



iSeries

Service Functions

Version 5 Release 3

SY44-5902-07





@server

iSeries

Service Functions

Version 5 Release 3

SY44-5902-07

Note

Before using this information and the product it supports, be sure to read the information in "Safety and Environmental Notices" on page vii and Appendix B, "Notices," on page 317.

Eighth Edition (April 2004)

This edition applies to version 5, release 3, modification 0 of Service Functions manual (SY44-5902-07) and to all subsequent releases and modifications until otherwise indicated in new editions. This edition applies only to reduced instruction set computer (RISC) systems.

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Safety and Environmental Notices

Danger Notices

A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people.

DANGER

To prevent power from switching on automatically during service procedures, select manual or secure mode on the system unit control panel or disconnect the cables that connect to J15 and J16 on the frame being serviced. (RSFTD211)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (RSFTD201)

DANGER

To prevent a possible electrical shock when installing the system, ensure that the power cords for all devices are unplugged before installing signal cables. (RSFTD202)

DANGER

To prevent a possible electrical shock when adding or removing any devices to or from the system, ensure that the power cords for those devices are unplugged before the signal cables are connected or disconnected. If possible, disconnect all power cords from the existing system before you add or remove a device. (RSFTD203)

DANGER

Use caution when installing or modifying telephone lines. Disconnect the lines at the network interface before working with telephone wires that are not insulated. Never install telephone jacks that are not waterproof in wet locations. Do not install or modify telephone lines or use a telephone (other than a cordless type) during an electrical storm. Do not use a telephone to report a gas leak in the area of the leak. (RSFTD213)

DANGER

To prevent a possible electrical shock during an electrical storm, do not connect or disconnect cables or station protectors for communications lines, display stations, printers, or telephones. (RSFTD003)

DANGER

To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables. (RSFTD004)

DANGER

To prevent a possible electrical shock, do not use the port tester during electrical storms. (RSFTD006)

Product Recycling and Disposal

Components of the system, such as structural parts and circuit cards, can be recycled where recycling facilities exist. IBM does not currently collect and recycle used IBM products from customers in the United States other than those products that are involved in trade-in programs. Companies are available to disassemble, reutilize, recycle, or dispose of electronic products. Contact an IBM account representative for more information.

The system unit contains batteries and circuit boards with lead solder. Before you dispose of this unit, these batteries and circuit boards must be removed and discarded according to local regulations or recycled where facilities exist. This book contains specific information on each battery type where applicable.

Battery Return Program

In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used IBM batteries and battery packs. For information on proper disposal of the batteries in this unit, please contact IBM at 1-800-426-4333. Please have the IBM part number that is listed on the battery available when you make your call. For information on battery disposal outside the United States, contact your local waste disposal facility.

Environmental Design

The environmental efforts that have gone into the design of the system signify IBM's commitment to improve the quality of its products and processes. Some of these accomplishments include the elimination of the use of Class I ozone-depleting chemicals in the manufacturing process, reductions in manufacturing wastes, and increased product energy efficiency. For more information, contact an IBM account representative.

Caution Notices

A caution notice calls attention to a situation that is potentially hazardous to people because of some existing condition.

CAUTION:

Be careful when removing or installing this part or unit. This part or unit is heavy, but has a weight smaller than 18 kilograms (39.7 pounds). (RSFTC201)

CAUTION:

The weight of this part or unit is between 18 and 32 kilograms (39.7 and 70.5 pounds). It takes two persons to safely lift this part or unit. (RSFTC204)

CAUTION:

The battery is a lead-acid battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations.

In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (RSFTC225)

CAUTION:

The circuit card contains lead solder. To avoid the release of lead (Pb) into the environment, do not burn. Discard the circuit card as instructed by local regulations. (RSFTC234)

CAUTION:

This assembly has a circuit card that contains lead solder. To avoid the release of lead (Pb) into the environment, do not burn. Discard the assembly as instructed by local regulations. (RSFTC235)

CAUTION:

The optical link card contains a laser. To avoid the release of toxic substances into the environment, do not burn. Discard the optical link as instructed by local regulations. (RSFTC236)

CAUTION:

The battery is a lithium battery. To avoid possible explosion, do not burn or charge the battery. Exchange only with the IBM-approved part. Discard the battery as instructed by local regulations. (RSFTC227)

Attention Notices

An attention notice indicates the possibility of damage to a program, device, system, or data.

Laser Safety Information

Laser Safety Information (for IBM Fiber Optic Link Products)

CAUTION:

This system may contain laser products called the IBM Optical Link Module (OLM), Serial Optical Converter (SOC), or Optical Link Card (OLC). In the United States, these fiber optic links are certified by IBM as Class I laser products that conform to the requirements contained in the Department of Health and Human Services (DHHS) regulation 21 CFR Subchapter J. Internationally, these fiber optic links are certified as Class 1 laser products that conform to the requirements contained in the International Electrotechnical Commission (IEC) standard 825-1 (1993), the CENELEC (European Committee for Electrotechnical Standardization) European Norm standard EN60825-1 (1994), and the Verband Deutscher Elektrotechniker (VDE) standard 0837 (1986). The German testing institute, VDE, has assigned certificate registration number 3642 to all IBM OLM, SOC, and OLC laser products.

The fiber optic links incorporate laser diodes that are either of the gallium aluminum arsenide (GaAlAs) type that emits in the wavelength range of 770 to 860 nanometers or of the indium gallium arsenide phosphide (InGaAsP) type that emits in the wavelength range of 1270 to 1355 nanometers. These fiber optic links incorporate discrete laser diodes that are Class 3B laser products with a rating of approximately 5.0 milliwatts peak power. Once the lasers are assembled into the OLM, SOC, or OLC, the automatic laser control safety system prevents laser emissions from exceeding Class 1 limits during both operation and service. There are no user maintenance operations or adjustments to be performed on IBM OLM, SOC, or OLC products. Class 1 laser products are not considered to be hazardous under any conditions.

The fiber optic links are designed and certified for use in applications with point-to-point optical links only. Use of these products with multiple input or multiple output links (for example, star coupler or fiber splitter) is not compatible with the OLM, SOC, or OLC design and function. In addition, the fiber optic link products must be connected only to other IBM OLM, SOC, or OLC (of the same model) or a compatible laser product. This is especially true for those models that contain both the open link detection safety system called Open Fiber Control (OFC) and the laser power control safety system. (All OLM, SOC, and OLC models contain the laser power control safety system. All OLC models contain OFC, all SOC model have No-OFC, but some OLM models are available with OFC and some have No-OFC.)

These requirements are necessary for the correct operation of the IBM OLM, SOC, and OLC products in any optical communication system. Failure to follow these restrictions could result in the system not operating correctly and the creation of points of access that emit laser radiation above the Class 1 limit specified by either the IEC 825-1 (1993) standard internationally or the DHHS regulation 21 CFR Sub J in the United States. (RSFTC211)

About Service Functions (SY44-5902-07)

This book provides basic information about iSeries 400 functions that are commonly used by field hardware service representatives. It provides enough detail for the hardware service representative to gather information about hardware problems while under the direction of the next level of support.

The book is meant to assist the hardware service representative in gathering information about commonly encountered field problems. It does not cover all service functions available on the iSeries 400.

Who should read this book

This book is intended for trained iSeries 400 hardware service representatives and service providers who act as the primary level of field hardware service support (as opposed to system operators) to help solve and diagnose hardware problems.

Before using this book, you should know how to service (analyze, isolate, report, and resolve problems, and verify fixes using the iSeries 400 maintenance package) the iSeries 400 hardware. You must also know how to safely work with electrical components.

Attention: Some service tools described in this book can be used to change or erase data, programs, or other objects on the iSeries 400 system. This damage can occur with the misuse of service tools or with inappropriate security in effect.

Conventions and terminology used in this book

This book contains examples of displays that are illustrated as completely as possible; however, they may vary from those you actually use.

Before using this information and the product it supports, be sure to read the general information and danger notices under Appendix B, "Notices," on page 317. Refer to the Glossary for terms not explained in the text.

Throughout this book, the terms iSeries or iSeries 400 system applies to any iSeries 400 System Model Unit, unless the reference is to a specific model.

Prerequisite and related information

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

You can access the Information Center two ways:

- From the following Web site:
<http://www.ibm.com/eserver/iseries/infocenter>
- From CD-ROMs that ship with your IBM Operating System/400 order:
iSeries Information Center, SK3T-4091-04. This package also includes the PDF versions of iSeries manuals, *iSeries Information Center: Supplemental Manuals*, SK3T-4092-01, which replaces the Softcopy Library CD-ROM.

The iSeries Information Center contains advisors and important topics such as Java™, TCP/IP, Web serving, secured networks, logical partitions, clustering, CL commands, and system application programming interfaces (APIs). It also includes links to related IBM® Redbooks™ and Internet links to other IBM Web sites such as the Technical Studio and the IBM home page.

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

iSeries Navigator

IBM iSeries Navigator is a powerful graphical interface for managing your iSeries servers. iSeries Navigator functionality includes system navigation, configuration, planning capabilities, and online help to guide you through your tasks. iSeries Navigator makes operation and administration of the server easier and more productive and is the only user interface to the new, advanced features of the OS/400 operating system. It also includes Management Central for managing multiple servers from a central system.

You can find more information on iSeries Navigator in the iSeries Information Center and at the following Web site:

<http://www.ibm.com/eserver/series/navigator/>

How to send your comments

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

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

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Introduction

Dedicated service tools (DST) is used to service Licensed Internal Code (LIC), work with disk units, work with configuration and resources, verify devices and communications, and display logs on the system.

DST operates in stand-alone, limited, and full paging environments. The DST tools and functions vary depending on the paging environment and the release level of the operating system. For more information, see “System paging environments” on page 2.

System Service Tools (SST) provides a way to access a subset of the service tools that DST offers without requiring access to DST. SST is available when OS/400® is operational, and can be accessed using the STRSST CL command.

Dedicated Service Tools requirements

Attention: It is a requirement to change the password the first time anyone signs on to DST or SST. The customer engineer needs to give the new (changed) password to the customer or have the customer change the password.

To use DST, you must have the following items:

- The disk that contains the Licensed Internal Code (the load-source disk).

Note: When you perform an alternate initial program load (IPL) to DST, you do not need the load-source disk.

- An operational workstation on bus 1 as either a primary console or an operations console.

- One workstation for each system partition.
- A valid service tools user ID and password to sign on to DST. IBM supplies service tools user IDs that have different levels of privileges. See “Work with service tools user IDs” on page 25 for more information.

To make a printout, attach the printer to the workstation I/O processor or storage media unit that is performing the service function. The printer that is used with DST for service tool output must be an SCS-type data stream printer (for example, type 5224).

System paging environments

The amount of assistance that software provides for service depends on how you perform the system IPL. The service tools and functions that are available depend on how you access DST and which operating system is in use. Service environments for the system are:

- Stand-alone (also called non-paging)
- Limited paging
- Full paging

Stand-alone paging (non-paging)

You can reach this environment only by performing an alternate IPL to DST (see “Performing an alternate IPL to DST (type D IPL)” on page 8).

You can access dedicated service tools (DST) while the system is in the stand-alone paging environment, but not all DST options are available. In this environment, no operating system is available, and only some functions of Licensed Internal Code are operational.

The following options are available in the stand-alone environment for all operating systems:

- Install Licensed Internal Code
- Work with disk units
- Work with DST environment
- Start a service tool
- Work with remote service support

For a description of each option, see “DST options” on page 10.

Attention: Performing an IPL on the primary partition will cause an IPL of all secondary partitions.

Limited paging

You can reach this environment by performing an IPL to DST (see “Performing an IPL to DST” on page 4).

The limited paging environment is the first servicing environment you access when you start to bring up the system in Manual mode. This environment contains all the functions of the Licensed Internal Code, including storage management.

You can access dedicated service tools (DST) while the system is in the limited paging environment. This environment accesses the temporary files that are needed and the Licensed Internal Code on the load-source disk. The operating system is not available.

