For Client Access Service Pack download, go to:  
<http://www.as400.ibm.com/clientaccess/casp.htm>
- For AS/400 Technical Support and for Internet PTFs, go to:  
<http://www.as400service.ibm.com>
- For Software Knowledge Base, go to:  
<http://www.as400service.ibm.com/supporthome.nsf/home/Software+Knowledge+Base>
- For Preventive Service Planning, see:  
<http://www.as400service.ibm.com/supporthome.nsf/home/Prev+Serv+Planning+-+PSP>
- For Software Problem - APARS, go to:  
<http://www.as400service.ibm.com/supporthome.nsf/home/>

Click the **Frameset - APAR Search** link. On the next page that appears, type software problem in the Search field.

**Note:** The Web addresses listed here were accurate at the time this redbook was written.



---

## Appendix K. Problem information

All methodologies of problem solving involve gathering information. This appendix contains checklists of questions to help gather information for some problem areas of the system. When a problem occurs, answer as many of the questions as possible. In addition, use the procedures in this document to help collect information.

The following categories of problems are included in this appendix:

- Twinax-attached printer errors
- PC Support printer errors
- RPG program errors

---

### K.1 Printer problem information

The information in this section applies to twinax-attached printers only. For problems with printers attached to a Personal Computer using PC Support, refer to K.2 "PC support problem information" on page 368.

The following types of problems with printers are included in this appendix:

- Hung printer or print writer
- Incorrect printer output

Before you collect information about the printer error, follow these steps:

1. To create the IBMLIB library and IBMOUTQ output queue if they do not exist, enter the following commands:

```
CRTLIB LIB (IBMLIB)
CRTOUTQ OUTQ (IBMLIB/IBMOUTQ)
```

2. Enter the following commands to add the IBMLIB library to your library list and to change your job's output queue to the IBMOUTQ output queue:

```
ADDLIBLE IBMLIB
CHGJOB * OUTQ (IBMLIB/IBMOUTQ)
```

3. Enter the following commands to send all spooled files created for this session to the IBMOUTQ output queue:

```
OVRPRTF FILE (QPCSMPT) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QSYSPRT) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QPJOBLOG) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QPDSPJOB) OUTQ (IBMLIB/IBMOUTQ)
OVRPRTF FILE (QPDSPJOB) OUTQ (IBMLIB/IBMOUTQ)
```

**Note:** These printer file overrides are not in affect after your job ends.

#### K.1.1 Hung printer

A hung printer is one that appears not to do anything even when all conditions appear to support activity. If the printer or print writer is hung, perform the following steps:

1. Enter `WRKWTR aaaaaaaa`, where *aaaaaaa* is the writer name.

A display appears like the example in Figure 348 on page 364.

```

 Work with Printer Writer

Writer : PRT01 User : QSPLJOB
Number : 012802

Started by user : TERRYVB
Status:
 Writing : N
 Waiting on message : Y
 Held : N
 End pending : N
 Hold pending : N
 Between files : Y
 Between copies : N
 Waiting for data : N
 On job queue : N
File being written :
 File number :

More...

Press Enter to continue.

F3=Exit F5=Refresh F6=Messages F10=Release F11=Hold F12=Cancel
F14=Queue F24=More keys

```

Figure 348. Work with Printer Writer

2. Press F17 (shown when F24 is pressed to display more keys) to work with the writer job.

A display appears like the example in Figure 349.

```

 Work with Job
 System: ITSOSYS1
Job: PRT01 User: QSPLJOB Number: 012802

Select one of the following:

 1. Display job status attributes
 2. Display job definition attributes
 3. Display job run attributes, if active
 4. Work with spooled files

 10. Display job log, if active or on job queue
 11. Display program stack, if active
 12. Work with locks, if active
 13. Display library list, if active
 14. Display open files, if active
 15. Display file overrides, if active
 16. Display commitment control status, if active

More...

Selection or command
====> 10

F3=Exit F4=Prompt F9=Retrieve F12=Cancel

```

Figure 349. Work with Jobs

3. Enter the following command to collect the job log for the writer. Use the job name at the top of the Work with Job display, for example:

```
DSPJOBLOG JOB(012802/QSPLJOB/PRT01)
```

4. Press the Enter key to create the QPJOBLOG spooled file. The job log will be written to this spooled file.
5. Select option 11 to display the program stack. For example, a display appears like the example in Figure 350.

Display Program Stack

System: ITSOSYS1

Job: PRT01      User: QSPLJOB      Number: 012802

Job status: ACTIVE

Request

| Level | Program  | Library | Statement | Instruction |
|-------|----------|---------|-----------|-------------|
| 1     | QCMD     | QSYS    |           | 00A9        |
|       | QSPWTRM1 | QSYS    |           | 0291        |
|       | QMHRMSS  | QSYS    |           | 09B0        |

Bottom

Press Enter to continue.

F3=Exit    F5=Refresh    F12=Cancel

Figure 350. Display Program Stack

6. Press the Print key to collect the program stack information.
7. Press the Error Reset key to unlock the keyboard.
8. Press Enter two times to return to the Work with Printer Writer display.
9. Press F14 to display the output queue associated with the print writer. For example, a display appears like the example shown in Figure 351 on page 366.

Work with Output Queue

Queue: IBMOUTQ      Library: IBMLIB      Status: RLS

Type options, press Enter.

1=Send   2=Change   **3=Hold**   4=Delete   5=Display   6=Release   7=Messages  
8=Attributes      9=Work with printing status

| Opt | File     | User    | User Data  | Sts        | Pages | Copies | Form Type | Pty |
|-----|----------|---------|------------|------------|-------|--------|-----------|-----|
| 3   | QPDSPPC  | WNELSON |            | <b>WTR</b> | 6     | 1      | *STD      | 5   |
| —   | QPJOBLOG | WNELSON | QPADEV0004 | RDY        | 3     | 1      | *STD      | 5   |
| —   | QSYSPT   | WNELSON |            | RDY        | 1     | 1      | *STD      | 5   |
| —   | QPDSPJOB | WNELSON |            | RDY        | 5     | 1      | *STD      | 3   |
| —   | QPJOBLOG | WNELSON | QPADEV0006 | RDY        | 1     | 1      | *STD      | 5   |

Bottom

Parameters for options 1, 2, 3 or command  
====>

---

F3=Exit    F11=View 2    F12=Cancel    F22=Printers    F24=More keys

Figure 351. Work with Output Queue

If there is a spooled file with the status WTR, select option 3 to hold the file. The status changes to \*HLD.

- On the command line, type the following command to collect a printed list of PTFs:

```
DSPPF LICPGM(5769SS1) OUTPUT(*PRINT)
```

If you can recreate the problem, continue with the next step. Otherwise, go to 23.1 “Sending the problem report” on page 285.

- Press the Enter key to return to the Work with Printer Writer display.
- Record the writer name, number, and user.
- Press the Enter key until a command line is displayed.
- Enter the following commands to start a trace of the writer, using the information you recorded:

```
STRSRVJOB JOB(number/user/name)
```

```
TRCJOB *ON
```
- Recreate the error.
- Enter `TRCJOB *OFF` to stop the trace. The trace data is saved in the QPSRVTRC spooled file.
- Enter the `ENDSRVJOB` command to stop servicing the writer job.
- Go to 23.1 “Sending the problem report” on page 285, to submit the collected materials.

### K.1.2 Incorrect printer output

If your print job or printer is creating incorrect output, perform the following steps:

1. Type the WRKSPLF or WRKOUTQ command to display the spooled file with the problem.
2. Type 3 next to the spooled file to hold it. Press the Enter key.
3. Type 2 next to the spooled file to change the spooled file attributes. Press the Enter key. A display appears like the example shown in Figure 352.

Change Spooled File Attributes (CHGSPLFA)

Type choices, press Enter.

|                               |              |                            |
|-------------------------------|--------------|----------------------------|
| Spooled file . . . . .        | > QPDSPJOB   | Name, *SELECT              |
| Job name . . . . .            | > QPADEV0020 | Name, *                    |
| User . . . . .                | > WNELSON    | Name                       |
| Number . . . . .              | > 012841     | 000000-999999              |
| Spooled file number . . . . . | > 1          | 1-9999, *ONLY, *LAST       |
| Printer . . . . .             | *OUTQ        | Name, *SAME, *OUTQ         |
| Print sequence . . . . .      | *SAME        | *SAME, *NEXT               |
| Form type . . . . .           | *STD         | Form type, *SAME, *STD     |
| Copies . . . . .              | 1            | 1-255, *SAME               |
| Restart printing . . . . .    | *STRPAGE     | Number, *SAME, *STRPAGE... |

Additional Parameters

|                        |         |                      |
|------------------------|---------|----------------------|
| Output queue . . . . . | WNELSON | Name, *SAME, *DEV    |
| Library . . . . .      | WNELSON | Name, *LIBL, *CURLIB |

Bottom

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

Figure 352. Change Spooled File Attributes (Part 1 of 2)

4. Press F10 to display additional parameters, and page down to the Save file prompt. For example, a display appears like the example in Figure 353.

Change Spooled File Attributes (CHGSPLFA)

Type choices, press Enter.

Page range to print:

|                                  |             |                              |
|----------------------------------|-------------|------------------------------|
| Starting page . . . . .          | 1           | Number, *SAME, *ENDPAGE      |
| Ending page . . . . .            | *END        | Number, *SAME, *END          |
| File becomes available . . . . . | *FILEEND    | *SAME, *JOBEND, *FILEEND...  |
| <b>Save file</b> . . . . .       | <b>*YES</b> | *SAME, *NO, *YES             |
| Output priority . . . . .        | 5           | 1-9, *SAME, *JOB             |
| User data . . . . .              | '           | User data, *SAME             |
| Align page . . . . .             | *NO         | *SAME, *NO, *YES             |
| Print quality . . . . .          | *STD        | *SAME, *STD, *DEV, *DRAFT... |
| Form feed . . . . .              | *DEV        | *SAME, *DEV, *CONT, *CUT...  |
| Print fidelity . . . . .         | *CONTENT    | *SAME, *ABSOLUTE, *CONTENT   |
| Print on both sides . . . . .    | *NO         | *SAME, *NO, *YES, *TUMBLE... |
| Pages per side . . . . .         | 1           | *SAME, 1, 2, 4               |

More...

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

Figure 353. Change Spooled File Attributes (Part 2 of 2)

5. Type \*YES in the Save file prompt, and press the Enter key.
6. Collect user data from a source/sink trace run under SST as described in Chapter 17, "Tracing the Licensed Internal Code (LIC)" on page 227. Use Table 37 to determine the fields to set for the printer problems that are different from the description in Chapter 17.

Table 37. Trace options for printing problems

| Display name                    | Prompt and value to enter                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------|
| Allocate general trace table    | General table size:<br>New ..... : 4000<br><b>Note:</b> For table size when creating the internal trace table. |
| Specify source/sink object      | Type ..... 2<br><b>Note:</b> For Device description (DEVD)                                                     |
| Start source/sink object traces | Opt Description<br>1 User data (data stream/SCS)                                                               |

**Note**

The trace is now running. Exit from SST. For more information using SST, see Chapter 19, "Using System Service Tools (SST)" on page 253.

7. Type the WRKSPLF or WRKOUTQ command to display the spooled file.
8. Type 6 next to the file to release it.
9. Once the error has occurred, return to the System Service Tools display.
10. Select the Trace Vertical Licensed Internal Code service tool, and press the Enter key.
11. Go to Chapter 17, "Tracing the Licensed Internal Code (LIC)" on page 227, and follow the instructions to the end. Then save the trace data.

## K.2 PC support problem information

If you have a problem with PC Support, answer the questions in the *General Environment* and *Problem Analysis* sections. Then find the type of problem you have.

The following types of problems are described in this section:

- Router
- Shared Folders
- Work Station Function (WSF)
- Virtual Print
- Windows

**Note:** PC Support was replaced with Client Access code. As a result, PC Support problems are no longer supported by the IBM Support Center. The information included in this appendix is supplied *for reference only*. If the problem with PC Support is not resolved using this reference, contact an independent consultant for further assistance.



## K.2.1 PC support checklists

To obtain the fastest possible resolution to customer problems, use these “checklists”. Fill them out as completely as possible. The intent is to provide the responsible support organization with enough detailed information to reproduce and resolve the problem. Be specific with the answers for the best results.

### K.2.1.1 General environment information

Answer the questions in Table 38 and Table 39 on page 370 about the customer environment.

#### Note

You do not need to answer the questions that are marked with an asterisk (\*) if XIINFO has been run.

Table 38. PC Support checklist: Software related

| Software question                                                                                                                                             | Answer             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| What are the version, release, and level of the PC Support components in use at the time of the problem?                                                      |                    |
| *What PC operating system and version and being used?                                                                                                         |                    |
| *If running V210 or later, is extended DOS being used?                                                                                                        |                    |
| What PC Support components are running (Router, Menu, WSF, etc.)?                                                                                             |                    |
| In what order are these components started?                                                                                                                   |                    |
| Which (if any) of the components are invoked from a shared folder?                                                                                            |                    |
| * Are there any non-PC Support terminate and stay resident (TSR) programs running in the PC?                                                                  | Circle one: Yes No |
| If the answer to the above question is yes, please describe the TSs that are loaded (manufacturer, function, revision level, etc.)                            |                    |
| * Are there other applications running (Windows or LOTUS 1-2-3 for example)? Please include the <i>description, manufacturer, and version/release level</i> . |                    |
| In what order are they started, and are they started before or after the PC Support components?                                                               |                    |
| What release level of software is running on the AS/400e server?                                                                                              |                    |

| Software question                                                           | Answer |
|-----------------------------------------------------------------------------|--------|
| What is the PTF level of the AS/400 software?                               |        |
| If this worked before PTFs were installed, what was the previous PTF level? |        |
| What is the PTF level of the PC Support software?                           |        |
| What are the levels of all PC Support device drivers?                       |        |

Table 39. PC Support checklist: Hardware related

| Hardware question                                                                                                                                            | Answer |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| What is the model number of the AS/400e server?                                                                                                              |        |
| What kind of PC is being used?<br>Manufacturer<br>Make<br>Model<br>CPU (for example: 286, 386**, 386SX**, etc.)                                              |        |
| * How much memory is in the PC?                                                                                                                              |        |
| Is it extended or expanded memory?                                                                                                                           |        |
| How much DASD is in the PC, and how much of it is available (unused)?                                                                                        |        |
| Is the DASD partitioned? How large are the partitions, and which ones are being used when the problem occurs?                                                |        |
| What type of display and adapter (for example: EGA, VGA, 8514, XGA*, etc.) are being used?                                                                   |        |
| Is there any OEM equipment installed in the PC (such as adapter cards or EMS cards)? If so, please describe them (manufacturer, make, model, function, etc.) |        |

### K.2.1.2 Problem analysis

Answer the questions in Table 40 to help narrow the problem. If there are other symptoms noted, list them as well.

Table 40. PC Support checklist: General

| Problem analysis question                                                          | Answer |
|------------------------------------------------------------------------------------|--------|
| Please describe (in detail) the step-by-step scenario used to produce the problem. |        |

| Problem analysis question                                                                                                      | Answer             |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Is the problem always repeatable?                                                                                              | Circle one: Yes No |
| Has the error/problem ever <i>not</i> consistently been a problem on this PC (for example: did it <i>ever</i> work correctly)? | Circle one: Yes No |
| If this was not a problem at one time, what has changed? If the above scenario has changed, please describe the old scenario.  |                    |
| Is there any unusual behavior or messages on the PC or AS/400e server? Please describe.                                        |                    |
| Where were error messages seen (on the AS/400e job log, message queue, PC, QSYSOPR queue, etc.)?                               |                    |
| Is the problem related to one PC, all PCs, or a mix?                                                                           |                    |
| If the answer to the above question is not all PCs, what is special or different about the ones that don't fail?               |                    |
| Is this a new installation (or recent upgrade)?                                                                                | Circle one: Yes No |
| Have any circumventions been discovered? If so, please describe.                                                               |                    |

### **Router information**

Answer the router-specific questions in Table 41.

Table 41. PC Support checklist: Router

| Router question                                                                                                   | Answer             |
|-------------------------------------------------------------------------------------------------------------------|--------------------|
| What kind of communications link is being used (for example: SDLC, ASYNC, TDL, TRLN)?                             |                    |
| If this is a twinax communications link, is an IBM twinax card installed in the PC?                               | Circle one: Yes No |
| If the twinax card is manufactured by IBM, is it micro-channel or non-MCA?                                        |                    |
| What happens when you start STARTRTR/D? This could be captured and sent (for example: STARTRTR/D > STARTRTR.OUT). |                    |
| If remote, what kind of modems are being used? How are they configured? (ASYN Modems)                             |                    |

| Router question                                                                                                                                                                                                                                 | Answer |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Are any bridges in the network (applies to Ethernet and token-ring environments)?<br>Have the PC or hardware timers been modified? If yes, describe the change.<br>Have the host or hardware timers been modified? If yes, describe the change. |        |
| If a LAN is in use, what kind of LAN cards are installed?                                                                                                                                                                                       |        |
| If a LAN is in use, what speed is the LAN?                                                                                                                                                                                                      |        |
| What is the version and release level of the LAN support program?                                                                                                                                                                               |        |
| Indicate the Ethernet MAC driver levels (indicate all that apply):<br>NDIS MAC driver<br>Protocol Manager<br>NETBIND<br>LANSUP                                                                                                                  |        |
| Is a 5394 (or other controller) being used?<br>If so, what are the make, model, and software (PTF) level?                                                                                                                                       |        |

### K.2.1.3 Shared folders information

If shared folders are being used, answer the questions in Table 42.

Table 42. PC Support checklist: Shared folders

| Shared folders question                                                                   | Answer             |
|-------------------------------------------------------------------------------------------|--------------------|
| What is the release and level of shared folders?                                          |                    |
| What type of (Type 0, 1, 2, Extended DOS, etc.) is being used?                            |                    |
| Does the problem persist when using a different shared folders type?                      | Circle one: Yes No |
| Does the problem persist when the hard drive or another network is being used?            | Circle one: Yes No |
| Is EMS being used?                                                                        | Circle one: Yes No |
| Does the problem persist when EMS is not used?                                            | Circle one: Yes No |
| Is a cache being used? If yes, does it work without caching?                              | Circle one: Yes No |
| Are AS/400e drives being lost? The switch disconnect setting should be set to *NO.        | Circle one: Yes No |
| Does the user have the proper authority to the folder?                                    | Circle one: Yes No |
| Was one of the PC Support software folders corrupted (for example, written to by a user)? | Circle one: Yes No |

Take steps to ensure that unauthorized users cannot write data to PC Support software folders. When you write to a folder such as QIWSFLR, consider performing authority checks, such as:

- User requires QSECOFR authority
- The folder requires a Public Authority of \*ALL or \*CHANGE
- Authority can be controlled through an Authorization List
- Authority can be controlled using Group Authorization
- Authority can be controlled using specific User Authorization
- System security level is 10 or 20
- If system security level is changed to level 30 or 40 from either level 10 or 20, modify security profiles with \*ALL authority.

All users have \*ALL authority on systems with System security level 10 or 20. If \*ALL authority is present on user profiles, before changing the system level to 30 or 40, make sure the authority in the user profile is appropriate for the system security level.

#### K.2.1.4 WSF information

If WSF printers are being used, answer the questions in Table 43.

Table 43. WSF checklist

| WSF question                                              | Answer |
|-----------------------------------------------------------|--------|
| What emulation type is being used (3812? 5219? other?)    |        |
| What printer is being used (make, model, driver)?         |        |
| Is a printer function table being used? If so, which one? |        |

#### K.2.1.5 Virtual Print information

If Virtual Print is being used, answer the questions in Table 44.

Table 44. Virtual Print checklist

| Virtual Print question                                    | Answer |
|-----------------------------------------------------------|--------|
| What printer data type is being used?                     |        |
| What type of AS/400 printer is being used?                |        |
| Is the printer attached to the AS/400e server or to a PC? |        |

#### K.2.1.6 Windows information

If Windows is being used, answer the questions in Table 45.

Table 45. Windows checklist

| Windows question                                                                    | Answer |
|-------------------------------------------------------------------------------------|--------|
| What mode is Windows operating in?                                                  |        |
| Is PCSWIN being executed after the router in a batch file?                          |        |
| Is a PIF file being used? If so, what is the information contained in the PIF file? |        |

| Windows question                                    | Answer |
|-----------------------------------------------------|--------|
| What is the display usage (Windows or full screen)? |        |

### K.2.2 Data to include with a PC Support problem

Include the following materials when submitting a problem for analysis. Send general materials and materials for each PC Support component loaded at the time the problem occurs. If there are items not listed here that would be of use in problem recreation, include them as well.

#### Note

Many of the procedures to collect these materials are explained in this redbook.

The general materials include:

- CONFIG.SYS file
- AUTOEXEC.BAT file
- CONFIG.PCS file
- UPDATE.PCS file
- QPTFIDX (if using V210 and later)
- STARTPCS.BAT, STARTPCS.CMD, or alternate PCS startup batch file (if used)
- PCSERR.LOG file (V210 and later)
- XIINFO
- AS/400e job logs (for example: QSYSOPR, WRKSPLF, DSPJOBLOG, etc.)
- Router traces

If OS/2 is being used, include:

- Communications Manager trace: Trace the data link control type, and ask the developer for specific events that need to be traced
- Communications line trace (for SDLC, 5394, or Token Ring): Most often formatted for SNA, but verify with the developer
- Source-Sink object trace (for Twinaxial, or ASYNC): Note that the source-sink trace should be a trace of the Twinax or Async device (that is, the 5150 device)
- Any alternate configuration files
- Memory map if using DOS 4.0 or later (MEM /DEBUG > MEMMAP.DAT)
- Memory map if using DOS 5.0 (MEM /C > MEMMAP.DAT)
- Line, controller, and device descriptions for communications hardware
- Step-by-step (be specific and complete) scenario for reproducing the problem
- CFGPCS materials
- CONFIG.PCS (and CONFIG.BAK, if available, or the current configuration file being configured)

- STARTPCS.BAT or STARTPCS.CMD (and STARTPCS.BAK, if available, or current command file being configured)
- PCS.WRK (if available)

The shared folders materials include:

- Sample data to reproduce the problem.
- Communications trace (formatted only for the controller to which the PC is attached). *Always* select “Y” for the “SNA data only” question.
- For V2R1 Extended DOS only, collect a monitor trace.
- If OS/2 is used in this environment, collect a communications manager trace. The tracing options include APPC and the environment being used (for example: IBMTRNET for a token-ring environment).

The transfer function materials include:

- Transfer request (.TTO or .TFR) file or files
- File description file (.FDF) file or files
- AS/400 database file (on 1600-bpi tape, if possible)
- If this is an API (STF.EXE or EHNTFSTF.DLL) problem, send a copy of the source and .EXE file for the application.

The Virtual Print materials include:

- Copy of data to reproduce the problem
- Copy of PC program to reproduce the problem
- Copy of AS/400 Printer Device Description
- Copy of AS/400 Printer file
- Copy of AS/400 Spooled file

The Windows materials include:

- PC Files (CONFIG.SYS, CONFIG.PCS, batch files used to start PC Support, WIN.INI, SYSTEM.INI)
- PIF files

The WSF materials include WSF configuration files (master and session profiles).

The WSF printer materials include:

- Function table (if user-defined)
- Host (Shift+h) and ASCII (Shift+a) data stream dumps: A hex mode printer dump can be substituted for the Shift+a dump

---

## K.3 RPG problem information

For problems with RPG programs, collect the materials listed in this section and send a note describing your problem. See the following sections for more details.

### K.3.1 RPG data to collect

For any RPG problem, always collect the following user source material and programs:

**Note**

Many of the procedures to collect these materials are explained in this redbook.

- All user programs to run the application (RPG, CLP, etc.)
- All user file data, data areas, etc.
- All user source files, such as RPG source, CL source, DDS source, OCL source (for S36E), etc., that are associated with the application
- Job log for the job, RPG dump if obtainable when an error occurs
- A list of RPG PTFs applied on the system

Answer the following questions:

- On which target release was the user program compiled?
- Did recompiling on a different target release solve the problem?

**Note**

If the program fails at one release but works fine on a previous release, include programs from both releases.

Use Table 46 to determine the additional information that needs to be collected for specific problems.

Table 46. Additional information for specific problems

| Type of problem                                                      | Data to collect                                                                                   |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Compile time problem (CPF6301 or incorrect RPG compile time message) | Compile listing with GENOPT(*LIST)                                                                |
| Program looping                                                      | A trace of the job                                                                                |
| Complex communication problem                                        | Application flow chart for programs                                                               |
| Compile option values used on the Create RPG Program command         |                                                                                                   |
| ICF problem                                                          | TRCICF                                                                                            |
| Communication problem                                                | Steps for communication<br><br>Configuration set-up for line, controller, and device descriptions |

### K.3.2 RPG data to send in a file

Send the instructions to reproduce the user problem. If possible, send them as an online Read Me file instead of paper material.

Include the following information in the instructions:

- Any override of files taking place before running the application
- The program to call to start the application



- The values to input for any input field on a user display, or special instructions (password on user application) to lead to the point that the program fails
- For a problem caused by two or more jobs running the same application, the detailed steps on a time sequence of what each job does



## Appendix L. EBCDIC, HEX, and ASCII conversion charts

Code (data and programs) is stored internally in formats other than alphabetic. When working with diagnostic tools, this information may need to be interpreted for you to understand and read the content. Conversion charts from and to hexadecimal and decimal are provided in the following figures.