Attention: For systems with multiple logical partitions, performing an IPL on the primary partition causes the secondary partitions to be powered down. Failing to power down these secondary partitions will cause an abnormal power-down on the secondary partitions and possible loss of data.

The following options are available in the limited paging environment for all operating systems:

- Perform an IPL
- Install the operating system
- Work with Licensed Internal Code
- Work with disk units
- Work with DST environment
- Start a service tool
- Work with remote service support
- Work with system partitions
- Work with system capacity
- Work with system security

Note: The following options are operating system-dependent. For a list of the options available for your IBM operating system, see “DST in OS/400 limited paging environment” on page 278.

- Perform automatic installation of the operating system
- Save Licensed Internal Code
- Select DST console mode
- Work with save storage and restore storage

For a description of each option, see “DST options” on page 10.

Attention: For systems with logical partitions, performing an IPL on the primary partition causes the secondary partitions to be powered down. Failing to power down these secondary partitions will cause an abnormal power down on the secondary partitions and possible loss of data.

Full paging

The full paging environment is used during normal system operation. The DST options vary depending on the release level of the operating system. You remain in this environment when you perform one of the following:

- Function 21 on the control panel or “Work with Partition Status” screen to access DST (see “Accessing Dedicated Service Tools” on page 4)
This is available only from the primary partition.
- System Request key procedure (see “Accessing Dedicated Service Tools” on page 4)
- Access system service tools (SST) on a system that uses OS/400 (see “Accessing system service tools” on page 279)

All disk units, the Licensed Internal Code, and the operating system are available.

Attention: For systems with logical partitions, performing an IPL on the primary partition causes the secondary partitions to be powered down. Failing to power down these secondary partitions will cause an abnormal power-down on the secondary partitions and possible loss of data.

The following options are available in the full paging environment for all operating systems:

- Perform an IPL
- Install the operating system
- Work with Licensed Internal Code
- Work with disk units
- Work with DST environment
- Start a service tool
- Work with remote service support
- Work with system partitions
- Work with system capacity
- Work with system security

Note: The following options are operating system-dependent. For a list of the options available for your operating system, see “DST in OS/400 full paging environment” on page 277.

- Select DST console mode
- Resume operating system display
- Perform automatic installation of the operating system
- Save Licensed Internal Code

For a description of each option, see “DST options” on page 10.

Attention: For systems with logical partitions, performing an IPL on the primary partition causes the secondary partitions to be powered down. Failing to power down these secondary partitions will cause an abnormal power-down on the secondary partitions and possible loss of data.

Accessing Dedicated Service Tools

You can start dedicated service tools (DST) in several ways:

- Performing an IPL to DST (see “Performing an IPL to DST”).
- Pressing the System Request key while the system is operational (see “Pressing the System Request Key while the system is operational” on page 7).
- Selecting function 21 while the system is operational (see “Selecting Function 21 while the system is operational” on page 7).

This is available from the primary partition only.

- Performing an alternate IPL to DST (type D IPL) (see “Performing an alternate IPL to DST (type D IPL)” on page 8).

After performing a type D IPL on a primary partition, the first step in DST must be configuration recovery.

- Using the function key F16 (which is not displayed) while in DST debug mode during a step-mode IPL.

Performing an IPL to DST

This procedure is for the entire system, or if logical partitions are installed, for the primary partition. For secondary partitions, see “Performing an IPL to DST for secondary partitions” on page 6.

Perform the following steps:

1. Select a type B IPL in Manual mode.
For information on how to select IPL options, see “IPL type, mode, and speed options” on page 213.
Attention: For systems with logical partitions, performing an IPL on the primary partition causes the secondary partitions to be powered down. Failing to power down these secondary partitions will cause an abnormal power-down on the secondary partitions and possible loss of data.
2. Perform one of the following:
 - **If there is a system hang condition after powering on the system,** perform a delayed power-off. (This is the data for problem analysis.) When the system is off, press the Power button on the control panel to perform an IPL. Select Function 03 if the delayed power-off takes longer than 40 minutes to complete. Be careful to realize that performing Function 03 may cause damage to objects, and it may also cause data loss.
 - **If there is an attention light after powering on the system,** use the Increment (↑) or Decrement (↓) button to select control panel Function 03. Press the Enter button on the control panel to perform an IPL.
 - **When the system is powered off,** press the Power button on the control panel to perform an IPL.
3. The IPL or Install the System display appears on the primary console. Select the *Use Dedicated Service Tools* option.
For more information on how to identify the primary console, see “Determining a primary or alternative console” on page 126.
4. The DST Sign On display appears. Sign on to DST with a valid user ID and password.
Enter a valid user ID and get the password from the customer. If the customer has changed the full DST authority, user ID, or password, ask the customer for the correct values.

Note: If prompted for a password, be sure to give the new (changed) password to the customer.

Note: You are limited to three sign on attempts to DST. After three unsuccessful attempts, the service tools user ID will be disabled. A user ID with a service tool security privilege will need to reset the ID.
5. The Use Dedicated Service Tools (DST) display appears.
The system is in the limited paging environment (see “System paging environments” on page 2). See “DST options” on page 10 for details on DST options.
This ends the procedure.

Changing a service tools user ID

Use this procedure to change a service tools user ID:

1. Sign on to DST.
2. Take option 5 on **Use Dedicated Service Tools (DST)** screen to Work with Dst Environment.
3. Take option 3 on **Work with Dst Environment** screen to work with service tools user IDs.
This ends the procedure.

Resetting QSECOFR service tools user ID

Use this procedure to recover from a disabled QSECOFR service tools user ID:

- Sign on with the QSECOFR OS/400 user profile.
- Use the XPF CL command CHGDSTPWD with *DEFAULT as the parameter value. Executing this command will enable the profile (if disabled), reset the profile's password to QSECOFR, and set the password to expired. After using the CHGDSTPWD command, you can change the password of the QSECOFR service tools user ID by signing on to DST.

Note: If the system security is set to prevent a service tools user ID with a default and expired password from changing its own password, then you will not be able to sign on to SST until you first sign on to DST and change your password there.

Performing an IPL to DST for secondary partitions

Perform the following steps:

1. Enter STRSST at the OS/400 command line on the system console for the primary partition. Press Enter.
2. At the Start Service Tools (SST) Sign On display, type in a user ID and password with QSECOFR service tools user ID authority. Press Enter.
3. At the System Service Tools display, select the *Start a service tools* option.
4. Select the *Work with system partitions* option.
5. Select the *Work with partition status* option.
6. Use the cursor to select the secondary partition you want to IPL.
7. Select option 10 (Mode manual).
8. Select option B (Source B).
9. Select option 1 (Power on). Press Enter.
10. The IPL or Install the System display appears on the secondary partition console. Select the *Use Dedicated Service Tools* option.
11. The DST Sign On display appears. Sign on to DST as QSRV.
Type QSRV as the valid user ID and get the password from the customer. If the customer has changed the full DST authority, user ID, or password, ask the customer for the correct values.

Note: If prompted for a password, be sure to give the new (changed) password to the customer.

Note: Starting with V5R1, you are limited to three sign on attempts to DST. After three unsuccessful attempts, the service tools user ID will be disabled. The system administrator with QSECOFR authority will need to reset the ID.

12. The Use Dedicated Service Tools (DST) display appears.
The system is in the limited paging environment (see "System paging environments" on page 2). See "DST options" on page 10 for details on DST options.

This ends the procedure.

Pressing the System Request Key while the system is operational

If your system has the OS/400 operating system, you can access DST by using the following procedure only when the system is in debug mode. Debug mode is an environment to test programs. It allows you to select a function key and access DST during the IPL process (see “Perform an IPL” on page 11). For more information on debug mode, see *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

From the console, perform the following steps:

1. Press the System Request Key.
2. Type DST on the system request line.

Note: Ensure that you use capital letters to type the DST command.

3. Sign-on to DST.

Type QSRV as the valid user ID and get the password from the customer. If the customer has changed the full DST authority user ID or password, ask the customer for the correct values.

Note: If prompted for a password, be sure to give the new (changed) password to the customer.

Note: Starting with V5R1, you are limited to three sign on attempts to DST. After three unsuccessful attempts, the service tools user ID will be disabled. The system administrator with QSECOFR authority will need to reset the ID.

4. The Use Dedicated Service Tools (DST) display appears.
See “DST options” on page 10 for details on DST options.

This ends the procedure.

Selecting Function 21 while the system is operational

Perform the following steps:

1. Select control panel Function 21 (Make DST available).

Select Manual mode, then push the Increment (↑) or Decrement (↓) button on the control panel until 21 appears in the Function/Data display. Press the Enter button on the control panel.

Notes:

- a. If you enter Function 21 and the primary console is powered off or not usable, reference code A600 500x appears on the control panel. Enter Function 21 again to force the DST Sign On display to appear on one of the alternative consoles.
 - b. For more information on how to select IPL options, see “IPL type, mode, and speed options” on page 213.
2. Primary console or alternate console will display the DST sign on.

Note: For more information on how to identify the primary console, see “Determining a primary or alternative console” on page 126.

3. Sign-on to DST.

Type QSRV as the valid user ID and get the password from the customer. If the customer has changed the full DST authority user ID or password, ask the customer for the correct values.

Note: If prompted for a password, be sure to give the new (changed) password to the customer.

Note: Since V5R1, you are limited to three sign on attempts to DST. After three unsuccessful attempts, the service tools user ID will be disabled. The system administrator with QSECOFR authority will need to reset the ID.

4. The Use Dedicated Service Tools (DST) display appears.

The system is in the full paging environment (see "System paging environments" on page 2). See "DST options" on page 10 for details on DST options.

This ends the procedure.

Performing an alternate IPL to DST (type D IPL)

An alternate IPL to DST is called a type D IPL or a stand-alone IPL by service representatives. Perform the following steps:

1. To use an alternate installation device, select the DST option to *Work with alternate installation device*, see "Work with Dedicated Service Tools environment" on page 23, "Work with alternate installation device" on page 27,, and *Install, upgrade, or delete OS/400 and related software*, SC41-5120-07. This option is available in DST from control panel function 21 or a type D IPL.
2. Determine the removable media unit or units for an alternate IPL. See the *Alternate IPL Device* section in the Problem Analysis information for your system. Power on the removable media units.
3. Place the media that contains the Licensed Internal Code (first tape of the customer's system save, the SAVLIC, ISMD tapes, or optical device) in the removable media units. Load the media and make the media units ready. See the device information for instructions on loading the removable media.
4. Power off the system. If the system is running, end all jobs and perform the power down procedure.
5. Select a type D IPL in Manual mode.

For information on how to select IPL options, see "IPL type, mode, and speed options" on page 213.

6. Power on the console.

For more information on how to identify the primary console, see "Determining a primary or alternative console" on page 126.

7. Load the media and make the media unit ready.
Press the Power button to power on the system.

Notes:

- a. Some types of removable media units automatically reset. In this condition, SRC A100 1933 (Media device not ready) may be displayed.
- b. If the installation device is an optical device, you may need to IPL the system again. This action will make the unit ready.

```
pwrwnsys restart(*yes) IPL(D)
```
- c. If the installation device is a tape unit, system reference code (SRC) A1001933 is displayed until the device automatically makes itself ready.

- d. The removable media becomes active. There is a delay while the system loads information from the load source. While running a process, the system continuously updates SRCs on the control panel that show the status.
8. Wait for the Install Licensed Internal Code display to appear on the console. The wait varies depending on the speed of the removable media unit and the processor speed for the specific system model.

Notes:

- a. If SRC A600 500x is displayed on the control panel, the system was not able to locate the console.
Ensure that the console is powered on (repair if necessary). Select Function 21 on the control panel (see “Control panel function descriptions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)” on page 158) to make DST available.
 - b. If an SRC other than A600 500x is displayed on the control panel, go to “Starting Point for All Problems” in the Problem Analysis information for your system.
9. The Install Licensed Internal Code display appears on the console.
 - If you want to access DST, select the *Work with Dedicated Service Tools (DST)* option and continue to the next step of this procedure.
 - If you want to install or restore Licensed Internal Code, select the *Install Licensed Internal Code* option and continue with the install or restore instructions (see “Utility to install Licensed Internal Code” on page 222).
 - If you want to define the device from which the system LIC should be installed, select the *Define alternate installation device* option. This option also allows you to enable or disable the alternate installation device.
 10. Reapply PTFs.
See the Software Installation manual for information on applying PTFs.
 11. Sign on to DST as QSRV.
Type QSRV as the valid user ID and get the password from the customer. If the customer has changed the full DST authority user ID or password, ask the customer for the correct values.