### Conversion Charts

#### Hexadecimal/Decimal Conversion

Use the following procedures to convert hexadecimal values to decimal values and decimal to hexadecimal. Use these procedures with the "Decimal/Hexadecimal Conversion Chart" and the "Negative Decimal/Hexadecimal Conversion Chart" on the next page.

##### Positive/Negative Hexadecimal to Decimal Conversion Procedure

1. Locate each hex digit in its corresponding column position and note the equivalent decimal value. Use the "Negative Decimal/Hexadecimal Conversion Chart" on page 2 if either number is negative.
2. Add the individual decimal equivalents to obtain the total decimal value for the hexadecimal number. Use the minus sign (-) to indicate negative numbers.

##### Positive/Negative Decimal to Hexadecimal Conversion Procedure

1. Locate the largest decimal value in the table that is less than or equal to the decimal number you are converting. Use the negative number conversion chart if converting a negative number.
2. Note its hexadecimal equivalent and the hexadecimal column position.
3. Subtract the value in the table from the number you are converting.
  - If the remainder is greater than 14, continue with step 1.
  - If the remainder is less than or equal to 14, note the hexadecimal equivalent for column position one.
4. Place the hexadecimal equivalents in the order of their column positions.

##### Decimal/Hexadecimal Conversion Chart

| Hex<br>Hex | digit 4<br>Dec | Hex<br>Hex | digit 3<br>Dec | Hex<br>Hex | digit 2<br>Dec | Hex<br>Hex | digit 1<br>Dec |
|------------|----------------|------------|----------------|------------|----------------|------------|----------------|
| 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              |
| 1          | 4,096          | 1          | 256            | 1          | 16             | 1          | 1              |
| 2          | 8,192          | 2          | 512            | 2          | 32             | 2          | 2              |
| 3          | 12,288         | 3          | 768            | 3          | 48             | 3          | 3              |
| 4          | 16,384         | 4          | 1,024          | 4          | 64             | 4          | 4              |
| 5          | 20,480         | 5          | 1,280          | 5          | 80             | 5          | 5              |
| 6          | 24,576         | 6          | 1,536          | 6          | 96             | 6          | 6              |
| 7          | 28,672         | 7          | 1,792          | 7          | 112            | 7          | 7              |
| 8          | 32,768         | 8          | 2,048          | 8          | 128            | 8          | 8              |
| 9          | 36,864         | 9          | 2,304          | 9          | 144            | 9          | 9              |
| A          | 40,960         | A          | 2,560          | A          | 160            | A          | 10             |
| B          | 45,056         | B          | 2,816          | B          | 176            | B          | 11             |
| C          | 49,152         | C          | 3,072          | C          | 192            | C          | 12             |
| D          | 53,248         | D          | 3,328          | D          | 208            | D          | 13             |
| E          | 57,344         | E          | 3,584          | E          | 224            | E          | 14             |
| F          | 61,440         | F          | 3,840          | F          | 240            | F          | 15             |

Figure 354. Hexadecimal/Decimal Conversion Chart

| Negative Decimal/Hexadecimal Conversion Chart |        |             |       |             |     |             |     |
|-----------------------------------------------|--------|-------------|-------|-------------|-----|-------------|-----|
| Hex digit 4                                   |        | Hex digit 3 |       | Hex digit 2 |     | Hex digit 1 |     |
| Hex                                           | Dec    | Hex         | Dec   | Hex         | Dec | Hex         | Dec |
| F                                             | 0      | F           | 0     | F           | 0   | F           | 0   |
| E                                             | 4,096  | E           | 256   | E           | 16  | E           | 1   |
| D                                             | 8,192  | D           | 512   | D           | 32  | D           | 2   |
| C                                             | 12,288 | C           | 768   | C           | 48  | C           | 3   |
| B                                             | 16,384 | B           | 1,024 | B           | 64  | B           | 4   |
| A                                             | 20,480 | A           | 1,280 | A           | 80  | A           | 5   |
| 9                                             | 24,576 | 9           | 1,536 | 9           | 96  | 9           | 6   |
| 8                                             | 28,672 | 8           | 1,792 | 8           | 112 | 8           | 7   |
|                                               |        | 7           | 2,048 | 7           | 128 | 7           | 8   |
|                                               |        | 6           | 2,304 | 6           | 144 | 6           | 9   |
|                                               |        | 5           | 2,560 | 5           | 160 | 5           | 10  |
|                                               |        | 4           | 2,816 | 4           | 176 | 4           | 11  |
|                                               |        | 3           | 3,072 | 3           | 192 | 3           | 12  |
|                                               |        | 2           | 3,328 | 2           | 208 | 2           | 13  |
|                                               |        | 1           | 3,584 | 1           | 224 | 1           | 14  |
|                                               |        | 0           | 3,840 | 0           | 240 | 0           | 15  |

Figure 355. Negative Decimal/Hexadecimal Conversion Chart

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## Appendix M. Special notices

This publication is intended to help AS/400 system operators and service personnel who carry out problem determination and problem source identification on the AS/400 system. The information in this publication is not intended as the specification of any programming interfaces that are provided by OS/400. See the PUBLICATIONS section of the IBM Programming Announcement for OS/400 and AS/400 systems for more information about what publications are considered to be product documentation.

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| CT                              | GDDM             |
| IMS                             | Tivoli           |
| Integrated Language Environment | IPDS             |
| Language Environment            | LPDA             |
| Netfinity                       | NetView          |
| OfficeVision                    | OfficeVision/400 |
| Operating System/400            | OS/2             |
| OS/400                          | RETAIN           |
| RS/6000                         | Service Director |
| SP                              | System/36        |
| System/38                       | System/390       |
| SystemView                      | VTAM             |
| XT                              | 400              |
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## Appendix N. Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

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### N.1 IBM Redbooks

For information on ordering these publications, see “How to get IBM Redbooks” on page 385.

- *IBM AS/400 TCP/IP Configuration and Operation*, GG24-3442
- *The System Administrator's Companion to AS/400 Availability and Recovery*, SG24-2161
- *Management Central: A Smart Way to Manage AS/400 Systems*, SG24-5407
- *Managing AS/400 V4R4 with Operations Navigator*, SG24-5646

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### N.2 IBM Redbooks collections

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at [ibm.com/redbooks](http://ibm.com/redbooks) for information about all the CD-ROMs offered, updates and formats.

| CD-ROM Title                                                       | Collection Kit Number |
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| IBM Application Development Redbooks Collection                    | SK2T-8037             |
| IBM Enterprise Storage and Systems Management Solutions            | SK3T-3694             |

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### N.3 Other resources

These publications are also relevant as further information sources:

- *AS/400 Client Access Console*, G325-6337
- *AS/400 Licensed Internal Code Diagnostic Aids - Volume 1*, LY44-5900
- *AS/400 Licensed Internal Code Diagnostic Aids - Volume 2*, LY44-5901
- *OS/400 Diagnostic Aids*, LY44-5907
- *AS/400 Physical Planning Reference*, SA41-5109
- *AS/400 Data Collection Guide*, SC21-8253
- *AS/400 Basic System Operation, Administration and Problem Handling*, SC41-5206
- *OS/400 Backup and Recovery*, SC41-5304
- *Work Management*, SC41-5306

- *Communications Management*, SC41-5406
- *AS/400 TCP/IP Configuration and Reference*, SC41-5420

The following publications are available in softcopy only at:

<http://publib.boulder.ibm.com/pubs/html/as400/online/v4r4eng.htm>

- *Systems Network Architecture Formats*, GA27-3136
- *System Operation*, SC41-4203
- *OS/400 Security - Reference*, SC41-5302
- *Client Access Express for Windows - Setup*, SC41-5507
- *AS/400 Operations Console Setup V4R4*, SC41-5508
- *CL Reference*, SC41-5722
- *OS/400 CL Reference*, SC41-5726

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## N.4 Referenced Web sites

These Web sites are also relevant as further information sources:

- Locate IBM Redbooks at: <http://www.redbooks.ibm.com>
- The iSeries 400 Information Center is located at:  
<http://publib.boulder.ibm.com/pubs/html/as400/infocenter.htm>
- Software Knowledge Base is located on the Web at:  
<http://www.as400service.ibm.com/supporthome.nsf/home/Software+Knowledge+Base>
- You can search for publications about Service Director on the Web at:  
<http://publib.boulder.ibm.com:80/cgi-bin/bookmgr/LIBRARY>
- The SDF server Web site is located at:  
<http://w3sms.boulder.ibm.com/w3sms.nsf/c00134a213f178748725642e007fcce3/cbbe0d039334ebf5872564cd0071d123?OpenDocument>
- The AS/400 Technical Support site is on the Web at:
  - <http://as400service.ibm.com>
  - <http://as400service.rochester.ibm.com>
- For information about Client Access, visit the home page at:  
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- For Software Problem - APARS, go to:  
<http://www.as400service.ibm.com/supporthome.nsf/home/>
- UPS manufacturer documentation is available on the Web at these sites:
  - <http://www.bestpower.com/>
  - <http://www.apcc.com/>
- A solution for configuring the implementation of a TCP/IP sockets server is available from Hummingbird at: <http://www.hummingbird.com>



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## How to get IBM Redbooks

This section explains how both customers and IBM employees can find out about IBM Redbooks, redpieces, and CD-ROMs. A form for ordering books and CD-ROMs by fax or e-mail is also provided.

- **Redbooks Web Site** [ibm.com/redbooks](http://ibm.com/redbooks)

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## Glossary

**1024-byte format** A format for 2D diskettes with 1024 bytes per sector and 26 sectors per track.

**128-byte format** A format for one diskette with 128 bytes per sector and 26 sectors per track.

**256-byte format** A format for diskette 2D diskettes with 256 bytes per sector and 26 sectors per track.

**3270 device emulation** The operating system support that allows an AS/400e server to appear as a 3274 Controller in a BSC multipoint network or SNA network.

**512-byte format** A format for 1 diskette with 512 bytes per sector and 8 sectors per track.

**5250 display station** Any display station attached by twinaxial cable that uses 5250 data streams.

**5250 emulation** Any one of many licensed programs that allows a personal computer to perform like a 5250 display station or printer and to use the functions of an AS/400e server.

**5290 display station** Any display station from the 5290 Display System.

**abnormal end** A system failure or operator action that causes a job to end unsuccessfully.

**abstract** A part of an APAR that summarizes a problem.

**across IPLs** From one IPL to another.

**active** A powered on partition.

**adapter** 1) A part that electrically or physical connects a device to a computer or to another device. 2) A device for attaching parts, for example, parts having different diameters or voltages.

**address** 1) The location in the storage of a computer where particular data is stored. Also, the numbers that identify such a location. 2) In data communications, the unique code assigned to each device or system connected in a network. 3) The second part of a two-part user identification used to send distributions. See also *user ID/address*.

**Advanced Function Printing (AFP)** The ability of programs to use the all-points-addressable concept to print text and images on a printer.

**Advanced Function Printing data stream (AFPDS)** In AFP support, the printer data stream used for printing Advanced Function printing data. The AFPDS includes composed text, page segments, electronic overlays, form definitions, and fonts that are downloaded from the AS/400e server to the printer.

**advanced peer-to-peer networking (APPN)** Data communications support that routes data in a network between two or more APPC systems that do not need to be directly connected.

**advanced peer-to-peer communications (APPC)**

Data communications support that allows programs on an AS/400e server to communicate with programs on other systems having compatible communications support. APPC on the AS/400e server provides an application programming interface to the SNA LU type 6.2 and node tape 2.1 architecture.

**advanced printer function (APF)** A function of the AS/400 Application Development Tools licensed program that allows a user to design symbols, logos, special characters, large characters, and forms tailored to a business or data processing application. The function supports printing of any design on the 5224 or 5225 dot matrix printer.

**AFP** See *Advanced Function Printing (AFP)*.

**AFPDS** See *Advanced Function Printing data stream (AFPDS)*.

**alert** In SNA, a record sent to a focal point to identify a problem or an impending problem.

**all object authority** A special authority that allows users to use all system resources without having specific authority to the resources. See also *job control authority security administrator, service authority, and spool control authority*.

**allocate** To reserve a resource for use in performing a specific task. Contrast with *deallocate*.

**alphameric** Pertaining to the letters, A through Z; numbers, 0 through 9; and special symbols, \$, #, @, ., or \_ . Synonymous with *alphanumeric*.

**alphanumeric** 1) Pertaining to the letters, A through Z or a through z; numbers 0-9; and special symbols, \$, #, @, ., or \_ . 2) Pertaining to a character set that contains letters, digits, and usually other characters, such as punctuation marks.

**alternate install IPL** See *boot load IPL*.

**alternate IPL** The process of loading code into main storage and preparing for system operation from a input/output hardware unit other than the system's primary load source unit. This is the "traditional" alternate load source type D IPL where the IPL and install load source are the same: an IOP other than the MFIO, but attached to SPD bus 1.

**alternate console** A display device assigned by the operating system to function as the console if the console is not working.

**American National Standard Code for Information Interchange (ASCII)** The code developed by American National Standards Institute for information exchange among data processing systems, data communications stems, and associated equipment. The ASCII character set consists of 7-bit control

characters and symbolic characters, plus one parity bit.

**APAR** See *authorized program analysis report (APAR)*.

**APF** See *advanced printer function (AFP)*.

**APPC** See *advanced program-to-program communications (APPC)*.

**application program** A program used to perform a particular data processing task, such as inventory control or payroll.

**APPN** See *advanced peer-to-peer networking (APPN)*.

**ASCII** See *American National Standard Code for Information Interchange (ASCII)*.

**ASP** See *auxiliary storage pool (ASP)*.

**Async** Asynchronous.

**attribute** A characteristic or trait of one or more items.

**authority checking** A function of the system that looks for and verifies a user's authority to an object.

**authorized program analysis report (APAR)** A request for correction of a defect in a current release of an IBM-supplied program.

**automatic configuration** A function that names and creates the descriptions of network devices and controllers attached to a pre-existing line. The objects are also varied on at a users request.

**automatic vary on** An option specified during the creation of configuration objects that allows them to be available when the system is started (IPL).

**autostart job** A batch job doing repetitive work or one-time initialization work that is associated with a particular subsystem. The autostart jobs associated with a subsystem are automatically started each time the subsystem is started.

**auxiliary storage** All addressable storage other than main storage. See also *control storage*. Contrast with *main storage*.

**auxiliary storage pool (ASP)** A group of units defined from the disk units that make up auxiliary storage. ASPs provide a means of isolating certain objects on specific disk units to prevent the loss of data due to disk media failures on other disk units. See also *unit*, *system ASP*, and *user ASP*.

**backup** 1) Pertaining to an alternative copy used as a substitute if the original is lost or destroyed, such as a backup log; 2) the act of saving some or all of the objects on a system to tape or diskette; 3) the tapes or diskettes with the saved objects; 4) for communications, a switched network backup.

**base pool** A storage area that contains all unassigned main storage on the system and whose minimum size is specified in the system value QBASPOOL. The system recognized identifier is \*BASE.

**batch** Pertaining to a group of jobs to be run on a computer sequentially with the same program with little or no operator action. Contrast with *interactive*.

**batch job** A predefined group of processing actions submitted to the system to be performed with little or not interaction between the user and the system. Contrast with *interaction job*. See also *autostart job*, *communications job*, *prestart job*, *scheduled job*, *spooling job*, and *system job*.

**binary** 1) Pertaining to a selection, choice or condition that has two possible values. 2) A numbering system with a base of two (0 and 1).

**binary format** Representation of a decimal value in which each field must be 2 or 4 bytes long. The sign (+ or -) is in the far left bit of the field, and the number value is in the remaining bits of the field. Positive numbers have a 0 in the sign bit and are in true form. Negative numbers that have a 1 in the sign bit and are in twos complement form.

**binary synchronous communications (BSC)** A data communications line protocol that users a standard set of transmission control characters and control character sequences to send binary-coded data over a communications line.

**bit** A contraction of a binary digit. Are either binary digits 0 or 1. Compare with *byte*.

**bit string** A series of bits consisting of the values 0 and 1.

**boot load IPL** Type D IPL that uses a load source medium attached to the MFIOP or an (alternate) IOP on bus 1. To IPL, the MFIOP and LIC, but performs the LIC installation using a load source medium attached to a different IOP from the one used for a regular IPL. In other words, in an alternate install IPL (boot IPL), the alternate install load source is a different bus unit and device (load source unit) than the IPL load source.

**boot load source** The load source that is to initially load the load source IOP, MFIOP and LIC during an alternate install IPL. It becomes distinguished as the "boot" load source when the system VPD, or user, defines an alternate load source bus unit that attaches another load source medium, such as a tape, for that install. It generally refers to the combination of the bus, OIP and device (load source it).

**BSC** See *binary synchronous communications (BSC)*.

**byte10** The smallest unit of storage that can be addressed directly; 2) a group of 8 adjacent bits in the EBCDIC coding system, where 1 byte can represent a character. In the double-byte coding system, 2 bytes represent a character.

**CA** Command Analyzer.

**cache** A high-speed buffer storage, containing frequently accessed instructions and data, used to reduce access time.

**call stack** A list of programs linked together as a result of programs calling other programs with the call instruction, or implicitly from some other entry within the same job.

**character** A letter, number, or other symbol in the data character set that is part of the organization, control, or representation of data.

**CL** See *Control language (CL)*.

**CMD** Command.

**cold start** A process by which all temporary objects (objects created by the system after the operating system is installed) are deleted and created again as a group. It occurs when the system operator specifies *clear/clear/clear* on the "IPL options" display that appears during a manual IPL.

**comm** Communication.

**command** 1) A statement used to request a function of the system. A command consists of the command name, which identifies the requested function, and its parameters. 2) In SDLC, a frame transmitted by a primary station. Asynchronous balanced mode stations send both commands and responses. 3) In SNA, any field set in the transmission header (TH), request header (RH), or a request unit that states an action or that starts a protocol.

**command definition** An object that contains the definition of command (including the command name, parameter descriptions, and validity-checking information) and identifies the program that performs the function requested by the command. The system-recognized identifier for the object type is \*CMD>.

**command line** The blank line on a display where commands, options numbers, or selections can be entered.

**command processing program (CPP)** A program that processes a command. This program performs some validity checking and processes the command so that the requested function is performed.

**communications configuration** The physical placement of communications controllers, the attachment of communications lines, and so forth. The configuration descriptions that describe the physical configuration to the system and describe how the configuration will be used by the system. See also *line configuration*, *controller configuration*, and *device configuration*.

**communications controller** The I/O processor card in the card enclosure.

**communications job** A batch job that is started by a program start request from a remote system.

**communications line** The physical link (such as a wire or a telephone circuit) that connects one or more workstations to a communications controller, or

connects one controller to another. Contrast with *data link protocol*.

**compatible** Pertaining to the characteristics that make devices, programs, products, or systems work together.

**compile** To translate a program written in a high-level programming language into a machine language program.

**configuration** The physical and logical arrangement of devices and programs that make up a data processing system. See also *communications configuration*, *line configuration*, *controller configuration*, and *device configuration*.

**configure** 1) To describe the interconnected arrangement of the devices, programs, communications, and optional features installed on a system. 2) To describe setting up auxiliary storage pools.

**console** A display station from which an operator can control and observe the system operation. For example, an operator can install the operating system, do an attended IPL, or sign on the system after using the End System (ENDSYS) command.

**control language (CL)** The set of all commands with which a user requests system functions.

**control panel** A panel located on the processing unit on the front of the rack that contains lights and switches to operate or service the system.

**control station** The controlling or primary computer on a multipoint line. The control station controls the sending and receiving of data. See also *host system*.

**control storage** Storage in the computer that contains the programs used to control input and output operations and other machine operations. See also *auxiliary storage*. Contrast with *main storage*.

**controller** A device that coordinates and controls the operation of one or more input/output devices (such as workstations) and synchronizes the operation of such devices with the operation of the system as a whole.

**controller configuration** The process of creating configuration descriptions for the local (device configuration) and remote (communications configuration) controllers that make up a data processing system. See also *line configuration* and *device configuration*.

**controller description** An object that contains a description of the characteristics of a controller that is either directly attached to the system or attached to a communications line. The system-recognized identifier for the object type is \*CTLD.

**controlling subsystem** The interactive subsystem that is automatically started first when the system is started and through which the system operator controls the system.

**conversation** In APPC, the communications between the application program and another application program at the remote system. See also *session* and *transaction*.

**CPP** See *command processing program (CPP)*.

**CPU** Control processing unit; see *processing unit*.

**create date** The system date when an object is created. See also *job date* and *system date*.

**CS** Control storage.

**CTLD** See *controller description*.

**CUT** Controller unit description. Also written as CD or CTLD. See *Controller description*.

**CUR** Cursor.

**current device** The device being used for the application program, usually a display station.

**cursor** A movable symbol, often a blinking or solid block of light, that tells the user where to type, or identifies a choice to select.

**D/A** Display/alter.

**D/A/D** Display/alter/dump.

**DASD** Direct access storage device.

**data area** A system object used to communicate data, such as CL variable values between the programs within a job and between jobs. The system recognized identifier for the data area is \*DTAARA.

**data circuit-terminating equipment (DCE)** The equipment installed at the user's premises that provides all the functions required to establish, maintain and end a connection, and the signal conversion and coding between the data terminal equipment and the line. See also *data terminal equipment (DTE)* and *modem*.

**data file** A group of related data records organized in a specific order. A file created by the specification of FILETYPE(\*DATA) on the create command. Contrast with *source file*.

**data link** The physical connection (communications lines, modems, controllers, workstations, and other communications equipment) and the rules, which include protocols for sending and receiving data between two or more locations in a data network.

**data link layer** One of the seven layers defined in the ISO standard.

**data link protocol** The rules that govern control of the physical connection for sending and receiving data between two or more locations in a network. Examples of data link protocols include a) asynchronous, b) binary synchronous communications (BSC), c) Ethernet, d) synchronous data link control (SDLC), e) token-ring network, and f) X.25. Contrast with *communications line*.

**data management** The part of the operating system that controls the storing and accessing of data to or from an application program. The data can be on internal storage (for example, database) on external media (diskette, tape, or printer) on another system.

**data queue** An object that is used to communicate and store data used by several programs in a job or between jobs. The system-recognized identifier is \*DTAQ.

**data service unit (DSU)** A device that provides a digital data service interface directly to the data terminal equipment. The DSU provides loop equalization, remote and local testing capabilities, and a standard EIA/CCITT interface.

**data stream** All information (data and control commands) sent over a data link usually in a single read or write operation.

**data terminal equipment (DTE)** That part of a data link that sends data, receives data, and provide the data communications control function according to protocols.

**data type** A characteristic used for defining data as numeric or character.

**database** All the data files stored in the system.

**database file** One of the several types of the system object type (FILE kept in the system that contains descriptions of how input data is to be presented to a program from internal storage and how output data is to be presented to internal storage for a program). See also *physical file* and *logical file*.

**DB** Database.

**DBCS** See *double-byte character set (DBCS)*.

**DC** Device configuration.

**DCE** See *data circuit-terminating equipment (DCE)*.

**deadlock** A state of inaction that occurs when several processes are waiting for a resource that will not become available because it is being held by another process that is in a similar wait state.

**deallocate** To release a resource that is assigned to a specific task. Contrast with *allocate*.

**debugging mode** An environment in which programs can be tested.

**dedicated system** A system intentionally reserved for a single job or task.

**Dedicated Service Tools (DST)** The part of the service function used to service the system when the operating system is not working.

**dedicated system** A system intentionally reserved for a single job or task.

**default** A value automatically supplied or assumed by the system or program when no value is specified by the user.

**default printer** A printer that is assigned to a system or user and accepts all the printed output from that system or user, if no other printer is specified.

**default program** A user-specified program that is assumed when no other program is specifically named on a debug command, or a user-defined program for handling error messages.

**default reply** A system assigned reply to an inquiry or notify message, which is used when the message queue at which the message arrives is in default delivery mode.

**default value** A value supplied by the system that is used when no value is specified by the user, or the value specified by the user with the DFT keyword is DDS.

**delayed power off (DPO)** A switch on the control panel used to power off the system when the Keylock is set to Manual mode.

**dequeue** In OS/400 application programming interfaces, an operation for removing items, such as messages, from a queue.

**DEVD** See *device description*.

**device class** The generic name for a group of device types. For example, all display stations belong to the same device class. Contrast with *device type*.

**device configuration** The physical placement of display stations, printers, and so forth; and the configuration descriptions that describe the physical configuration to the system and describe how the configuration will be used by the system. See also *line configuration* and *controller configuration*.

**device description** An object that contains information describing a particular device or logical unit (LU) that is attached to the system. A device description is a description of the logical connection between two LUs (local and remote locations). The system recognized identifier for the object type is \*DEVD.

**device file** One of several types of the system object type \*FILE. A device file that contains a description of how data is to be presented to a program from a device or how data is to be presented to the device from the program. Devices can be display stations, printers, a diskette unit, tape units, or remote system.

**device type** The generic name for a group of devices. For example, 5219 for IBM 5219 Printers. Contrast with *device class*.

**diagnostic** Pertaining to the detection and isolation of an error.

**diagnostic aids** Logs, traces, dumps, messages, problem handling and service tools used to analyze and solve system problems.

**diagnostic message** A message that contains information about errors or possible errors. This message is generally followed by an escape message.

**digit** An of the numbers from 0 through 9.

**directory** In the hierarchal file system, a grouping of related files and directories, such as a folder containing related documents. A directory may hold zero or more entries, which refer to other directories and files.

**disconnected mode (DM)** In communications, a response from a secondary station indicated that it is logically disconnected from the link disk. A direct-access storage medium with magnetically recorded data.