Note: If prompted for a password, be sure to give the new (changed) password to the customer.

Note: Since V5R1, you are limited to three sign on attempts to DST. After three unsuccessful attempts, the service tools user ID will be disabled. The system administrator with QSECOFR authority will need to reset the ID.

12. The Use Dedicated Service Tools (DST) display appears. Options are limited because the system is in the stand-alone environment (see “System paging environments” on page 2). See “DST options” on page 10 for details on DST options.

This ends the procedure.

Function keys (in DST)

The F3, F12, F16, and System Request function keys perform the following:

- The F3 function key returns you to the primary menu of the service tool you are using.
- The F12 function key returns you to the previous DST display.
- The F16 function key returns you to the Use Dedicated Service Tools (DST) display from the service function you are in. The active service function is not canceled. To display the service function again, select the *Work with DST environment* option.
- The System Request function key returns you to the Use Dedicated Service Tools (DST) display (on the console). You must type the following on the system request line:

DST

The active user job is not canceled.

Exiting Dedicated Service Tools

You can exit dedicated service tools (DST) by performing one of the following:

- To exit DST and end all DST functions:
Press F3 (Exit) on the Use Dedicated Service Tools (DST) display. The Exit Dedicated Service Tools display appears with the following options:
 - Exit dedicated service tools (DST)
 - Resume dedicated service tools
 To exit and end all DST functions, select the *Exit dedicated service tools (DST)* option.
- To exit DST and allow the DST functions to remain active, ensure that the system is operating in debug mode. Select the *Select DST console mode* option on the Use Dedicated Service Tools (DST) display. For more information on the DST console mode, see “Select DST console mode” on page 27

DST options

DST options vary depending on the paging environment and how you access DST. This section provides information on all DST functions in all paging environments.

For a list of specific options available in each paging environment, see Table 1 or “System paging environments” on page 2.

For more information on how to access DST, see “Accessing Dedicated Service Tools” on page 4.

Table 1. DST options

DST options	Paging environment		
	D-IPL (non-paging)	Limited	Full
Install Licensed Internal Code	Yes	No	No
Install the operating system	No	Yes	Yes
Perform an IPL	No	Yes	Yes
Perform automatic installation of the operating system	No	Yes ¹	Yes
Save Licensed Internal Code	No	Yes ¹	Yes ¹
Select DST console mode	No	Yes ¹	Yes ¹
Start a service tool	Yes	Yes	Yes

Table 1. DST options (continued)

DST options	Paging environment		
	D-IPL (non-paging)	Limited	Full
Work with disk units	Yes	Yes	Yes
Work with DST environment	Yes	Yes	Yes
Work with Licensed Internal Code	No	Yes	Yes
Work with remote service support	Yes	Yes	Yes
Work with save storage and restore storage	No	Yes ¹	No
Work with system partitions	No	Yes ¹	Yes ¹
Work with system capacity	No	Yes	Yes
Work with system security	No	Yes	Yes
End batch restricted state	No	No	Yes ¹

Note: ¹ Indicates that this option is operating system-dependent. It is available only under certain operating systems (see Appendix A, "OS/400 Operating System," on page 277).

Installing Licensed Internal Code

This option allows you to install or restore Licensed Internal Code. For more information on how to use this option, see "Utilities to Install and Restore Licensed Internal Code" on page 221.

Attention: Doing this to a system with multiple partitions can cause damage to the partition configuration and loss of data.

This option is available only in the stand-alone environment.

Installing the operating system

Select the *Install the operating system* option from the Use Dedicated Service (DST) Tools display.

This option installs the operating system from removable media (for example, tape). The present operating system (if any) is replaced. Use this option to install a new release of the presently installed operating system or to install the operating system after a failure. You must run this option from the primary console.

This option is not available under basic DST authority. For more information about authority, see "Work with service tools user IDs" on page 25.

Perform an IPL

Select the *Perform an IPL* option from the Use Dedicated Service Tools (DST) display.

This option allows you to load and start the operating system from the disk. If you have installed the Licensed Internal Code and there is no operating system installed, load and start the operating system from the same removable media device as the Licensed Internal Code.

Work with Licensed Internal Code

This option applies PTFs, removes PTFs, or makes PTFs permanent to the system Licensed Internal Code from removable media when the operating system is not

available. It also allows you to rebuild the Licensed Internal Code, display the Licensed Internal Code information and PTFs, and display free space. Select this option from the Use Dedicated Service Tools (DST) display. For more information on Licensed Internal Code fixes and PTFs, see “Licensed Internal Code (LIC) introduction” on page 219 and the system operation information.

Licensed Internal Code general information

There can be two versions of some Licensed Internal Code modules on the load-source disk unit. The IPL type (A or B) determines which version of the modules your system uses. When the system is running on a type A IPL, it uses the original, permanent version. When a Licensed Internal Code fix (or program temporary fix (PTF)) is temporarily applied, the system creates a second version of the module. The system uses this second version when it is running on a type B IPL.

When the PTF is permanently applied, the side B of the LIC replaces the original side A version of the LIC module. The system will then use the PTF version of the LIC module (which is now permanent) when running on a type A IPL.

For PTFs to be activated on each partition, they must be separately applied to each partition.

To apply a PTF that currently has an earlier version applied temporarily on the system, be sure you IPL the system from the B side (type B IPL). Then load and apply the PTF. The existing temporarily applied PTF automatically becomes permanent as the new PTF is loaded. If you do not want the existing temporarily applied PTF to become permanent, remove it manually (see the system operation information).

If you perform the IPL on the B side when you apply PTFs to Licensed Internal Code, the system applies the PTFs to the active copy of the Licensed Internal Code.

To run the system with the PTFs, you must perform an IPL. For normal operations use type B IPL. Use type A IPL when the B side is not available or when you want to remove a PTF.

Note: During and install or upgrade a type A IPL will also be used.

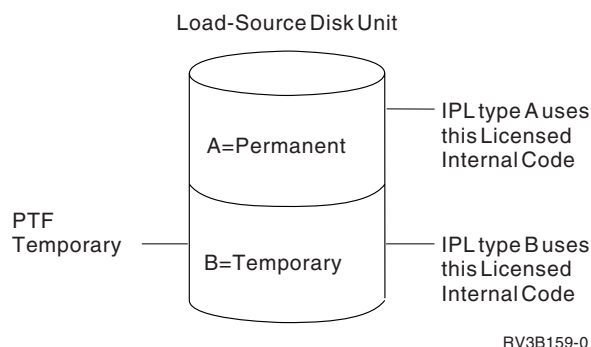


Figure 1. Copies of load-source Licensed Internal Code

Options and function keys

- Apply fixes

This option places the fixes into the Licensed Internal Code from removable media. These PTFs are placed in the inactive (change) copy of the Licensed Internal Code.

Note: There are two copies of some Licensed Internal Code on the load-source disk unit. It is the IPL type (A or B) that selects the Licensed Internal Code level with which your system will run.

- Rebuild Licensed Internal Code

This option allows you to rebuild the Licensed Internal Code. On RISC systems, this means combining free space for all nucleus and service Load IDs.

- Display Licensed Internal Code

This option allows you to display the following:

- Replaceable unit information (code or object modules)
- Fix information
- Product information

The *Fix information* option allows you to display the status of the Licensed Internal Code fix (if it is permanently or temporarily applied). For more information on displaying fixes, see “Displaying Licensed Internal Code fixes” on page 220.

- Work with free space

This option displays the space available for storing new modules on the system and allows you to combine the space that is used.

- Remove fixes

To remove Licensed Internal Code fixes, if the PTF is a delayed PTF, the system must be running on the copy without the changes (type A IPL). Removing these changes causes the system to load the primary copy over the changes in the changed copy of Licensed Internal Code.

Immediate LIC PTFs can be removed while running a type B IPL.

- Make fixes permanent

To make Licensed Internal Code fixes permanent, the system must be running on the copy with the changes. When these changes are made permanent, they are loaded into the primary copy of the Licensed Internal Code.

- Display status (F6)

Press the F6 function key on the Work with Licensed Internal Code display to view the history log.

For more information on PTFs, see “Displaying Licensed Internal Code fixes” on page 220 and the system operation information.

Work with disk units

This option allows you to do the following from the partition from which DST was entered:

- Work with disk configuration.
 - Create and update the disk configuration.
 - Display the logical structure (disk unit and auxiliary storage pool (ASP) information).
- Work with disk unit recovery.

Note: A graphical interface is available for you to use. See **Manage disk unit configuration** located in the Systems management, Disk pools, Configure and manage disk pools topic in the Information Center (<http://ibm.com/eserver/iserries/infocenter>).

Options on the Work with Disk Units Display

Options and menu flow for the *Work with disk units* options vary depending on the system paging environment (see “System paging environments” on page 2). Use the following table as a reference during problem analysis and system repair.

Select the *Work with disk units* option on the Use Dedicated Service Tools display. Options and menu flow for this function vary depending on the paging environment.

Table 2. Paging environments and the work with disk unit options

Paging environment	Work with disk unit options
Stand-alone	<ol style="list-style-type: none">1. Save load-source disk unit data2. Copy load-source disk unit data3. Display/change page data4. Analyze disk unit surface5. Initialize and format disk unit6. Reclaim IOP cache storage7. Stop device parity protection

Table 2. Paging environments and the work with disk unit options (continued)

Paging environment	Work with disk unit options
Limited paging	<ul style="list-style-type: none"> 1. Work with disk configuration <ul style="list-style-type: none"> - Display disk configuration <ul style="list-style-type: none"> - Display disk configuration status - Display disk configuration capacity - Display disk configuration protection - Display non-configured disk units - Display device parity status - Display disk hardware status - Display disk compression status - Work with ASP threshold - Work with ASP configuration <ul style="list-style-type: none"> - Display disk configuration capacity - Delete user ASP - Add units to ASP - Delete ASP data - Change ASP storage threshold - Move units from one ASP to another - Remove units from configuration - Add units to the ASP and balance data - Work with mirrored protection <ul style="list-style-type: none"> - Display disk configuration - Start mirrored protection - Stop mirrored protection - Enable remote load-source mirroring - Disable remote load-source mirroring - Work with device parity protection <ul style="list-style-type: none"> - Display device parity status - Start device parity protection - Stop device parity protection - Include unit in device parity protection - Exclude unit in device parity protection - Work with disk compression <ul style="list-style-type: none"> - Display disk compression status - Start compression on disk units - Stop compression of disk units

Table 2. Paging environments and the work with disk unit options (continued)

Paging environment	Work with disk unit options
Limited paging	2. Work with disk unit recovery <ul style="list-style-type: none"> - Save disk unit data - Restore disk unit data - Replace configured unit - Assign missing unit - Recover configuration - Disk unit problem recovery procedures <ul style="list-style-type: none"> - Initialize and format disk units - Display/change page data - Analyze disk unit surface - Suspend mirrored protection - Resume mirrored protection - Copy disk unit data - Delete disk unit data - Upgrade load-source utility - Rebuild disk unit data - Reclaim IOP cache storage - Correct device parity protection mismatch - Recover unknown load source - Recover mirrored load source - Recover from start compression failure - Migrate load-source disk unit data

Table 2. Paging environments and the work with disk unit options (continued)

Paging environment	Work with disk unit options
Full paging	<ol style="list-style-type: none"> 1. Display disk configuration <ul style="list-style-type: none"> • Display disk configuration status • Display disk configuration capacity • Display disk configuration protection • Display non-configured units • Display device parity status • Display disk hardware status • Display disk compression status 2. Work with disk configuration <ul style="list-style-type: none"> • Display disk configuration • Add units to ASPs • Work with ASP threshold • Include unit in device parity protection • Enable remote load-source mirroring • Disable remote load-source mirroring • Start compression on non-configured units • Add units to ASPs and balance data • Start device parity protection 3. Work with disk unit recovery <ul style="list-style-type: none"> • Replace configured unit • Disk unit problem recovery procedures <ul style="list-style-type: none"> – Initialize and format disk units – Display/change page data – Analyze disk unit surface • Suspend mirrored protection • Resume mirrored protection • Delete disk unit data • Rebuild disk unit data • Rebuild IOP cache storage

Work with disk configuration: Options and menu flow for the *Work with disk configuration* option vary depending on the system paging environment (see “System paging environments” on page 2). Options are:

- *Display disk configuration*
For details on this option, see the main heading “Display disk configuration” on page 18.
- *Add units to ASPs*
For details on this option, see the main heading “Work with ASP configuration” on page 18.
- *Add units to ASPs and balance data*
For details on this option, see the main heading “Work with ASP configuration” on page 18.
- *Work with ASPs threshold*
For details on this option, see the main heading “Work with ASP threshold” on page 18.

- *Include unit in device parity protection*
This option allows you to add an unprotected disk unit to an existing parity set.
- *Enable remote load-source mirroring*
For details on this option, see the main heading “Work with ASP threshold.”
- *Disable remote load-source mirroring*
For details on this option, see the main heading “Work with ASP threshold.”
- *Start compression on non-configured disk units*
Select this option to increase the effective disk unit capacity of non-configured disk units.

Display disk configuration: You can select the *display disk configuration* option from the main service tools display or the *work with disk configuration* display according to the paging environment. From this option, you can display the disk units that are attached to the ASP and the status and capacity of the system auxiliary storage pool.

- *Display disk configuration status*
Select this option to display the status of all ASPs and the disk units that are configured on the system.
- *Display disk configuration capacity*
Select this option to display the following for each ASP and the assigned disk units within each ASP:
 - Threshold values
 - Overflow values
 - Protected storage values
 - Unprotected storage values
- *Display disk configuration protection*
This option allows you to display the type of protection for each ASP and the assigned disk units within each ASP.
- *Display non-configured units*
Select this option to display the status of all the disk units that are not configured.
- *Display device parity status*
Select this option to display the status of the disk unit subsystems that have device parity protection on the system. For more information on device parity, see the main heading “Work with device parity protection” on page 20.
- *Disable remote load-source mirroring*
For details on this option, see the main heading “Work with ASP threshold.”
- *Display disk compression status*
This option displays the compression status of compressed disk units.

Work with ASP threshold: Select this option to display or change the threshold for the system auxiliary storage pool (user ASPs are not supported). The system issues a notice when it reaches the threshold value.

Work with ASP configuration: The following options appear on the *Work with ASP Configuration* display:

- *Display disk configuration capacity*

Select this option to display the threshold and overflow values of the ASP and the assigned disk units. This display is also available under the *Display disk configuration* option (see “Display disk configuration” on page 18).

- *Delete user ASP*

Select this option to delete a user-defined ASP (ASP 2 through 16).

- *Add units to ASPs*

Select this option to add non-configured units to an existing ASP. This increases the amount of storage that is assigned to the system ASP (ASP 1).

- *Add units to ASPs and balance data*

Select this option to add disk units to an existing ASP or to create an ASP and add non-configured disk units to that ASP.

After the disk units are initialized and configured, the data on the other disk units is moved to equally balance the capacity of all the disk units in the ASP.

- *Delete ASP data*

Select this option when you want to destroy the data in the ASP.

- *Change ASP storage threshold*

Select this option to display or change the threshold for the system auxiliary storage pool (user ASPs are not supported). The system notifies you when the threshold value is reached.

- *Move units from one ASP to another*

Select this option to change the assignment of a disk unit to another ASP.

- *Remove units from configuration*

Select this option to remove a disk unit from the ASP configuration. If the unit being removed has data and there is space in the ASP, the system copies the data to other units in the ASP. If there is not enough space in the ASP, the system prompts you to delete the ASP data before removing the disk unit. The unit that is removed becomes non-configured.

Attention: This is space-dependent. There must be enough space on the remaining units to accommodate the data from the unit being removed.

Work with mirrored protection: Select this option to display or change mirrored protection on the disk units.

- *Display disk configuration*

For details on this option, see the main heading, “Display disk configuration” on page 18.

- *Start mirrored protection*

This option allows you to start mirrored protection on the selected Auxiliary Storage Pool (ASP).

- *Stop mirrored protection*

This option allows you to stop mirrored protection on the selected Auxiliary Storage Pool (ASP).

- *Enable remote load-source mirroring*

Select this option to turn on the ability to physically place the two units that make up the mirrored load-source disk unit (unit 1) on different input-output processors (IOP). This option does not start mirrored protection.

- *Disable remote load-source mirroring*

Select this option to turn off the ability to physically place the two units that make up the mirrored load-source disk unit (unit 1) on different IOPs. This option does not stop mirrored protection.

Work with device parity protection: Select this option to perform the system functions that handle device parity protection on the system. Device parity protection is a data redundancy feature available on some storage media units. It is maintained across all the units that are within the parity set. If one unit fails, the units within the set handle the functions for the failed unit. This type of protection can improve system availability and reduce the possibility of data loss. The following options are available:

- *Display device parity status*
Select this option to show the status of disk unit subsystems that have device parity protection.
- *Start device parity protection*
Use this option to begin the process of protecting data on the system.
- *Stop device parity protection*
This option allows you to end device parity protection.
- *Include unit in device parity protection*
This option allows you to add an unprotected disk unit to an existing parity set.
- *Exclude unit in device parity protection*
This option allows you to remove a disk unit from a parity set.

Work with disk compression: Select this option to display disk compression status, or select this option to start or stop disk compression.

The following options are available:

- *Display disk compression*
Select this option to display the status of compressed disks.
- *Start compression on disk units*
Select this option to start compression on disk units. This will increase the effective size of the disk unit.
- *Stop compression on disk units*
Select this option to stop compression on disk units.

Work with disk unit recovery: Select the Work with Disk Unit Recovery display from the *Work with disk units* option on the Use Dedicated Service Tools (DST) display. Options are available to save and restore disk units, find and assign disk units that are missing from the configuration, replace disk units, reclaim IOP cache storage, and recover the system configuration if it is lost, destroyed, or changed.

- *Save disk unit data*
Run this option when the disk unit reference code (URC) indicates that a disk enclosure should be exchanged.
Before removing the disk enclosure and installing a new disk enclosure, you should save the data from the disk units in the disk enclosure to removable media.
When the system has saved all of the disk unit data to removable media, an ending display appears with the status information.

Note: This procedure does not save the Licensed Internal Code on the load-source disk unit.

Note: The option is not allowed for disk units that have device parity protection or mirror protection (with both units in an active state.)

- *Restore disk unit data*

This option reads the data (recorded using the *Save disk unit* option) from the removable medium and writes the data on the disk unit. The data can be restored to a disk unit of the same type or to a different type of disk unit that has the same or larger storage capacity. When all data is restored to the disk unit, an ending display appears with status information. If the replaced disk is load source, the system will IPL to DST from the new disk. For the others, the system will not re-IPL.

For systems with multiple partitions, the partition configuration will have to be restored first.

- *Replace disk unit*

This option is part of the disk unit recovery procedure. It allows you to exchange a configured disk unit with a non-configured unit. Use the *Delete ASP data* option to clear the system ASP before replacing the disk unit only if the disk is not under mirror or device parity protection. You can make the protection active again after replacing the failed disk by following the Disk Unit Recovery Procedure.

- *Assign missing units*

This option reports any missing units (units that were part of the system during the last IPL that have been disconnected accidentally or configured differently). When you select to assign a unit, the system attempts to find one or more valid non-configured disk units. If no valid non-configured disk units are found, use the *Replace disk unit* function.

- *Recover disk configuration*

This option recovers the correct system configuration in cases where the load source was damaged and the device configuration table on the installation device was lost.

- *Disk unit problem recovery procedures*

For details on this option, see the main heading “Disk unit problem recovery procedures” on page 22.

- *Suspend mirrored protection*

Select this option when you want to stop mirrored protection for a unit in a mirrored auxiliary storage pool.

- *Resume mirrored protection*

Select this option when you want to restart mirrored protection for a unit in a mirrored auxiliary storage pool.

- *Copy disk unit data*

This option allows you to copy all the data from a configured disk to a non-configured disk unit. This action can take the place of *save disk unit data to tape* and a *restore disk unit data*. After the operation is complete, the target disk unit (the one copied to) takes the place of the original disk unit in the system configuration. The original disk cannot be used in the system configuration without data loss.

- *Delete disk unit data*

This option allows you to delete all the data from a non-configured disk unit.

Note: This option is only allowed for non-configured disk units.

- *Upgrade load-source utility*

This option allows you to migrate the disk unit configuration to a system with new hardware.

- *Rebuild disk unit data*

When a failed disk unit is repaired, use this option to rebuild the data. This option allows you to use the redundancy feature of device parity protection to rebuild data to a disk unit.

Attention: If there are several disk unit incompatibilities, make certain that the correct units are installed.

- *Reclaim IOP cache storage*

When the IOP cache memory fails and needs to be replaced, this option allows you to remove and destroy the damaged data in the IOP cache.

Data can remain in the IOP cache when failures occur. Occasionally, a situation is so severe that the system perceives missing units. This prevents the system from IPLing. At other times, a reduction in the amount of usable cache storage occurs. This situation presents itself only as a warning during a manual mode IPL.

- *Correct device parity protection mismatch*

This option allows you to accept the situation where configured disk units are expected to have device parity protection enabled but currently have device parity protection disabled. The configuration will no longer expect these disk units to be device parity protected.

- *Recover unknown load source*

This option allows recovery from an unknown load-source error where the mate of the load source in the mirrored pair is missing and the system does not currently recognize the load source.

Note: For load-source disks in remote load-source mirrored pairs, use the next option.

- *Recover mirrored load source*

This option allows you to recover from a local load-source failure.

Remote load-source mirroring support must be started.

This option will find the disk configuration, find the remote load source, and copy the data from the remote load source to the new local load source. The system will be IPLed to DST once this operation completes successfully.

- *Recover from start compression failure*

Use this option in a recovery from a start compression operation that failed.

- *Migrate load-source disk unit data*

During migration, this option copies data from an original load-source disk unit onto the load-source disk unit of a new system.

Disk unit problem recovery procedures: This option allows you to select functions that assist in problem isolation and repair actions.

Note: Only the disk units that are available for a specific function are displayed.

- *Initialize and format disk units*

Use this option when the disk unit reference code indicates that reallocations have failed because no other space is available. All the ID fields on the disk unit are written again. Running this option erases all the data from the disk unit. This option is not available for the load-source disk unit.

- *Display/change page data*

Use this option as follows:

- The results of the *Analyze disk unit surface* option (under the *Work with disk unit recovery* option) show which pages have data check conditions. Use the *Display/change page data* option to assign those sectors to new locations on the disk.
- To inspect and change the 64 bytes of page header, if necessary.
- To inspect and change the 4096 bytes of page data, if necessary.

The *Display/change page data* option has the following functions:

- Reading data from a selected page.
- Displaying the data in hexadecimal and EBCDIC formats.
- Allowing the hexadecimal data to be changed and written to the page again.
- Displaying the 64-byte page header in formatted form.
- Allowing the 64-byte page header to be changed and written to the sector again.
- Allowing the sector to be assigned to a new location on the disk.
- Displaying the disk unit reference code after each operation.
- *Analyze disk unit surface*
This option performs a read/verify operation on the selected units. Pages that report disk URCS indicating data check errors can be assigned to new locations on the disk using the *Display/change data* option. The results of the analysis can be displayed on the console.

Work with Dedicated Service Tools environment

Use this option to work with active service functions and system devices while you are in Dedicated Service Tools (DST). If you are logged on with service tools security authority, you can also change service tools user IDs and work with some system values.