**disk data management** The system programs that provide access to data, perform or monitor storage of data, and control input/output devices.

**diskette file** A device file created by the user for a diskette it.

**display area** For double-byte character set support, the area that is used to display the character currently being defined or changed.

**display screen** The part of the display device that is similar to a television (TV) picture tube. It is used to display information entered or received at a display station.

**display station** A device that includes a keyboard from which an operator can send information to the system and a display screen on which an operator can see the information sent to or the information received from the system.

**document library** 1) The entire collection of documents and folders on a system. 2) The AS/400e system library named QDOC that contains all documents and folders.

**document library object (DLO)** Any system object that resides in the document library, such as RFT and FFT documents, folders, and PC files.

**double-byte character set (DBCS)** A set of characters in which each character is represented by 2 bytes. Languages such as Japanese, Chinese, and Korean, which contain more symbols than can be represented by 256 code points, require double-byte character sets. Because each character requires 2 bytes, the typing, displaying and printing DBCS characters requires hardware and programs that support DBCS.

**device emulation** The programming that allows one device to appear to the user or to a system as another device.

**downline** Pertaining to devices that are below a controller, and controllers that are below a communications line in a communications configuration. Contract with *upline*.

**DPO** See *delayed power off (DPO)*.

**draft** A printed copy of a document that is not yet completed.

**DSID** Dump session ID.

**DST** See *Dedicated Service Tools (DST)*.

**DSU** See *Data Services Unit (DSU)*.

**DTAARA** Data or dump area.

**DTE** See *data terminal equipment (DE)*.

**DUD** DASD unit descriptor.

**dump** 1) In problem analysis and resolution, to write, at a particular instant, all or part of the contents of main or auxiliary storage onto another data medium for the purpose of protecting the data or collecting error information. 2) To copy data from main or auxiliary storage onto an external medium, such as tape, diskette, or printer. 3) Data copied in a readable format from main or auxiliary storage to an external medium such as tape, diskette, or printer.

**EA0** Effective address overflow.

**EBCDIC** See *extended binary-coded decimal interchange code (EBCDIC)*.

**EBCDIC character** Any one of the symbols included in the 8-bit EBCDIC set.

**element** 1) In a list of parameter values, one value. 2) In Advanced Function Printing Utilities/400, the smallest unit, such as text, an image, or a bar code, used to design an AFP resource like an electronic overlay.

**ELOG** Error log.

**emulation** Imitation of one system or device by another.

**enqueue** 1) In OS/400 application programming interfaces, an operation for placing items, such as messages, on a queue. 2) In Client Access for OS/400, an operation for placing items, such as messages, on a queue. Contrast with *dequeue*.

**EOJ** End of job.

**EOV** End of volume.

**EPO** Emergency power off.

**EREP** Environmental recording, editing, and printing. Contrast with EE.

**ERP** Error recovery procedure.

**error log** A record of machine checks, device errors, and media statistics.

**exception** 1) Something that does not conform to normal. 2) Something excluded.

**EXCLRD lock** Exclusive read lock on a workstation that allows device-related operations to be performed on that workstation.

**expiration date** 1) The date after which the file on the diskette or tape volume is no longer protected from being automatically deleted by the system. 2) The date after which a database file member should not be used. 3) In the OfficeVision/400 program, the date that an action item, document, or reference to a document should be deleted from the system by the user.

**extended binary-coded decimal interchange code (EBCDIC)** A coded character set of 8-bit coded characters.

**extended characters** Double-byte characters that are stored in a DBCS font file, not in the hardware of a DCBCS-capable workstation. When displaying or printing extended characters, the workstation receives them from the DBCS font table under control of the extended character processing function of the operating system.

**external message queue** The part of the job message queue that sends messages between an interactive job and the workstation user. For batch jobs, messages sent to the external message queue appear only in the job log.

**external object** An object that has a defined object type (such as 8FILE or \*PGM). In general, external objects can be displayed by a user. See also *object*.

**external storage** Data storage not located in main or auxiliary storage, such as tape or diskette.

**field** A group of related bytes (such as name or amount) that are treated as a unit in a record.

**FIFO** See *first-in-first-out*.

**file** A generic term for the object type that refers to a database file, device file, or save file. The system-recognized identifier for the object type is \*FILE.

**file description** The description of a file and its contents. See also *label*.

**file name** The name used by a program to identify a file.

**first-in-first-out (FIFO)** A queuing technique in which the next request to be processed from a queue is the request of highest priority that has been on the queue for the longest time.

**FMS** Folder management services.

**FMT** File format.

**folder** A directory for documents. A folder is used to group related documents and to find documents by name. The system-recognized identifier for the object type is \*FLR. See also *document library object*. Compare with *library*.

**font** 1) An assortment of characters of a given size and type style. 2) A particular style of type (for example, Bodini or Times Roman) that contains



definitions of character sets, marker sets, and pattern sets.

**format** 1) A defined arrangement of such things as characters, fields, and lines, usually used for displays, printouts, files, or documents. 2) The arrangement or layout of fields in a record. 3) The arrangement or layout of data on a storage medium, such as disk, tape, or diskette. 4) To set the block size for the 9332 Disk Unit, either automatically by the system or specifically by the user. 5) To arrange information on a page, in a file, or on a display screen. 6) To prepare a diskette so that it can be used by a computer.

**frame** In communications, the unit of transmission sent and received.

**frame relay (FR)** A protocol for routing frames through the network based on the address field (data link connection identifier) in the frame and for managing the route or virtual connection.

**FRU** Failing replaceable unit.

**FS** File server.

**function** Any instruction or set of related instructions that perform a specific operation.

**function key** A keyboard key that allows the user to select keyboard functions or programmer functions.

**general-purpose library** The library shipped with the system that contains IBM-provided objects required for many system functions and user-created objects that are not explicitly placed in a different library when they are created. Named QGPL.

**generic** Relating to, or characteristics of, a whole group or class.

**graphics** Pictures and illustrations. Pertaining to charts, tables, and their creation.

**group data area** A data area that is automatically created when an interactive job becomes a group job. This data area is shared by all jobs in the group, but cannot be used by jobs outside the group.

**group job** One of up to sixteen interactive jobs that are associated in a group with the same workstation device and user.

**hardware** Physical equipment, rather than programs, procedures, rules, and associated information.

**HDC** Hardware data compression or decompression.

**hex** See *hexadecimal*.

**hexadecimal** Pertaining to a number system with a base of 16.

**high-level data link control (HDLC)** A form of communications line control that uses a specified series of bits rather than control characters to control data transmission over a communications line.

**high-level language (HLL)** A programming language, such as RPG, BASIC, PL/I, COBOL, PASCAL, FORTRAN, and C used to write computer programs.

**HIPER** High impact or pervasive APAR.

**history log** A summary of the system activities, such as system and job information, device status, system operator messages, and a record of program temporary fix (PTF) activity on the system. The history log is identified by the name QHST, and the system-recognized identifier for the object type is \*MSGQ.

**HLL** See *High-level language (HLL)*.

**host system** 1) The primary or controlling computer in a communications network. See also *control station*. 2) In TCP/IP, a computer that is part of a network as a peer system.

**HRM** Hardware Resource Manager.

**hypervisor** A thin kernel that enables partitioning. It consists of a layer of code called Partitioning Licensed Internal Code (PLIC) and parts of the primary partition SLIC.

**I/O** See *input/output*.

**I/O bus unit** Common name for I/O processors and bus controllers. For example, IOPS and bus are both I/O bus units (IOBUs).

**IC** Insert cursor.

**ID** Identifier or identification.

**identifier** 1) The name of something. 2) A sequence of bits or characters that identifies a user, program, device, or system to another user, program, device, or system. 3) In Client Access for OS/400, an entry in a Client Access for OS/400 configuration file that defines how a particular Client Access for OS/400 function operates.

**ILE** See *Integrated Language Environment*.

**image** An electronic representation of an original document record by a scanning device.

**IMP** Internal microprogramming.

**IMPI** Internal microprogrammed instruction.

**IPIP** Internal microprogramming instruction processor.

**implicit** Capable of being understood from something else, although unexpressed.

**IMSG** IPL message.

**IN** Installation

**INAUT** Install authority object.

**initial program** A user-profile program that runs when the user signs on and after the command processor program QCMD is started. QCMD calls the first program.

**initial program load (IPL)** The process that loads the system programs from the system auxiliary storage, checks the system hardware, and prepares the system for user operations. This can be further differentiated into system IPL and partition IPL. See *partition IPL*. See also *initial program load (IPL)*.

**initialize** To set the addresses, switches, or the contents of storage to zero, or the starting value set by the manufacturer.

**inline** Spooled input data that is read into a job by a reader.

**INOP** Inoperative.

**input/output** Data provided to the computer or data resulting from computer processing.

**input/output processor (IOP)** A functional unit or the part of an I/O controller that processes programmed instructions, and controls one or more input/output devices or adapters.

**installation** The act or result of installing.

**install load source** The load source bus unit and device, used during a type D IPL, that provides the LIC source to create or update the load source DASD attached to the MFIOP.

**integrated language environment (ILE)** A program model used to enhance the machine architecture and OS/400 program to support a family of high-level language compilers. The ILE model provides a common framework for ILE languages in the areas of program creation, management, calling, and debug.

**integrated services digital network (ISDN)** A CCITT recommendation that defines an interact to a network that can carry voice, data, and images over the same communications line.

**interactive** Pertaining to the exchange of information between people and a computer. Contrast with *batch*.

**interactive job** A job started for a person who signs on to a workstation. Contrast with *batch job*.

**interactive subsystem** A subsystem in which interactive jobs are processed.

**interface** A shared boundary. An interface might be the hardware to connect two devices, or it might be a part of main storage or registers used by two or more computer programs.

**internal object** An object that the system program uses to store the information needed to perform some system functions. Internal objects cannot be displayed by a user. For example, you cannot use a display command (like the Display Library (DSPLIB) command) to display internal objects. Contrast with *external object*.

**Internet Protocol (IP)** In TCP/IP, a protocol that routes data from its source to its destination in an Internet environment.

**invocation** The activation of a program or procedure. An execution of a program.

**IOBU** See *I/O bus unit*.

**IOP** See *input/output processor (IOP)*.

**IOP-level I/O partitioning** All devices under an IOP are assigned to one logical partition, bus IOPs on the same system I/O bus may belong to different logical partitions.

**IP** See *Internet Protocol (IP)*.

**IPL** See *initial program load (IPL)*, *partitioning IPL*, and *system IPL*.

**IPDS** See *intelligent printer data stream (IPDS)*.

**IPL load source** The load source bus unit device that provides the MFIOP and LIC loads to IPL the system.

**irrecoverable error** An error that needs an IPL to recover (unrecoverable error).

**ISDN** See *integrated services digital network (ISDN)*.

**IWS** Interactive workstation (programming workstation).

**IX** Indexing.

**job** A unit of work to be done by a computer.

**job control authority** A special authority that allows a user to: change, delete, display, hold, and release all files on output queues; hold, release, and clear job queues and output queues; start writers to output queues; hold, release, change, and end other users' jobs; change the class attributes of a job; and subsystems; and start (do an IPL of) the system. See also *all object authority*, *security administrator authority service authority*, and *spool control authority*.

**job date** The date associated with a job. The job date usually assumes the system date, but it can be changed by the user. See also *creation date* and *system date*.

**job description** A system object that defines how a job is to be processed. The system-recognized identifier for the object type is \*JOBDD.

**job log** A record of requests submitted to the system by a job, the messages related to the requests, and the actions performed by the system on the job. The job log is maintained by the system program.

**job message queue** A message queue that is created for each job. A job message queue receives requests to be processed (such as commands) and sends messages that result from processing the requests. A job message queue consists of an external message queue and a set of program message queues. See also *external message queue* and *program message queue*.

**job name** An object that contains a list of batch jobs waiting to be processed by the system. The

system-recognized identifier for the object type is \*JOBQ.

**JOBQ** See *job description*.

**JOBQ** See *job queue*.

**JSD** Job structure dump.

**JSQ** Job structure queue.

**JTLB** Job temporary library.

**Julian date** A date format that contains the year in positions 1 and 2, and the day in positions 3 through 5. Time is represented as 1 through 365, right-adjusted, with zeros in the unused high-order positions. For example, the Julian date for April 6, 1987 is 87096.

**keylock** A mechanical or electronic switch on the control panel that can be set to one of four different modes to establish the allowable power-on and power-off modes for the system.

**keyword** A name that identifies a parameter in a command.

**KJ** Kanji

**L/D** Load/dump

**label** The name of a file on a diskette or tape.

**LAN** See *local area network (LAN)*.

**last in first out (LIFO)** A queuing technique in which the next item to be retrieved is the item most recently placed o the queue. Contrast with *first-in first-out (FIFO)*.

**LD** Load/dump.

**LDA** Local data area.

**LEAR** Lock exclusive allow read. See *EXCLRD lock*.

**LED** Light-emitting diode or light.

**LG** Database logging.

**LI** Librarian or log information.

**LIB** See *library*.

**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. The system-recognized identifier for the object type is \*LIB. Compare with *folder* and *document library*. 2) The set of publications for a system.