The Work with Dedicated Service Tools Environment display includes the following options:

- Active service tools
- System devices
 - Printers
 - Select output printer
 - Cancel printer output
 - Cancel printer output and deallocate printer
 - Tape devices
 - Select tape
 - Cancel tape operation and deallocate tape
 - Optical devices
 - Select optical device
 - Cancel optical device operation and deallocate optical device
 - Alternate installation device
 - Console mode
 - Configures service tools LAN adapter
- Service tools user IDs
 - Create
 - Change password

- Delete
- Display
- Enable
- Disable
- Change privileges
 - Revoke
 - Grant
- Change description
- System values
- Service tools device IDs
 - Create
 - Reset password
 - Delete
 - Display
 - Enable
 - Disable
 - Change attributes
 - Revoke
 - Grant
 - Change description
- Service tools security data
 - Reset operating system default password
 - Change operating system install security
 - Work with service tools security log
 - Restore service tools security data
 - Save service tools security data
 - Password level

Work with active service tools

Select this option from the *Work with Dedicated Service Tools Environment* display.

Note: The *Work with active service tools* option is also available from the *System Service Tools (SST)* display.

This option shows the status of the active service functions. Service functions can be started and left active while you start another service function.

Use this option to work with a service function you left active. The status of a service tool can be active, ending, or no. A NO status indicates that no displays are pending.

The following options appear on the *Work with Active Service Tools* display:

- Display

This option allows you to work with an active service tool. You can select only one active service tool.
- End service tool

This option ends an active service function. A service function in the process of ending cannot be selected.

- Option
Type the desired option number in this field next to the active service tool name you are displaying or ending.

Work with system devices

Before you select an option on the Work with System Devices display, ensure the following is true:

- If you have a printer available, ensure that it is connected and configured to the same I/O processor or storage media unit as the workstation.
- If you have a tape or optical device storage unit available, ensure that it is installed, connected to the system, and configured correctly.

On the Select Output Printer display, the Select Tape display, or the Select Optical Device display, the system fills in the following fields:

Resource Name

A name that is assigned by the system to identify a specific device, I/O processor, or communications device.

Type A number that is assigned by the manufacturer to identify the specifics of a printer, tape, or optical device unit.

Model The model number of the printer, tape, or optical device unit.

Serial A number that is assigned by the manufacturer to identify a specific printer, tape, or optical device unit.

If no printer is available for this workstation I/O processor, you must select a different output device (such as a tape unit) for the service tool to use.

If the device you selected is already being used by a job, do one the following:

- Press the Enter key to cancel the job and use the device for the service tool.
- Press F12 (Cancel) to cancel this device selection and then select a different device.

Selecting Console Type:

This option allows you to choose from the following console types:

Note: These changes will only take affect after performing an unattended IPL.

- 1 = twinax.
- 2 = Ops-console (Direct).
- 3 = Ops-console (LAN).
- 4 = Hardware management console (HMC)

Work with service tools user IDs

Service tools user IDs control access to DST functions, System Service Tools (STRSST command), and Licensed Internal Code service functions. When a Service tools user ID is changed, the old ID is replaced with the new one.

Note: When you type the new password, it is not displayed.

Table 3. Service tools user IDs

Privilege Description	QSECOFR	QSRV	"22222222" (full)	"11111111" (basic)	default
Logical partitioning operator	x	x	x		

Table 3. Service tools user IDs (continued)

Logical partitioning administrator	x	x	x		
DASD management operator	x	x	x		
DASD management administrator	x	x	x		
Disk unit — read only	x		x		x
Trace	x	x	x	x	
SLIC security administrator	x				
Display, alter, dump	x		x		
LIC log	x	x	x		x
Hardware resources manager	x	x	x		
Product activity log	x	x	x	x	
Main storage dump	x	x	x	x	x
Install	x	x	x		
Performance data collector	x	x	x	x	x
Initial program load (IPL)	x	x	x	x	
Work with license internal code	x	x	x	x	x
DST environment	x	x	x	x	
Debug	x	x	x		
Save and restore storage	x	x	x		
Remote service support	x	x	x		
Operator panel key	x	x	x	x	
Operator panel	x	x	x	x	
System capacity – operations	x				
System capacity – administration	x				
System security lock down	x				
Start Service Tools	x	x	x		

Note: The default column is for reference in the event a user creates a new service tools user ID without changing any of the privileges.

Table 4. Device ID

Privilege Description	QCONSOLE	default
LAN attached console	x	x
Remote operator panel	x	
Remote console panel	x	

Note: The default column is for reference in the event a user creates a new service tools user ID without changing any of the attributes.

Work with system values

Attention: If the system has logical partitions, contact your next level of support before proceeding with the option to change the system serial number. LPAR configuration will be impacted.

This option allows you to force a display to appear during the next IPL. The following options appear on the Work with System Values display:

- Force a prompt for system serial number on the next IPL
- Force a prompt for system type on the next IPL
- Force a prompt for system unique identifier on the next IPL (only for OS/400)

Note: The *Work with system values* option is not available under basic or full DST authority. For more information on authority, see “Work with service tools user IDs” on page 25. Asset protection approval is required prior to any system serial number changes. Program licensing issues should also be addressed.

Work with alternate installation device

An alternate installation IPL is a special kind of type D IPL. Two pieces of media are involved in such an installation: the alternate IPL load source (usually an optical device) and the alternate installation medium. The alternate IPL load source is used to start the type D IPL and will always be read through a device on bus 1 of the system. The alternate installation medium contains the Licensed Internal Code that will be installed or restored on the system. The alternate installation medium is placed on any bus.

To enable an alternate installation IPL, select the DST option *Work with alternate installation device*. This option is available in DST from control panel function 21 or a type D manual IPL.

Notes:

1. Once an alternate bus load source is defined, the LIC also IPLs this bus and IOP for main storage dump IPLs and as a possible dump device.
2. If no alternate load source is defined for the alternate installation, the LIC IPLs only those IOPs on bus 1 and uses the IPL load source.

For more information, see *Install, upgrade, or delete OS/400 and related software*, SC41-5120-07.

Select DST console mode

This option causes the operating system to share the console workstation with DST during an IPL of the operating system.

Notes:

1. For the OS/400 operating system, this option requires the Install privilege. For more information on authority, see “Work with service tools user IDs” on page 25..
2. When your system is in the full or limited paging environment (see “System paging environments” on page 2), the appearance of the *Select DST console mode* option varies depending on the operating system. For more information, see Appendix A, “OS/400 Operating System,” on page 277.

Operating system displays remain displayed until either of the following occurs:

- You enter Function 21 (bring up DST) from the control panel.

- You make a system request by pressing the System Request key while holding down the Shift key, then typing DST and pressing the Enter key.
- The program debug service function encounters a breakpoint.

Selecting the *Select DST console mode* option while you are in the full paging environment causes the operating system display to be restored. Any active service functions remain active, and any device that was allocated to the service tool remains allocated.

Options on the DST Console Mode display

- Exit Dedicated Service Tools (DST) on IPL
Service functions will not interrupt the console display unless you have already set debug mode. Sign-on is necessary to access DST. All active service functions end.
- Start DST in debug mode on IPL
Service functions can interrupt the normal operating system process to display debug information. When an operating display appears, you can enter DST by performing the System Request Key procedure. This displays the *Use Dedicated Service Tools (DST)* display without requiring you to log on to DST. For more information on the System Request Key procedure, see “Pressing the System Request Key while the system is operational” on page 7.

Start a service tool

Select this option from the Use Dedicated Service (DST) Tools display.

Note: The *Start a service tool* option is also available from the System Service Tools (SST) display.

It displays the available service functions.

Options on the Start a Service Tool display

The following options are available from the Start a Service Tool display:

- Display/Alter/Dump
- Licensed Internal Code log
- Licensed Internal Code trace
- Hardware service manager
- Main storage dump manager
- Product activity log
- Operator panel functions
- Performance data collector
- Work with communications trace (available only on systems with SST)

Display/Alter/Dump: Select this option from the Start a Service Tool display.

Note: The *Display/Alter/Dump* option is also available under System Service Tools (SST).

This option allows you to display or change virtual storage data. It also allows you to dump the data to removable media (tape or optical) or a printer.

You can then use an output device to perform the following tasks:

- To view the data from storage on the display

- Select the *Display/alter storage* option to display **unformatted** data and to change the contents of storage. Use the keyboard to scroll forward or backward to view the storage information.
- Select the *Display/alter storage* option to generate a **formatted** dump of the contents in storage. The display is inhibited while the format function is running. When the formatting process is complete, use the keyboard to search, scroll (forward or backward), or shift (left or right) the output.
- To generate a formatted dump of the data in storage to an output device.
 - Select one of the following:
 - *Dump to printer*
 - *Dump to media*

When the output device is a printer or media, the actual dump task runs asynchronously with the Display/Alter/Dump control functions. That is, while a dump is completing on a printer or media, you can operate the display/alter function (output device is the display), or you can make other dump requests for a printer or media. The system saves dump requests in a first-in-first-out queue and processes them one at a time. To display the status of the Display/Alter/Dump asynchronous dump task, select the *Display dump status* option on the Display/Alter/Dump Output Device display.

- To generate a printout from media that contains data from the Display/Alter/Dump function or from other Licensed Internal Code service functions.
 - Select the *Print media dump file* option on the Display/Alter/Dump Output Device display.

The Display/Alter/Dump function is controlled by selecting display options and by responding to prompts. Each Display/Alter/Dump function option allows you to request specific data. The following are examples of data types:

- Machine Interface (MI) object
- Licensed Internal Code (LIC) data
- LIC module
- Tasks and processes
- Starting address

Note: When you exit the Display/Alter/Dump function, the dump request that is running is ended (even if it has not completed). Unprocessed dump requests are lost.

For more information, see *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

Licensed Internal Code (LIC) log: Select this option from the Start a Service Tool display.

Note: The *Licensed Internal Code log* option is also available under System Service Tools (SST).

This option allows you to work with Licensed Internal Code (LIC) log information. Use this option to perform the following:

- Select specific log entries
- Dump selected Licensed Internal Code log entries to a printer or removeable media (tape or optical)

- Change the following Licensed Internal Code log attributes:
 - The maximum number of entries
 - The size of the note log area and the size of the dump log area
 - The maximum size for dump entries
- Clear the Licensed Internal Code log
- Display the status of the Licensed Internal Code log dumps that are not complete

The dump tasks (one for printer and one for media) run asynchronously from the control functions for this tool. Requests are saved in a first-in-first-out queue, and there is no practical limit to the number of requests you can have waiting to be processed. When you exit the Licensed Internal Code Log display, all the dumps that are running end. To determine the dump status, use the *Display the status of the Licensed Internal Code* option.

For more information, see *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

Licensed Internal Code (LIC) trace: Select this option from the Start a Service Tool display.

Note: The *Licensed Internal Code trace* option is also available under System Service Tools (SST).

This option allows you to activate (resume) or deactivate (suspend) a trace of the Licensed Internal Code so that you can gather information on the internal operation of Licensed Internal Code. Trace data can be collected by:

- Component
- Machine interface instruction-supervisory linkage (SVL)
- Multi-programming level (MPL)
- Transaction
- Task and thread performance data

The trace is placed in a trace table. Information in the table can be displayed or dumped to a printer. This command also allows you to create, allocate (size), clear, or delete a table. For more information, see *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

Hardware service manager: Select this option from the Start a Service Tool display.

Note: The *Hardware service manager* option is also available under System Service Tools (SST).

This option allows you to display, work with, and print the stored hardware resources information. For more information on the hardware service manager function, see Chapter 2, "Hardware Service Manager," on page 45.

Main storage dump manager: Select this option from the Start a Service Tool display.

Notes:

1. The *Main storage dump manager* option is also available under System Service Tools (SST).

2. The Main Storage Dump Manager display is available when you press Enter on the Main Storage Dump Occurred display.

The main storage dump manager manages and processes main storage dumps. It allows you to copy main storage dump information and work with the current main storage dump. The current main storage dump is the latest dump on the system. It is stored on the load-source disk.