**library list** A list that indicates which libraries are to be searched and the order in which they are to be searched. The system-recognized identifier is \*LIBL.

**library name** A user-defined word that names a library.

**LIC** See *Licensed internal Code (LIC)*.

**LIC log** A list of problem analysis information created by Licensed Internal Code.

**Licensed Internal Code (LIC)** Programming that defines logical operations on data. The Licensed Internal Code translates the machine interface (MI) instructions. The layered architecture below the machine interface (MI) and above the machine, consisting of the model-independent and the model-unique Licensed Internal Code. The Licensed Internal Code is a proprietary system design that carries out many functions, including, but not limited to storage management, pointers and addressing, program management functions, exception and event management, data functions, I/O managers, and security. See also *model-unique Licensed Internal Code*.

**Licensed Internal Code fix** A temporary solution to, or bypass of, a defect in a current release of the Licensed Internal Code. Contrast with *program temporary fix (PTF)*.

**licensed program (LP)** A separately orderable program, supplied by IBM, that performs a function.

**LICIR** LIC initialization and recovery.

**LICR** Licensed Internal Code trouble report. This term replaced the term microcode trouble report (MTR), but it is not commonly used. The term most commonly used for LIC trouble reports or LIC APARs is Authorized Problem Analysis Report (APAR). See *APAR*.

**LIFO** See *last-in-first-out (LIFO)*.

**LIND** Line description.

**line** The physical path in data transmission

**line configuration** The process of treating configuration descriptions for the lines that make up a data processing system. See also *controller configuration* and *device configuration*.

**line description** An object that contains information describing a particular communications line that is attached to the system. The system-recognized identifier for the object type is \*LIND.

**line number** The number that precedes a line of information in a printout or on a display. This number can be up to five digits long from 00001 through 99999.

**link problem determination aid** A series of procedures used by products, such as the AS/400e server, and NetView and VTAM programs, to test modem or other data circuit-terminating equipment (DCE) operations, and to provide information about the DCE and the data link. An extended version also provides operational and configuration commands.

**link protocol** The rules for sending and receiving data at the link level.

**list** A series of items.

**LLD** Low-level debug.

**LLD functions** These functions are enabled at the control panel when the service processor stops because of a severe error.

**load** To move data or programs into storage.

**load source** Device used to move data or programs into the system, for example, a CD-ROM or tape device.

**local** Pertaining to a device, system, or file that is connected directly or read directly from your system, without the use of a communications line. Contrast with *remote*.

**local area network (LAN)** The physical connection that allows transfer of information among devices located on the same premises. Contrast with *wide area network (WAN)*.

**local data area** A 1024-byte data area that can be used to pass information between programs in a job. A separate local data area is automatically created for each job.

**local workstation** A workstation that is connected directly to the system without a need for data transmission functions. Contrast with *remote workstation*.

**logic** The systematized interconnection of digital switching functions, circuits, or devices.

**logical file** A description of how data is to be presented or received from a program. This type of data base file contains no data, but it defines formats for one or more physical files. See also *database file*. Contrast with *physical file*.

**logical partition** A collection of machine resources capable of running a copy of OS/400 SLIC and applications in a separate 64-bit address space. If hardware requirements are met, multiple logical partitions can exist within a system.

**logical unit (LU)** In SNA, related to processing user data. Examples of licensed programs are Client Access for OS/400, COBOL/400, AS/400 Application Development Tools, OfficeVision/400, and so on.

**logical unit description** An internal machine object (\*LUD) created at the same time as the device description (\*DEVDP); it is created from a CRTDEVDP command in the operating system. The LUD resides in LIC.

**LP** See *licensed program (LP)*.

**LPAR** See *logical partitioning*.

**LPDA** See *link problem determination aid*.

**LPP** See *licensed program (LP)* (formerly licensed program product).

**LU** See *logical unit*.

**MA** Maintenance analysis procedure attributes.

**mach.** Machine

**machine check** Device errors that cause the system to stop. A detected machine malfunction may result in an AER.

**machine check exception** Device errors that are not severe enough to cause the system to stop.

**machine interface (MI)** The interface, or boundary, between the operating system and the Licensed Internal Code.

**machine object** A program object that has no defined storage form, the object is defined internally to the machine. The machine aspect is not available to the user.

**machine storage pool** A storage pool used by the machine and certain highly shared programs, whose size is specified in the system value QMCHPOOL.

**magnetic storage device controller** The I/O controller card in the card enclosure that controls the operation of the disk, diskette, and tape devices.

**main storage** All addressable storage where programs are run. Synonymous with "memory". See also *control storage*. Contrast with *auxiliary storage*.

**main storage dump space** A section of storage reserved on the disk device that is used as a place to see main storage data for recovery and debugging.

**main storage pool** A division of main storage, which allows the user to reserve main storage for processing a job or group of jobs, or to use the pools defined by the system. Contrast with *auxiliary storage pool*.

**maintenance analysis procedure (MAP)** Written information used by IBM customer engineers and by service representatives to repair IBM equipment. A MAP contains yes/no questions and procedures that direct the user to the failing part of the equipment.

**MAP** Manufacturing Automation Protocol (MAP).

**master programming temporary fix index** An index created and used by the system to record the program temporary fix activity for each licensed program installed. Each index contains a record of all PTF activity for a licensed program since the last release. The user's record of PTF activity is record in the history log.

**MCH** Machine

**MCHK** Machine check

**MCK** Machine check or device error

**MCR** Machine configuration record

**medium** The disk, tape, or diskette used to store information in a save or restore operation.

**megabyte (MB)** A unit of measure for storage capacity. For main storage, 1 megabyte = 1 048 576 bytes (1024 X 1024); for auxiliary storage (disk, diskette, and tape), 1 megabyte = 1 000 000 bytes (1000 x 1000).

**MEM** Database file member.

**member** Different sets of data, each with the same format, within one database file.

**message description** Information describing a particular message.

**message file** An object that contains message descriptions. The system-recognized identifier for the object type is \*MSGF.

**message identifier** A seven-character code that identifies a predefined message, and is used to get the message description from a message file. See *predefined message*.

**message line** An area on the display where messages are displayed.

**message queue** A list on which messages are placed when they are sent to a user ID or device description. The system-recognized identifier for the object type is \*MSGQ.

**MG** LIC messages.

**MH** Message handler (component).

**MI** See *machine interface (MI)*.

**MISR** Machine initialization status record.

**MIT** Message information table.

**MN** Menu, context management.

**mode** The session limits and common characteristics of the sessions associated with advanced-program-to-program communications (APPC) devices managed as a unit with a remote location.

**mode description** A system object created for advanced-program-to-program (APPC) devices that describes the session limits and the characteristics of the session, such as the maximum number of sessions allowed, maximum number of conversations, allowed, the pacing value for incoming and outgoing request or response units, and other controlling information for the session. The system-recognized identifier for the object type is \*MODD.

**model-unique Licensed Internal Code** The Licensed Internal Code shipped with the system hardware that provides support. See also *Licensed Internal Code*.

**modem (modulator-demodulator)** A device that converts data from the computer to a signal that can be sent over a communications line (modulator), and converts the communications signal to data for the computer (demodulator). See also *data circuit-terminating equipment (DCE)*.

**monitor** 1) A functional unit that observes and records selected activities for analysis within a data processing system. 2) Devices or programs that observe, supervise, control, or verify system operations.

**MP** Microprocessor.

**MPTFI** See *master programming temporary fix index*.

**MRI** Machine-readable information. IBM internal term for textual data. A collective term for menus, displays, lists, prompts, options, help information, on-line help information, messages, and so on.

**MRT** Multiple requestor terminal program.

**MS** Main storage, Machine Services Control Point.

**MSD** Main storage dump.

**msec.** Millisecond.

**MSGF** Message file.

**MSGQ** Message queue.

**MSP** Main storage pool.

**MSRVI** Master service index.

**MSSD** Main storage stand-alone dump.

**MULIC** Model-unique Licensed Internal Code.

**multivolume file** A file that occupies more than one diskette or tape.

**MWS** Machine-wide storage

**N/A** Not applicable.

**native** AS/400 system or AS/400 operating system environment.

**ND** See *network unit description* and *line description*.

**NE** Not equal.

**negative response** In data communications, a reply indicating that data was not received correctly or that a command was incorrect or unacceptable. Contrast with "positive response".

**network** A collection of data processing products connected by communications lines for exchanging information between stations.

**network attribute** Control information about the communications environment. System name and default local location names are examples of network attributes. Contrast with *system value*.

**network unit description (UD)** More commonly referred to as ND. The machine instruction name for line description.

**NG** Not greater than.

**node** 1) One of the systems or devices in a network. 2) A location in a communications network that provides host processing services.

**nonswitched line** A connection between computers or devices that does not have to be made by dialing. Contrast with *switched line*.

**normal installation** A process in which the OS/400 operating system contained on tape is installed in auxiliary storage, replacing the operating system (if any) that is currently in the system. Often abbreviated as *install*. See *installation*. Contrast with "abbreviated install".

**NPDA** IBM Network Problem Determination Application.

**NPT** Nonprogrammable terminal (workstation). See also *NWS*.

**nucleus** That part of a control program residing in main storage.

**NUD** Network unit description. See *network unit description (ND)* or *line description*.

**null** The name for an EBCDIC character that represents hex 00.

**null character** The character hex 00 used to represent the absence of a displayed or printed character.

**numeric field** An area that is reserved for a particular unit of information and that can contain only the digits 0 through 9. Contrast with "character field".

**NW(D)** Network interface (description).

**NWS** 1) Network server; 2) Nonprogrammable workstation (also seen as PWS or NPT).

**NWSD** Network server description. A configuration object for FSIOP.

**object** 1) A named storage space that consists of a set of characteristics that describe itself and in some cases, data. An object is anything that exists in and occupies space in storage and on which operations can be performed. Some examples of objects are programs, files, libraries, and folders.

**object authority** A specific authority that controls what a system user can do with an entire object. For example, object authority includes deleting, moving, or renaming an object. There are three types of object authorities: object operational, object management, and object existence.

**object description** The characteristics (such as name, type, and owner name) that describe an object.

**object name** The name of an object. Contrast with "qualified name".

**object management authority** An object authority that allows the user to specify the authority for the object, move or rename the object, and add members to database files.

**observable** Able to observe. For example, a program is observable if the MI instruction stream is displayable.

**ODP** See *open data path (ODP)*.

**ODT** Object definition table.

**OFC** Office.

**off-line** Pertaining to the operation of a functional unit that is not under the continual control of the system. Contrast with *on-line*.

**offset** The distance from the beginning of an object to the beginning of a particular field, or for substring

operations, the number of character positions from the beginning of a field.

**OIR** Object information repository.

**omit function** A system function that determines which records from a physical file are to be omitted from a logical file. Contrast with "select function".

**on-line** Pertaining to the operation of a functional unit that is under the continual control of the system. Contrast with *off-line*.

**on-line information** Information on the display screen that explains displays, messages, and programs. See also *textual data*.

**open** The function that connects an object to type \*FILE to program for processing. Contrast with "close".

**open data path (ODP)** A control block created when a file is opened. An ODP contains information about the merged file attributes and information returned by input or output operations. The ODP only exists while the file is open.

**operand** An entity of which an operation is performed.

**operating system** A collection of system programs that control the overall operation of a computer system.

**operation** The result of processing statements in a high-level language. See also *keyword*.

**operation code** A code used to represent the operations of a computer.

**OS** See *operating system*.

**output** Information or data received from a computer that is shown on a display, printed on the printer, or stored on disk, diskette, or tape.

**output field** A field specified in a display file, database file, printer file, or ICF file that is reserved for the information processed by a program. Contrast with "input field".

**output queue** An object that contains a list of spooled files to be written to an output device, such as a printer or diskette. The system recognized identifier for the object type is \*OUTQ.

**OUTQ** See *output queue*.

**overflow** The condition that occurs when the last line specified as the overflow line to be printed on a page has been passed.

**overlay** To write over (and therefore destroy) an existing file.

**override** 1) To specify attributes at run time that change the attributes specified in the field description or in the program. 2) The attributes specified at run time that change the attributes specified in the file description or in the program.

**owner** The user who creates an object (or is named the lower of an object).

**pad** To fill unused positions in a field with dummy data, usually zeros or blanks.

**PAG** See *process access group (PAG)*.

**page** 1) A unit of storage equal to 512 bytes. 2) A 512-byte block of information that can be moved between auxiliary storage and main storage. 3) One printer form. 4) To move information up or down on the display.

**page fault** An exception that occurs when a program refers to data or programs that are marked as not in main storage.

**page-out** The process of moving a page from main storage to auxiliary storage.

**paging** To move a page of data between main and auxiliary storage.

**PAR** Problem analysis and resolution.

**parameter** A value supplied to a command or program that is used either as input or controls the actions of the command or program.

**parameter list** A list of values that provide a means of associating addressability of data defined in a called program with data in the calling program. It contains parameter names and the order in which they are to be associated in the calling and called program.

**partition identifier** A numeric value representing a particular partition. This value is represented internally within SLIC as a 1-byte value with a predictable range, limited by the maximum number of partitions. The primary partition ID is always 0.

**partitioning Licensed Internal Code (PLIC) hits** Licensed Internal Code implements the hypervisor (along with parts of the primary partition SLIC).

**partition IPL** Perform an IPL of a particular logical partition. An IPL of a secondary partition is independent of other partitions. An IPL of the primary partition causes all partitions to perform an IPL and is equivalent to a system IPL. See *system IPL*. See also *initial program load (IPL)*

**pass-through** Display station pass-through.

**path** In a network, any route between any two nodes.

**PC** Programming change. See *PTF*.

**PDP** Problem determination procedure.

**pending** Pertaining to a request that was submitted and that is awaiting processing.

**PGM** Program-external object.

**physical file** A description of how data is to be presented to or received from a program and how data is actually stored in the database. A physical file contains one record format and one or more members. See also *database file*. Contrast with *logical file*.

**PMR** Problem management record, also call record or problem record.

**PMS** Problem management system.

**PN** See *printer*.

**pool** A division of main or auxiliary storage. See also *base pool* and *storage pool*.

**POR** Power on reset.

**port** 1) System hardware where the I/O devices are attached. 2) An access point (for example, a logical unit) for data entry or exit.

**post** 1) To add information in a record to keep that record current. 2) To note the occurrence of an event.

**PRA** Permanent restriction.

**predefined message** A message whose description is created and stored in a message file before it is sent by the program. Contrast with "immediate message".

**predefined value** A fixed value defined by IBM that has a specific use in the control language and is reserved in the operating system. A predefined value usually has an asterisk (\*) as the first character in the value.

**prestart job** A batch job that starts running before the remote program sends a program start request.

**primary partition** A logical partition providing certain general functions on which all logical partitions are dependent. The primary partition is the only partition active in a single partition system. All partition management function is performed from this partition. If this partition fails, the whole system fails. If this partition is powered off, the whole system is powered off. If an IPL is performed on this partition, an IPL may be performed on the secondary in the whole system.

**print file** A file created by the host system that is printed on your system.

**print queue** A list of output waiting to be printed by the system.

**printer** A device that writes data from a computer onto paper or other media.

**printer file** A device file that determines what attributes printed output will have. A particular printer may or may not support all of the attributes specified in a printer file.

**problem analysis** The process of finding the cause of a problem, for example, a program error, device error, or user error.

**problem log** A record of problems and of the status of the analysis of those problems.

**process access group (PAG)** A group of job-related objects that may be paged in and out of storage in a single operation when a job (process) enters or leaves a long wait.

**processing** The action of performing operations and calculations on data.

**processing unit** The part of the system that performs instructions and contains main storage.

**profile** Data that describes the characteristics of a user, program, device, or remote location.

**PROG** Program-machine interface.

**program message queue** An object used to hold messages that are sent between program calls of a routing step. The program message queue is part of the job message queue.

**program object** One of two machine object classifications. It includes those objects used in programs that get their definition from an object definition table. Program objects are used as the parameter or values of machine instructions. Contrast with *system object*.

**program temporary fix (PTF)** A temporary solution to or bypass of a problem diagnosed by IM as resulting from a defect in a current unaltered release of a licensed program. Contrast with *Licensed Internal Code fix*.

**program variable** A named changeable value that can exist only within programs. Its value cannot be obtained or used when the program that contains it is no longer running.

**Programming Request for Price Quotation (PRPQ)** A customer request for a price quotation for a licensed program to be designed especially for a particular group of customers or an application. Documentation for the program is provided only to those customers who order the PRPQ. Compare with *Request for Price Quotation (RPQ)*.

**prompt** A reminder or a displayed request for information or user action. The user must respond to allow the program to proceed.

**protocol** A set of rules controlling the communication and transfer of data between two or more devices in a communication system.

**PRPQ** See *Programming Request for Price Quotation (PRPQ)*.

**PSD** Print stand-alone dump.

**PSI** Problem source identification.

**PSP** Program service package.

**PTF** See *program temporary fix (PTF)*.

**PTR** 1) Program trouble report. 2) Pointer.

**PWR** Power control.

**QCL** See *QCMD*.

**QCHG** PF log message queue.

**QCMD** The IBM-supplied control language processor that interprets and processes CL commands for the system.

**QGPL** See *general-purpose library*.

**QHST** History log message queue. See *history log*.

**QICO** OS/400 installation communications object.

**QPGMR** Programmer's user profile.

**QQueue** OS/400 module prefix.

**QRY** Query.

**QSECOFR** Security officer's user profile.

**QSRV** Service log message queue.

**QSYSOPR** System operator's user profile or system operator's message queue.

**QTEMP** Job temporary library.

**quadword** Equivalent to four words or 16 bytes of a URC.

**qualified job name** A job name and its associated user name and a system-assigned job number. Contrast with *job name*.

**qualifier** In data processing, all names in a qualified name other than the far right, which is called the "simple name".

**query** A request to select and copy from a file or files one or more records based on defined conditions.

**queue** A list of messages, jobs, files, or requests waiting to be read, processed, printed, or distributed in a predetermined order.

**QUSER** Workstation user's user profile.

**r** 1-byte register.

**rack** A free-standing framework that holds the devices and card enclosure.

**RAS** Reliability, availability, serviceability.

**RDR** Reader.

**read operation** An input operation that obtains data from a file or device and passes it to a program.

**reader** An internal program that reads jobs from an input device or a database file and places them on a job queue.

**receive time-out** In data communications, the result of no data being received in a given period of time.

**receiver** In hardware, a functional unit that converts small electronic signals to signals that control a device.

**record** A group of related data, words, or fields treated as a unit, such as one name, address, and telephone number.

**record format** A named part of a file that identifies records of a specified record format description.

**recursion level** The position on a program in a call stack. The first occurrence of a program in a job has a recursion level of 1, the second occurrence of the same program has a recursion level of 2, and so on.



**rediscover** To find again.

**relational expression** A logical statement that describes the relationship (such as greater than or equal to) of two arithmetic expressions or data items.

**remote** Pertaining to a device, system, or file that is connected to another device, system, or file through a communications line. Contrast with *local*.

**remote system** Any other system in the network with which your system can communicate.

**remote workstation** A workstation that is connected to the system by data communications. Contrast with *local workstation*.

**Report Program Generator (RPG)** A programming language designed for writing application programs for common business data processing requirements.

**REQ** Request.

**Request for Price Quotation (RPQ)** A customer request for a price quotation on alterations or additions to the functional capabilities of a hardware product for a computer system or a device. Compare with *Programming Request for Price Quotation (PRPQ)*.

**request message** A message that requests a function from the receiving program.

**request unit (RU)** The record transmitted to the other system. This record can contain a request, data, or both. Contrast with *response unit*.

**REQIO** Request input/output.

**resident** Remaining in main storage.

**resource** Any part of the system required by a job or task, including main storage, devices, the processing unit, programs, files, libraries, and folders.

**resource name** A name assigned by the system that shows the relationship of the configuration description on the system to the physical equipment connected to the system.

**response unit (RU)** In SNA, the record sent to respond to a request. The response can be either positive or negative and can include control information. Contrast with *request unit (RU)*.

**restore** To copy data from tape, diskette, or a save file to auxiliary storage. Contrast with *save*.

**return code** For printer files, display files, and ICAF files, a value sent by the system to a program to indicate the results of an operation by that program.

**RISC** Reduced instruction set computer.

**RM** Resource management or manager.

**ROS** Read only storage.

**router** A part of Client Access licensed program that handles requests to send and receive data from applications on the personal computer and routes

them to the appropriate applications on the AS/400e server.

**routine** A set of statements in a program that causes the system to perform an operation or series of related operations.

**routing** The list of user who are to receive an item when it is distributed, including all users named specifically and those users named on distribution lists by the sender.

**RPG** See *Report Program Generator*.

**RPQ** Request for price quotation. A customer request for a price quotation on alterations or additions to the functional capabilities of a hardware product for a computer system or a device. Compare to *PRPQ*.

**RReal** 2-byte register.

**RSF** Remote Support Facility

**S/S** Source/sink.

**save** To copy specific objects, libraries, or data by transferring them from main or auxiliary storage to a media such as tape, diskette, or a save file. Contrast with *restore*.

**save file** A file allocated in auxiliary storage that can be used to store saved data on disk (without requiring diskettes or tapes), to do I/O operations from a high-level language program, or to receive objects sent through the network. The system-recognized identifier for the object type is FILE.

**save system authority** A special authority that allows the user to save and restore all objects on the system and free storage of all objects on the system. See also *all object authority*, *job control authority*, *security administration authority*, *service authority*, and *spool control authority*

**SBS** Subsystem.

**SBSD** Subsystem description (an object type).

**SCB** 1) Spool control block. 2) In communications protocol, string control byte.

**SCP** System control programming.

**SCPF** Start-control-program-function (SCPF).

**scratch install** Install Licensed Internal Code and initialize the system. For example: IPL type D, and choose Option 2 from the Install the Licensed Internal Code (LIC) menu.

**SCS** SNA character string.

**SDC** Software data compression or compression.

**SDLC** Synchronous data link control (SDLC).

**secondary partition** Secondary logical partitions are all logical partitions that are not the primary logical partition. A secondary partition has certain dependencies on the primary partition. Otherwise, it is completely independent. For example, it may be

powered off and on (IPL or restart), dumped, or installed without impacting other partitions.

**sector** 1) An area on a disk track or a diskette track to record information. 2) The smallest amount of information that can be written to or read from a disk or diskette during a single read or write operation.

**secure** Controlling who can use and to what extent an object can be used by controlling the authority given to the user.

**security** Safety; protection from damage or theft.

**security administrator authority** A special authority that allows a user to add users to the system distribution directory, to create and change user profiles, to add and remove access codes, and to perform office tasks, such as delete documents, folders, and document lists, and change distribution lists for other users. See also *all object authority*, *save system authority*, *job control authority*, *service authority*, and *spool control authority*.

**security officer** A person assigned to control all of the security authorizations provided with the system. A security officer, can, for example, remove password or resource security; or add, change, or remote security information about any system user.

**segment identifier (SID)** Refers to a 3 or 4 high-order byte of a six-byte virtual storage address. The SID extended is used internally to extend the size that can be specified.

**SEPT** System entry point table.

**sequence** To arrange in order.

**service authority** A special authority that allows the user to perform the alter function in the service functions. See also *all object authority*, *see system authority*, *job control authority*, *security administrator authority*, and *spool control authority*.

**service library** The system library provided in the system that is used temporarily for loading IBM-supplied programming changes and creating APARs. Named QSRV.

**service support system** A computerized service information network.

**session** 1) The length of time that starts when a user signs on at a display station and ends when the user signs off. 2) In communications, the logical connection by which a program or device can communicate with a program or device at a remote location.

**severity code** A number that indicates how important a message is. The higher the number is, the more serious the condition is.

**SF** Subfile.

**shared access path** An access path used by more than one file member to get data common to both members.

**shift** A keyboard action to allow uppercase or other characters to be entered.

**SID** See *segment identifier*.

**single-byte character set (SBCS)** A character set in which each character is represented by a one-byte code. Contrast with *double-byte character set*.

**slip install** Restore Licensed Internal Code. For example: IPL type D, and choose Option 1 from the Install the Licensed Internal Code (LIC) menu.

**SM** Storage management or session manager.

**SNA** See *Systems Network Architecture (SNA)*.

**SNA distribution services (SNADS)** An IBM asynchronous distribution service that defines a set of rules to receive, route, and send electronic mail in a network of systems.

**SNADS** See *SNA distribution services (SNADS)*.

**SNBU** See *switched network backup (SNBU)*.

**source listing** A portion of a computer listing that contains source statements and, optionally, test results. See also *compiler listing*.

**source program** A set of instructions that are written in a programming language and must be translated to machine language before the program can be run.

**space pointer** A pointer that provides addressability to a byte string in the space part of machine interface object.

**spool** The system function of putting files or jobs into disk storage for later processing or printing.

**spool control authority** A special authority that allows the user to perform spooling functions, such as display, delete, hold, and release spooled files on the output queue for herself and other users. This authority also allows the user to change the spooled file attributes, such as the printer used to print the file. See also *all object authority*, *save system authority*, *job control authority*, *security administrator authority*, and *service authority*.

**spooled file** A file that holds output data waiting to be processed, such as information waiting to be printed. Also known as *spooled output file*.

**spooled output file** See *spooled file*.

**spooling** The system function that saves data in a disk file for later processing or printing.

**spooling job** A batch job that is started by the spooling subsystems.

**SR** Save/restore.

**SRC** See *system reference code (SRC)*.

**SSF** Service support facility.

**SST** See *system service tool (SST)*.

**stand-alone dump** A printout of main storage requested separately from normal system operations, which does not require the system to be the condition for normal operations.