Attention: If you do not copy the dump data on the load-source disk to removable media or the MSD library, it will be replaced by the next main storage dump and lost at the next IPL.

The *Main storage dump manager* option allows you to:

- Display or print a current main storage dump
- Display or print a copy of a main storage dump
- Copy a current main storage dump to removable media
- Copy a current main storage dump to the MSD library
- Copy a main storage dump from the MSD library to removable media
- Copy a main storage dump from removable media to the MSD library

An MSD library is available to access copies of main storage dumps. The contents of the library are stored in auxiliary storage. The dumps that are held in the library can be from the system on which you are working or from another system.

When entered from the Main Storage Dump Occurred display, the Main Storage Dump Manager may also allow you to:

- Activate the remote service support communication line. For more information, see “Activating remote service support” on page 41.
- Work with system partitions. For more information, see “Work with system partitions” on page 42.
- Dump all partitions.

You can display a current MSD or an MSD that has been copied to the MSD library. The Display Main Storage Dump display allows you to display or print:

- MSD summary
- System data
- Processor data
- Hardware data
- Licensed Internal Code module data
- MSD by address
- MSD by data

To ensure that the current MSD information is available for problem analysis, you must copy the dump. For details on how to use the copy options under the main storage dump manager function, see “Copying a main storage dump” on page 268.

Program temporary fixes (PTF) repair problems that appear to be hardware problems. Your next level of support can assist you in determining whether you need to copy a dump or if a PTF is available for your problem.

For more information on main storage dumps, see Chapter 10, “Working with Storage Dumps,” on page 265 and the *iSeries Licensed Internal Code Diagnostic Aids - Volume 1* book.

Product activity log: Select this option from the Start a Service Tool display.

Note: The *Product activity log* option is also available under System Service Tools (SST).

This option allows you to display or print data (system, Licensed Internal Code, software components, subsystem, and I/O device data) that has been logged. It also provides data summaries, allows data to be sorted, and allows you to work with removable media statistics. For more information on the functions of the product activity log, see Chapter 3, "Product Activity Log," on page 97.

Operator panel functions: Select this option from the Start a Service Tool display.

This option allows you to do the following tasks:

- Change the IPL attributes
- Set the IPL attributes and restart the system
- Set the IPL attributes and power off the system

Note: At the next IPL, a file rebuild might be necessary. For more information on a file rebuild, see the system operation information.

Performance data collector: Select this option from the Start a Service Tool display.

This option allows you to gather detailed information about system performance. Use the *Performance data collector* option only if directed by your next level of support.

To create the trace, you must specify the following:

- The collector mode
- The jobs or tasks from which to collect the data
- The events to collect

After you select the *Start* option, the collector data is placed in temporary storage. When the collector is stopped, you can copy the data to tape by selecting the *Get data* option on the Work with Performance Data Collections display. To delete the data from storage, select the *Delete* option on the Work with Performance Data Collections display. The data is automatically erased at the next IPL.

Work with communications trace: The *Work with communications trace* option is available only under System Service Tools (SST). Select this option from the Start a Service Tool display.

This option allows you to start or stop a communications line trace on a configuration object.

Once you run the trace, the data can be formatted. You can view the formatted data by printing it.

You should use communications trace for the following situations:

- To isolate errors that you cannot isolate using the communications verification procedure
- To collect more data when the problem analysis procedures do not provide enough information on the problem

- If you suspect a communications protocol violation problem or some other line problem
- If you suspect line noise
- When the error messages indicate that there is an SNA BIND problem

Running and interpreting the communications trace requires detailed knowledge of communications protocols. Whenever possible, start the communications trace before varying on the lines. Doing this gives you the most accurate sample of your line status.

Note: Online help from the Work with Communications Trace display allows you to view a list of protocols.

Options and Function Keys

The Work with Communications Traces display has the following options and function keys:

- Start trace (F6)

This function key allows you to start tracing the data on a communications configuration object. The *Start Trace* display appears after you press this function key. For more information, see “Starting a trace” on page 34.
- Stop trace (option 2)

This option appears only on the Work with Communications Traces display. It allows you to end the trace and stop collecting data. A trace must be stopped before you can format, print, or delete the data. To ensure that the trace is stopped, press the Refresh function key and check the trace status field.
- Delete trace (option 4)

The trace must be stopped (option 2) before you can use this option. Select this option to delete the trace information when you no longer need the data. Traces are not automatically deleted when you leave a communications trace function. *Delete trace* releases system space so that you can start other traces without having to increase the maximum amount of storage provided for the communications trace. Traces that are not deleted are listed on the Work with Communications Traces display.
- Format and print trace (option 6)

Use this option to format and print the trace. For more information on the *Format and print trace* option, see page 36.
- Display message (option 7)

Use this option to view a message that indicates the status of the trace that stopped because of an error.
- Restart trace (option 8)

Use this option to start a trace that has been stopped.
- Change size (F10)

Use this function key to change the amount of storage that all traces use. You might want to increase the amount of storage, if your system has many active traces or traces that will be active for a long time.
- Display buffer size or display trace status (F11)

This function key allows you to select and alternate between buffer size and trace status.
- Refresh (F5)

This function key updates the data on the display.

Status Conditions

After the *Work with communications trace* option is selected from the Start a Service Tool display, the Work with Communications Traces display appears.

```
Work with Communications Traces

Type choice, 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
-   LosAngeles      Line  Test LosAngeles Line  SDLC      Active
-   Mpls            NWI   Test Mpls              ISDN      Stopped
-   Tucson          Line  Test Tucson Line      ASYNC     Waiting

F3=Exit   F5=Refresh   F6=Start trace  F10=Change size
F11=Display buffer size  F12=Cancel
```

Details of the trace, including status, are displayed. The trace status can be one of the following:

Condition

Description

Waiting

The trace is waiting for the configuration object to be varied on (not collecting data).

Active The trace data is being collected.

Stopping

The trace is stopping.

Stopped

The trace has stopped (not collecting data).

Error

An error occurred on the configuration object while the trace was collecting data. The data might or might not be collected. The trace stopped.

Starting

Trace is being started by another user. You cannot stop or delete this trace.

Formatting

Trace is being formatted.

Starting a trace: The Work with Communications Traces display has a *Start trace* function key that allows you to select options for tracing data. The following is an example of a *Start Trace* display:


```

                                Start Trace
Configuration object . . . . . _____
Type . . . . . 1 1=Line 2=Network interface
3=Network server
Trace description . . . . . _____
Buffer size (in kilobytes) . . . . . 1 1=128, 2=256, 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
Ending bytes . . . . . *CALC VALUE, *CALC
Type choices, press Enter.
F3=Exit F5=Refresh F12=Cancel

```

Enter the name of a communications configuration object description in the *Configuration object* prompt:

- For OS/400 operating systems:

If you do not know the name of the configuration object, the work with configuration status (WRKCFGSTS) command allows you to view a list. You can view line, controller, or network information by entering the *LIN, *CTL, *NWI, or *NWS parameter.

Note: You can also use this command to vary off a line and all the I/O processors and devices under it.

Describe the trace in the *Trace description* field. This field can help you identify the trace.

You can select a buffer size to hold the communications data that the trace collects. The default buffer size is 1=128K bytes. Base the size of the buffer on the speed of the communications line and on the amount of time necessary to trace the data. For high speed lines or long periods of tracing, a larger buffer size is recommended.

If you specify Yes in the *Stop on buffer full* field, the trace stops when the buffer is full. This option is useful for viewing the initial data that is coming across a line. If you specify No, the trace continues until you stop it. In this case, the data in the buffer will be written over each time the buffer is full.

You can select the direction of data to be traced by specifying one of the three selections in the *Data direction* field:

- Only data that the system is sending (option 1)
- Only data that the system is receiving (option 2)
- Both the data sent and received by the system (option 3)

Note: If you specify option 1 (*Sent*) for lines that are in SDLC short hold mode, the trace does not include controller names.

You can select how much data is traced in a frame of data. The value that is entered is the amount that is saved as part of the trace. The minimum value that is allowed for both the beginning and the end value is 36 bytes. Those 36-byte minimum values include the protocol header. The configuration object you are tracing determines the maximum value that is allowed.

Notes:

1. The BSC protocol ignores the beginning and ending byte values.
2. The SDLC, high-level data link control (HDLC), X.25, frame relay, Ethernet, distributed data interface (DDI), ATM, and token-ring protocols ignore the ending byte value.
3. The minimum value that is allowed for the beginning byte value for local area network (LAN) protocols (including frame relay protocols and ATM protocols) is 72 bytes.

When all required options are complete, press the Enter key. The Work with Communications Trace display appears.

If the communications object being traced is in varied off status when you start the trace, the trace remains in waiting status until you vary the communications object on. If the object is varied on, the trace will immediately go to the active state, and the system will begin to collect trace data.

The trace remains active until one of the following occurs:

- You select the option to stop the trace on the Work with Communications Traces display.
- You vary off the configuration object being traced.
- The configuration object being traced has an error.
- The trace buffer is full, and the option to stop on buffer full was selected.

Note: You can exit the communications trace function to do other work while the trace is active.

Traces are not automatically deleted when you exit a communications trace function. To return to the communications trace:

1. Select the *Start a service tool* option from the service tools (SST or DST) display.
2. Select the *Work with communications traces* option.
3. From the Work with Communications Traces display, you can check the status of the trace or select to stop the trace.

Format and print trace

You must select the *Stop Trace* option before you format or print the trace. The *Format and print trace* option allows you to select various formatting options and prepare the trace data for printing. The options vary for each protocol. The following is an example of the Format Trace Data display:

```

                                Format Trace Data
Configuration object . . . . . TRNLINE
Type . . . . . LINE
Type choices, press Enter.
Controller . . . . . *ALL *ALL, name
Data representation . . . . . 3      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 TCP/IP data only . . . . . N      Y=Yes, N=No
F3=Exit  F5=Refresh  F12=Cancel

```

Figure 2. Example Format Trace Data Display

Notes:

1. Press the Enter key without changing to the defaults on the Format a Trace Data display to view all the data associated with the trace. The information is not in any special format.
2. Select the option to format and print only the data that you want to see.
3. All options available for formatting depend on the protocol of the line that is being traced. Only valid choices appear for each protocol.
4. Not all combinations of options are valid for all protocols. If you select an option that is not valid, error messages appear. If an error message appears, you must change your selections. You can restore all options to their default values by using the F5 (Refresh) function key.
5. Use online help for more information about these options.

When the format of the trace data is complete, the output can be printed on the console printer (the printer that is attached to the same I/O processor as the console). Only SCS-type data streams are supported. If OS/400 is available, the trace might be in the job spooled files.

The format of the trace data is:

- An introduction page that contains, for example, configuration object, type, protocol, start and stop dates and times, trace options, and formatting options.
- A help page, to assist in understanding the output. Help information for a specific protocol is given because the trace data differs for each communications protocol.
- The formatted trace data output appears as follows:

Record Number	S/R	Data Length	Record Status	Record Timer	Data Type	Controller Name/Number	Command	Number Sent	Number Received	Poll/Final
7	R	69	00000000	12:29:56.72963	EBCDIC	ZSDLLC30 /01	XID			ON
										.../&;...D{.....4
										ABC.ABCDEFG..1.....94065001010
										*DFD
										*
8	S	0	00000000	12:29:56.76081	EBCDIC	ABCLLC30 /01	SNRM			ON
9	R	0	00000000	12:29:56.78450	EBCDIC	ABCLLC30 /01	UA			ON
52	S	110	00000000	12:29:57.76210	EBCDIC	ABCLLC30 /01	I	0	0	ON
										*.....A.....GFFG.....
										M...ABC.ABCLLD30...SNASVCMG...
										.9.0...ABC.ABCLLD30...#.9.0...
										*.ABC.ABCLLD40
										*
53	R	110	00000000	12:29:57.80065	EBCDIC	ABCLLC30 /01	I	0	1	ON
										*.....A.....GFFG.....
										M...ABC.ABCLLD40...SNASVCMG...
										.9N...ABC.ABCLLD40...#.9N...
										*.ABC.ABCLLD30
										*

***** END OF EXAMPLE PRINTOUT *****

Figure 3. Example Formatted Trace Data Output for SDLC

The width of the file is 132 characters. The data is in hexadecimal representation and either American National Standard Code for Information Interchange (ASCII) or EBCDIC character representation. The columns of the trace output common to all protocols are:

Record number

The number of the trace record.

S/R Shows if the record type is sent (S) or received (R).

Notes:

1. The letter C in this column indicates that an X.21 short hold mode connection was cleared.
2. If an M appears, a modem change has occurred.

Data length

The amount of data, in decimal, that the record contains.

Record status

The protocol-dependent return code for the trace record. 00000000 is successful; no errors were found. Other return codes are listed in the functional specification for the protocol that is running or the port manager. For more information on return codes, see the *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

Record timer

The time that each event occurs. Depending on the communications hardware that is being used, the record timer will be either:

1. A time of day value, HH:MM:SS.NNNNN (where H=hours, M=minutes, S=seconds, and N=subseconds), based on the system time when the trace was stopped.
2. A relative time in decimal seconds. This timer value provides the relative time between events.

Data type

Shows whether the traced data is printed in ASCII or EBCDIC character representation. If the character representation of the data is mostly periods, you might want to format the data again using the other option for data representation.

Controller name/number

Indicates which controller originated the frame or record. In some conditions, this data is not available, and the column remains blank.

Note: The formatted trace output is not security protected. Customer passwords are shown going across the line.

Communications trace limitations: Only two communications traces can run concurrently on one communications controller. Only one trace can exist for the same configuration object at the same time. If OS/400 is available, access SST to trace more lines.

Although a communications trace can start before or after the configuration object is varied on, if it is important to see the starting information coming across the configuration object, you must start the trace *before* varying on the configuration object.

Two or more users can select the same trace to format and print. When multiple users attempt to use the same resources (trace data), one user must wait for the other user to finish before beginning to process the data.

SDLC communications trace considerations: When the system is configured as an SDLC secondary station on a multipoint configuration object, the communications controller traces all records or frames. The records or frames sent to the system include those records and frames intended for other stations. When you use the communications trace service tool to format the data for this configuration, the resulting report might show received records that were intended for other stations.

On a single point-to-point line, where only one secondary station is configured, SDLC traces all frames received before it gets the frames intended for other station addresses. It is not until the secondary SDLC receives the other station addresses that it knows which single-station address the communications equipment uses.

LAN communications trace considerations: Trace options are provided for some of the LAN protocols that allow you to select, at trace start time, which data to trace. For example, you can start a trace to collect data for only a specific remote controller. Selecting one of these trace options when starting a trace will result in less trace data and reduce the need for a large trace buffer.

Trace-filtering options are not available for all LAN communications adapters. If the adapter does not support filtering, all data will be traced, and the following informational message will appear in the prologue of the formatted trace: "Trace Options not supported. All data was traced (no filtering)."

Perform automatic installation of the operating system

This option allows you to install the operating system, selecting from the following devices:

1. Tape
2. Optical
3. Virtual optical — preselected image catalog

Note: When your system is in the full or limited paging environment (see "System paging environments" on page 2), the appearance of the *Perform an automatic*

installation of the operating system option varies depending on the operating system. For more information, see Appendix A, "OS/400 Operating System," on page 277.

Save Licensed Internal Code

This option allows you to save the Licensed Internal Code to tape or optical device, with all currently applied PTFs. You can use the tape or optical device to restore the Licensed Internal Code after a failure.

Note: When your system is in the full or limited paging environment (see "System paging environments" on page 2), the appearance of the *Save Licensed Internal Code* option varies depending on the operating system. For more information, see Appendix A, "OS/400 Operating System," on page 277.

Work with save storage and restore storage

The *Work with save storage and restore storage* option allows you to perform the following:

- Restore all system auxiliary storage (except Licensed Internal Code)
- Resume a restore storage process that was interrupted
- Force end of an interrupted restore storage process
- Resume a save storage process that was interrupted

Note: When your system is in the limited paging environment (see "System paging environments" on page 2), the appearance of the *Work with save storage and restore storage* option varies depending on the operating system. For more information, see "DST in OS/400 limited paging environment" on page 278.

Work with remote service support

The *Work with remote service support* option allows you to:

- Test remote service communications
- Activate and deactivate remote service support communication line
- Work with the security log (shows remote service activity)
- Change service attributes

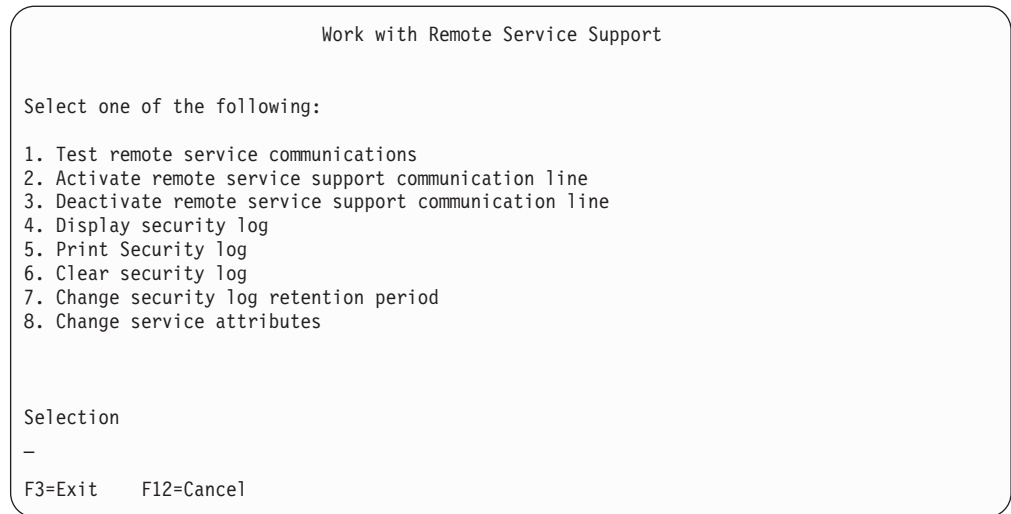


Figure 4. Example Work with Remote Service Support Display

Through remote service support, DST functions that would normally be available only at the local system console can be accessed from a remote site. Remote service support requires the following:

- An electronic customer support communications line.
- The system at the local site must be IPLed to DST or past DST.
- Remote service support must be enabled and activated at the local site (see “Allowing access for remote service support” and “Activating remote service support”).

For more information on remote access support, see *AS/400® Remote Access Support* (SC41-0596).

Allowing access for remote service support

Before you begin a session, remote service support must be allowed access by the system. Perform the following to allow access for remote service support:

1. Select the *Work with remote service support option* on the Use Dedicated Service Tools (DST) display.
2. Select the *Change service attributes* option.
Set the *Allow remote access* field to 1 (yes).

Note: The system is shipped with remote service access disabled (not allowed). After remote access is set to 1 the first time, it remains set until you select 2 (not allowed) or the system is restored. The system operates normally with remote access in either state (allowed or not allowed).

3. The system now allows a remote service support session. To activate a remote service support session, see “Activating remote service support.”

This ends the procedure.

Activating remote service support

Before you can activate a session, you must allow access for remote service support (see “Allowing access for remote service support”). After you have allowed access for remote service support, you can activate remote service in one of the following ways:

- Perform Function 66 (Activate Remote Service) on the control panel. See “Function 66–Activate Remote Service” on page 169.

- Select the *Activate remote service support communication line* option on the Work with Remote Service display by performing the following procedure:
 1. Select the *Work with remote service support option* on the Use Dedicated Service Tools (DST) display.
 2. Make a note of the current mode setting on the modem. Then select the *Activate remote service support communication line* option from the Work with Remote Service Support display. This activates the communications line and sets the modem to asynchronous mode.
 3. When the service provider ends the remote service session, the console is available for normal DST operations.

Note: If the console is input-inhibited after the service provider ends the remote service session, select Function 21 to make DST available again.

4. Select the *Work with remote service support* option from the Use Dedicated Service Tools (DST) display.
5. Select the *Deactivate remote service support communication line* option from the Work with Remote Service Support display to release the communications line.

Note: Releasing the line does not reset the modem mode. Remote service uses asynchronous mode. If the modem was originally set to a mode other than asynchronous, you must manually select the mode again.

This ends the procedure.

Note: Electronic customer support is not available while DST remote service is active. For more information on electronic customer support, see the system operation information.

Work with system partitions

Select the *Work with system partitions* option from the System Service Tools (SST) display or from the Use Dedicated Service Tools (DST) display to create and manage logical partitions.

System resources such as processors, main storage, busses, and I/O processors can be distributed among the various logical partitions. Dividing the system and its resources in this manner is referred to as *creating logical partitions*.

Each logical partition runs a separate copy of the Licensed Internal Code (LIC) and operating system, which in turn acts like a separate system. All systems have a default single partition called a *primary partition* which is created without explicit action by the user. The primary partition is used to control the overall system resources, some of which may be controlled within the secondary partitions. All resources are assigned to the primary partition until they are removed and assigned to a secondary partition. Secondary partitions are created by the user out of resources from the original primary partition.

For details on service actions for logical partitions, see “Logical partitions” on page 134. For general information on logical partitions, see the Information Center CD-ROM (English version: SK3T-2027) or the Information Center Web site: <http://www.as400.ibm.com/infocenter>.

Work with system capacity

The *Work with system capacity* option allows you to perform the following:

- Display system capacity information
- Activate permanent system capacity (pcod)
- Work with temporary system capacity (tcod)

Through this interface, you can activate additional processors (Capacity Upgrade on Demand) to handle increased workload.

Work with system security

Select **Work with system security** from the Use Dedicated Service Tools (DST) display or the System Service Tools (SST) display to manage system security options. There are three settings that can be changed on the Work with System Security display:

- **Allow system value security changes.** This option controls whether CHGSYSVAL can be used to change security-related system values (see the onscreen help for a list of these values).
- **Allow new digital certificates.** This option controls whether the Add Verifier (QYDOADDV) API can add digital certificates and also whether passwords for digital certificate stores can be reset.
- **Allow a service tools user ID with a default and expired password to change its own password.** This option controls whether service tools user IDs with a default or expired password can change their password during SST sign-on or with the QSYCHGDS API. When set to 'No,' the password can only be changed from DST or by using the QSYCHGDS API with a requesting user that has the necessary authority.

End batch restricted state

Select **End batch restricted state** to end the batch job running in restricted state and start the controlling subsystem. This option has no effect if the system is not in batch restricted state.