**start** The beginning of a process.

**state** A type of operation or condition of being.

**status** The condition of something.

**status message** A message that describes the status of the work done by a program.

**storage** A device, or part of a device, that can hold data.

**storage device controller** See *magnetic storage device controller*.

**storage device subsystem** A part of the computer consisting of the controller and one or more attached storage devices.

**storage management recovery** A function that prepares the system to access data from all disk units configured to the system.

**storage pool** A logical division of storage reserved for processing a job or group of jobs.

**store** To place, or keep, data in a storage device.

**string** 1) A group of auxiliary storage devices connected in a series on the system. The order and location in which each device is connected to the system determines the physical address of the device. 2) A sequence of elements of the same nature, such as characters considered as a whole.

**subsystem** An operating environment, defined by a subsystem, where the system coordinates processing and resources.

**subsystem description** A system object that contains information defining the characteristics of an operating environment controlled by the system. The system-supplied identifier for the object type is \*SBSD.

**SUG** In APARs, a suggestion.

**switched line** In data communications, a connection between computers or devices that is established by dialing. Contrast with *nonswitched line*.

**switched network backup (SNBU)** A modem feature that allows a nonswitched line to be used alternatively as a switched line or allows a switched line to be used as a nonswitched line depending on the characteristics of the modem.

**syntax** The rules for constructing a command or statement.

**SYS** See *system*.

**system** In data processing, a collection of machines, programs, and methods organized to accomplish a set of specific functions.

**system ASP** The auxiliary storage pool where system programs and data reside. It is the storage pool used if a storage pool is not defined by the user. See also *auxiliary storage pool* and *user ASP*.

**system configuration** A process that specifies the machines, devices, and programs that form a particular data processing system.

**system configuration list** A list of devices that are provided with the system.

**system date** The date assigned in the system values when the system is started. See also *create date* and *job date*.

**system IPL** A system IPL means performing an IPL on all logical partitions of a particular AS/400e server. Contrast to partition IPL. See also *initial program load (IPL)*.

**system job** A batch job created by the OS/400 program to control system resources and to schedule time.

**system Licensed Internal Code (SLIC)** Single level Licensed Internal Code, which functions similar to a combination of vertical and horizontal (in IMPI release terms) Licensed Internal Code. The term Licensed Internal Code (LIC) is equivalent and is preferred for external use. See *Licensed Internal Code*.

**system name** An IBM-supplied name that uniquely identifies the system. It is used as a network value for certain communications applications such as APPC.

**system object** A machine object classification. Any of the machine objects shipped with the system or any of the operating system objects created by the system.

**system pointer** A pointer that contains addressability to a machine interface system object.

**system power control network (SPCN)** An asynchronous serial communications network. SPCN connects to the power system in participating components to the operating system and can report critical changes and power failures in those components to the operating system. SPCN gives the operating system control of electrical power.

**system reference code (SRC)** The characters that identify the name of the unit that detected the condition and the reference code that described the condition.

**system security** A system function that restricts the use of files, libraries, folders, and devices to certain users.

**System Service Tool (SST)** The part of the service function used to service the system while it is running.

**system time** The elapsed time from the point where the system was started to the current time. If the system time is changed to the local time when the system is started, the current system time is the local time of day.

**system unit** A part of a computer that contains the processing unit, and may contain devices such as disk units and tape units.

**system value** Control information for the operation of certain parts of the system. A user can change the system value to define his working environment. System date and library list are examples of system values. Contrast with network attribute.

**System/36 environment** A function of the operating system that processes most of the System/36 operator control language (OCL) statements and procedure statements to run System/36 application programs and allows the user to process the control language (CL) commands. Contrast with *System/38 environment*.

**System/38 environment** A function of the operating system that processes most of the System/38 control language (CL) statements and programs to run System/38 application programs. Contrast with *System/36 environment*.

**Systems Network Architecture (SNA)** See *SNA distribution services (SNADS)*.

**SysVal** System value.

**T1** Twinaxial data link control.

**tag bits** Extra bits built into the memory cards for security. Tags can only be turned on in MI pointers. There is one tag bit for each word (4 bytes) of main storage. The bits may only be set by a few special LIC instructions.

**TAP** Timing analysis programs.

**tape file** A device file to support a tape device.

**tape mark** A unique mark written on the tape to distinguish file boundaries.

**tape volume** A single reel of magnetic tape.

**task** A basic unit of work to be performed.

**TCP/IP** See *Transmission Control Protocol/Internet Protocol (TCP/IP)*.

**TDLC** See twinaxial data link control (TDLC).

**template** A pattern to help the user identify the location of keys on a keyboard, functions assigned to keys on a keyboard, or switches and lights on a control panel.

**temporary library** A library that is automatically created for each job to contain temporary objects that are created by the system for that job. The objects in the temporary library are deleted when the job ends. The system name for the temporary library is QTEMP.

**temporary objects** Objects, such as data paths or compiler work areas, that are automatically deleted by the system when the operating system is loaded.

**test** In communications, a data link command or response used to perform a basic test of the station-to-station link connection.

**textual data** The collective term for menus, displays, lists, prompts, options, on-line help information, and messages. See also *on-line information*.

**threshold** A level set in the system at which a message is sent or an error-handling program is called. For example, in a user auxiliary storage pool, the user can set the threshold level in the system values, and the system notifies the system operator when that level is reached.

**time slice** The amount of processor time (specified in milliseconds) allowed for a job before other waiting jobs of equal priority are allowed to process data.

**time stamp** 1) To apply the current system time. 2) The value on an object that indicates the system time at some critical point in the object's history.

**TOD** Time of day.

**token-ring network** A local area network that sends data in one direction through a specified number of locations by using the symbol of authority for control of the transmission line, called a "token", to allow any sending station in the network (ring) to send data when the token arrives at that location.

**topology** The schematic arrangement of the links and nodes of a network.

**track** A circular path on the surface of a disk or diskettes on which information is magnetically recorded and from which recorded information is read.

**transaction** 1) A act of business, for example, the handling of customer orders and customer billing. 2) On communications, an exchange between a program on a local system and a program on a remote system that accomplishes a particular action or result. See also *conversation* and *session*.

**Transmission Control Protocol/Internet Protocol (TCP/IP)** A set of non-proprietary communications protocols that support peer-to-peer connectivity functions for both local and wide area networks.

**truncate** To cut off data that cannot be printed or displayed in the line width specified or available. Contrast with "fold". 2) To cut off data that does not fit in the specified field length in a field definition.

**twinaxial cable** A cable made of two twisted wires inside a shield that is used on the 5250 family devices.

**twinaxial data link control (TDLC)** A communications function that allows personal computers, which are attached to the workstation controller by twinaxial cable, to use advanced program-to-program communications (APPC) or advanced peer-to-peer networking (APPN).

**UEPO** Unit emergency power off.

**UIM** See user interface manager (UIN).

**uninterruptible power supply** A source of power from a battery installed between the commercial power

and the system that keeps the system running, if a commercial power failure occurs, until it can complete an orderly end to system processing.

**unit** The defined space within disk units that is referred to by the system.

**unit reference code** A group of numbers displayed on the console or control panel that identifies failing parts, system, or device states, or system or device status conditions.

**unprotected storage** 1) The part of the system auxiliary storage pool that is not protected. 2) The storage reserved for temporary objects and internal machine data.

**upline** Pertaining to controllers that are above devices, and lines that are above controllers in a communications configuration. Contrast with "downline".

**UPS** See *uninterruptible power supply*.

**URC** See *unit reference code*.

**user ASP** One or more auxiliary storage pools used to isolate some object from the other objects stored in the system ASP. See also *auxiliary storage pool* and *system ASP*.

**user-defined data stream (UDDS)** A data stream in which the user has defined and embedded all device control characters.

**user ID** See *user identification (User ID)*.

**user ID/address** The two-part network name used in the system distribution directory and in the office applications to uniquely identify a user and send electronic mail.

**user identification (user ID)** 1) The name used to associate the user profile with a user when a user signs on the system. See also *user profile name*. 2) The first part of a two-part network name used in the system distribution directory and in the office applications to uniquely identify a user. The network name is usually the same as the user profile name, but does not need to be.

**user password** A unique string of characters that a system user enters to identify that user to the system, if the system resources are secured.

**user profile** An object with a unique name that contains the user's password, the list of special authorities assigned to a user, and the objects the user owns. The system-recognized identifier of the object is 8USRPRF.

**user profile name** The name or code that the system associates with a user when they sign on the system. Also known as *user ID*. See also *user identification (user ID)*.

**USRPRF** User profile-external object.

**VA** Virtual address.

**valueData** Numbers off character strings entered in any entry field, and data supplied in parameters of CL commands.

**variable** A name used to represent data whose value can be changed while the program is running by referring to the name of the variable.

**vary off** To make a device, controller, line or network interface unavailable for its normal, intended use.

**vary on** To make a device, controller, line, or network interface available for its normal, intended user.

**virtual storage (VS)** An addressing scheme that allows external disk storage to appear as main storage.

**vital product data (VPD)** A structured description of a device or program. For devices, it is recorded in the device at manufacture and includes at least the type, model, serial number, and installed features. It may include the manufacturers ID and other fields. For programs, it is compiled as a data area Licensed Internal Code group, the release and modification, the program model names, the national language or languages elected, and possibly to other fields. Vital product data is transferred from the device to the system and stored for display. Vital product data is also visible on the device name plate or a similar tag.

**volume** A storage medium that is put on or taken off the system as a unit, for example, a magnetic tape or diskette.

**volume 2** The first 80 bytes on a standard tape used to identify the tape volume and its owner. This area contains VOL1 in the first four positions.

**volume table of contents (VTOC)** An area on a disk or diskette that describes the location, size, and other characteristics of each file, library, and folder on the disk or diskette.

**VPD** See *vital product data (VPD)*.

**VS** See *virtual storage (VS)*.

**VTOC** See *volume table of contents (VTOC)*.

**WCB** Work control block.

**WCBT** Work control block table.

**WCBTE** Work control bloc table entries.

**wide area network (WAN)** A data communications network designed to serve an area of hundreds or thousands of miles-for example, public and private packet-switching networks, and national telephone networks. Contrast with *local area network (LAN)*.

**work space** Area of the disk storage used temporary by licensed programs to hold work that while the licensed programs are running.

**workstation** A device used to transmit information to or receive information from a computer; for example, a display station or printer.

**workstation address** The address to which the switches on a workstation are set, or the internal address assumed by the system, if no address is specified.

**workstation controller (WSC)** An I/O controller card in the card enclosure that provides the direct connection of local workstations to the system.

**workstation entry** An entry in a subsystem description that specifies the workstations from which users can sign on to the subsystem or from which interactive jobs can transfer to the subsystem.

**WP** Workstation printer.

**write operation** An output operation that sends a processed record to an output device or output file.

**writer** The part of the operating system spooling support that writes spooled files to an output device independently of the program that produced the output.

**writing** The action of making a recording of data on a external storage device or other data medium.

**WS** Workstation display.

**WSC** See *workstation controller (WSC)*.

**WTR** Writer.

**X** Hexadecimal.

**XID** Exchange identification command.

**XPF** Extended program facility. This is an IBM internal term used by developers. It is comparable to the OS/40 licensed program. OS/40 is a trademark; XPF is the IBM internal product name.

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| <b>Redbook Title</b>                                                                                                                                                              | AS/400e Diagnostic Tools for System Administrators: An A to Z Reference for Problem Determination                                                                                                                      |
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## AS/400e Diagnostic Tools for System Administrators

(0.5" spine)  
0.475" <-> 0.873"  
250 <-> 459 pages







# AS/400e Diagnostic Tools for System Administrators

An A to Z Reference for Problem Determination



**Redbooks**

**One source to help  
make problem  
resolution easy**

**Beginning and  
advanced tools for  
diagnosing problems**

**Procedures to  
document, gather,  
and report problems**

Although the AS/400e server rates over a 99.9% availability factor, there are times when problems occur. Some problems limit the use of a device, program, or application. More severe and pervasive problems limit the use of more components. In either circumstance, the amount of time a component is unavailable relates directly to the actions taken to manage the situation. The ability to resolve problems depends on the tools that are available, the knowledge (and attitude) of the worker, the symptoms and nature of the problem at hand, and other factors.

This IBM Redbook is designed to introduce you to the problem determination aids used in an AS/400e environment. You will become familiar with the tools that are available and the instructions for how each one works. As proficiency is built with the use of each tool and familiarity with the procedures, efficiency of the system operator and service personnel increases.

Consider this redbook as a "Don't Panic, Read Me First" guide to help you support the AS/400e server. It discusses problem analysis, problem determination, and problem source identification. And it offers you step-by step instructions that show you how to use the AS/400 problem determination aids to produce detailed problem information.

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