Chapter 2. Hardware Service Manager

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Introduction

You can select the *Hardware service manager* option from the Start a Service Tool display. It allows you to display and work with system hardware (logical or packaging) and debug input-output processors (IOP) and devices.

```

Hardware Service Manager

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

System unit . . . . . : 9406-820 10-4046M
Release . . . . . : V4R5M0 (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 5. Example Hardware Service Manager display for Model 8xx (in the full and limited paging environments)

Note: The system power control network (SPCN) option appears only on systems with SPCN.

The Hardware Service Manager display provides the following information:

- System type, model, and serial number
- Licensed Internal Code and operating system release information
For details on how to interpret the Release field, see “Determining the dominant operating system” on page 124.
- A list of the hardware service manager options
The options available vary depending on the system type and paging environment (see “Hardware Service Manager options”).
- Function keys
The function keys vary depending on the display that is shown. For information on how to use them to collect information, see “Collecting information and performing functions from the Hardware Service Manager displays” on page 60.

For more information on the system configuration and resources, see Chapter 9, “System Architecture and Configuration,” on page 225 and “Resource names” on page 238.

Hardware Service Manager options

Options on the Hardware Service Manager display vary according to the paging environment. In the non-paging (stand-alone) environment (type D IPL), the Hardware Service Manager display shows a subset of the options that are allowed when the operating system is available. For more information on paging environments, see “System paging environments” on page 2.

Table 5. Paging environments and hardware service manager options

Paging environment	Hardware service manager options
Type D initial program load (IPL) (Non-paging or Stand-alone)	Logical hardware resources <ul style="list-style-type: none"> - System bus resources - Processor resources - Main storage resources - High-speed link resources
Limited and full paging	Packaging hardware resources <ul style="list-style-type: none"> - Change detail - Concurrent maintenance - Remove - Display detail - Associated logical resources - Hardware contained within package Logical hardware resources <ul style="list-style-type: none"> - Bus - Change detail - Remove - Display detail - I/O debug - Verify - Associated packaging resources - Resources associated with IOP Locate resource by resource name Failed and non-reporting hardware resources System power control network (SPCN) * / Battery Power Unit Information Work with service action log Display label location work sheet Device concurrent maintenance

Packaging hardware resources

The *Packaging hardware resources (systems, frames, cards,...)* option appears on the Hardware Service Manager display when the system is in the full or limited paging environment. This option allows you to display and work with packaging resources. Packaging hardware resources are the physical resources of the system. The display lists them by their physical location within the system. Some packaging hardware resources contain other packaging hardware resources within them. For example, a frame might contain a card enclosure, and the card enclosure might contain cards. To display these resources, select the *Hardware contained within package* option on the Packaging Hardware Resources display.

The Packaging Hardware Resources display shows packaging hardware resources in levels that begin with the system resource. The Packaging Hardware Resource display shows all associated first level hardware resources. To see the resources contained within a packaging hardware resource, select the *Hardware contained within package* option on the packaging resource that has a "+" symbol next to it. For more information on symbols, see "Symbols on the Hardware Service Manager displays" on page 91.

Note: The *Hardware contained within package* option will not be valid for a remote system unit since no packages for hardware within them will be created. This is because HRI will not see VPD from any resources within a remote system unit or remote expansion unit.

```

Packaging Hardware Resources

                                Local system type . . . . : 9406
                                Local system serial number: 10-0033333

Type options, press Enter.
  2=Change detail    3=Concurrent maintenance    4=Remove    5=Display detail
  8=Associated logical resource(s)    9=Hardware contained within package

Opt Description                Type-Model  Frame ID  Resource Name
- System                       9406-500
- System Unit                  + 9406-500   1         FR01
- System Expansion Unit        + 5073-001   2         FR02F
- Rack Enclosure               9309-002   22        FR03F
- Rack Enclosure               + 9309-002   23        FR04F
- Remote System                9406-730   SYS03S
- Remote System Unit           9406-730   1         FR05S
- Remote Expansion Unit        + 5083-001   2         FR06F

F3=Exit    F5=Refresh    F6=Print    F8=Exclude non-reporting resources
F9=Reserve frame space    F10=Non-reporting resources
F11=Display SPCN system information    F12=Cancel    F13=Unresolved locations

```

Figure 6. Example Packaging Hardware Resources display

Selecting the *Display SPCN system information* function key will cause the following display to appear. This display lists the System Power Control Network (SPCN) type and serial number. The SPCN type and serial number is the type and serial number of the system that controls the power for this resource.

```

Packaging Hardware Resources

                                Local system type . . . . : 9406
                                Local system serial number: 10-0033333

Type options, press Enter.
  2=Change detail   3=Concurrent maintenance   4=Remove   5=Display detail
  8=Associated logical resource(s)   9=Hardware contained within package

                                ---SPCN System--
                                Serial
Opt Description                Type-Model  Frame ID  Type  Number
- System                       9406-500   1         9406  10-0033333
- System Unit                   + 9406-500   1         9406  10-0033333
- System Expansion Unit         + 5073-001   2         9406  10-0033333
- Rack Enclosure                + 9309-002   22        9406  10-0033333
- Rack Enclosure                + 9309-002   23        9406  10-0033333
- Remote System                 9406-730   1         9406  10-1234567
- Remote System Unit           9406-730   1         9406  10-1234567
- Remote Expansion Unit         + 5083-001   2         9406  10-1234567

F3=Exit   F5=Refresh   F6=Print   F8=Exclude non-reporting resources
F9=Reserve frame space   F10=Non-reporting resources
F11=Display resource names   F12=Cancel   F13=Unresolved locations

```

Figure 7. Example Packaging Hardware Resources display

For more information on how to collect information and perform specific functions by using the options and function keys from the Packaging Hardware Resources display, see “Collecting information and performing functions from the Hardware Service Manager displays” on page 60.

Logical hardware resources

The *Logical hardware resources (buses, IOPs, controllers,...)* option appears on the Hardware Service Manager display. This option allows you to display and work with logical resources. Logical hardware resources are the functional resources of the system used by the operating system.

When you select the *Logical hardware resources (buses, IOPs, controllers,...)* option, the following Logical Hardware Resources display appears:

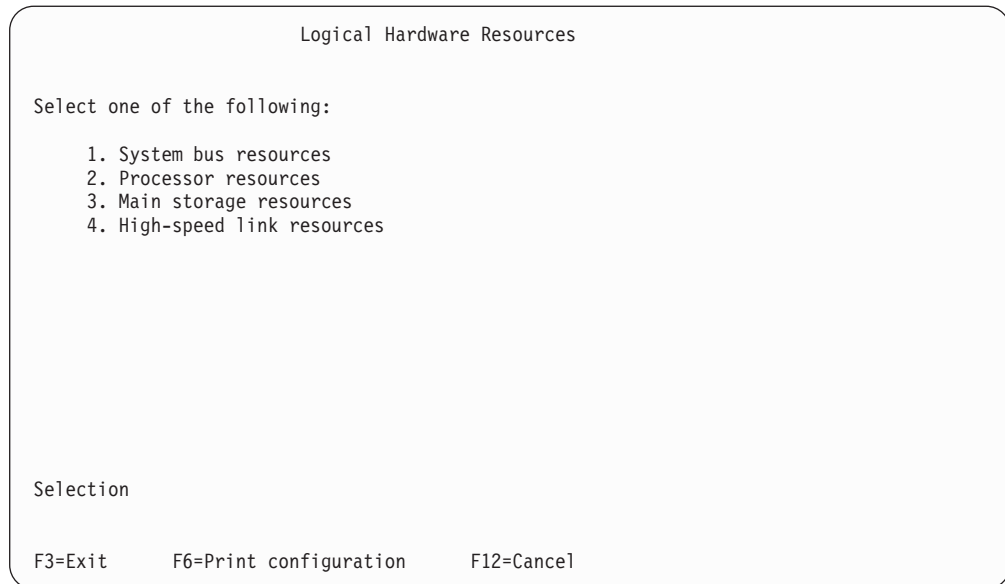


Figure 8. Example Logical Hardware Resources display.

From the Logical Hardware Resources on System Bus display, Display Processor Information display, Display Main Storage Information display, or the Work with High Speed Link (HSL) Resources display, you can perform the following:

- Display or change logical hardware resource information
- Display associated packaging hardware resources
- Display logical hardware resource status

Note:

- The *System bus resources* option also allows you to perform I/O debug functions and run verification procedures. For more information on this option, see “Display system bus resources” on page 78.

The High-speed link resources display also allows you to enable and disable HSL Opticonnect and to display port information.

For more information on collecting information and performing specific functions using the options and function keys from the Logical Hardware Resources display, see “Collecting information and performing functions from the Hardware Service Manager displays” on page 60.

For details on the symbols that appear next to the resource description field, see “Symbols on the Hardware Service Manager displays” on page 91.

Locate resource by name

The *Locate resource by resource name* option appears on the Hardware Service Manager display when the system is in the full or limited paging environment. It allows you to enter a resource name on the Locate Resource by Resource Name display:

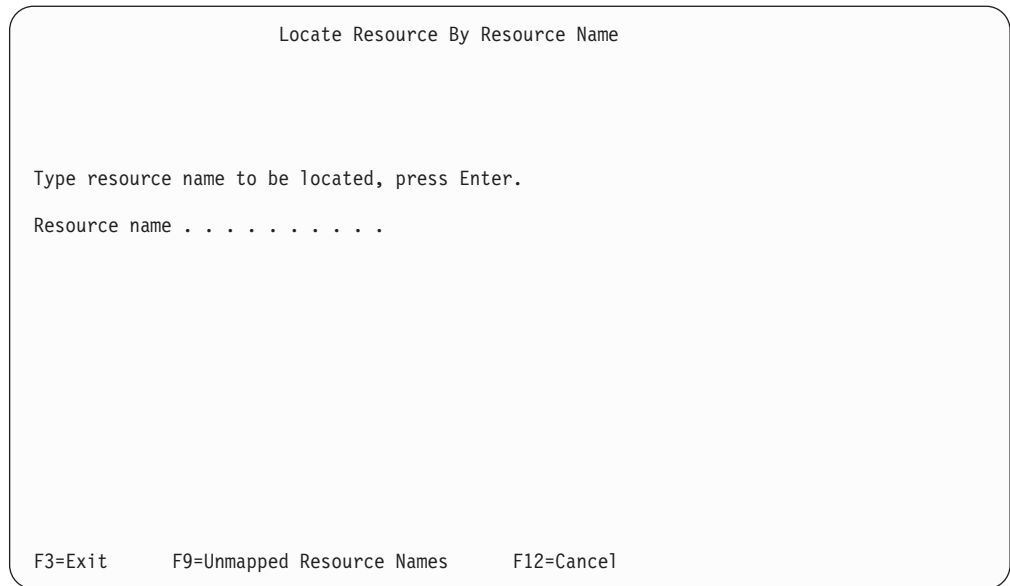


Figure 9. Example Locate Resource By Resource Name display

The system responds by displaying one of the following messages:

- Resource is not found.
The system displays the following message:
x does not exist as a current resource name.
(Where x is the resource name that the user specified.)
- Resource is found but is a reserved resource name.
A reserved resource name is created when an OS/400 command (CRTDEVx) supplies an unassigned resource name. The following message displays:
x exists as a reserved resource name.
Resource does not exist.
(Where x is the resource name that the user specified.)
- Resource is found. If the resource name represents a logical hardware resource, the Logical Hardware Resources display appears. It allows you to work with the logical hardware resource. The resource name in the following example is CC02.

```

Logical Hardware Resources

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
-    Communications IOP         2619-001   Operational  CC02

F3=Exit    F5=Refresh    F6=Print     F9=Failed resources
F10=Non-reporting resources  F11=Display serial/part numbers  F12=Cancel
CC02      located successfully.

```

Figure 10. Example Logical Hardware Resource display

You can also use the Locate Resource By Resource Name display to find a packaging resource. When the system finds the packaging resource name, the following display appears.

```

Packaging Hardware Resources

Type options, press Enter.
 2=Change detail   3=Concurrent Maintenance   4=Remove
 5=Display Detail  8=Associated logical resource(s)

Opt  Description                Type-Model  Resource  Card  Device
      HSL I/O bridge            282c       c01       Pos  Pos

F3=Exit    F5=Refresh    F6=Print     F10=Non-reporting resources  F12=Cancel

```

Figure 11. Example Packaging Hardware Resources display

For more information on collecting information and performing specific functions by using the options and function keys from the Logical Hardware Resources display, see “Collecting information and performing functions from the Hardware Service Manager displays” on page 60.

Failed and non-reporting resources

The *Failed and non-reporting hardware resources* option appears on the Hardware Service Manager display when the system is in the full or limited paging environment. It allows you to display a list of the logical hardware resources that either failed or did not report to the system at the last IPL.

Note: To view location information and display a list of the packaging hardware resources that either failed or did not report at the last IPL, select the *Associated packaging resource(s)* option on the Failed and Non-Reporting Logical Hardware Resources display.

A failed resource that reports to the system at the time of the IPL might have a problem with its operation. On the Failed and Non-Reporting Logical Hardware Resources display, *Failed* appears in the *Status* column to indicate a failed resource. The failed resources appear at the top of the list.

A non-reporting resource does not report to the system at the time of the IPL. On the Failed and Non-Reporting Logical Hardware Resources display, a question mark symbol (?) appears next to the resource description field to indicate a non-reporting resource. The status of a non-reporting resource is Unknown.

Note: For more information on symbols, see “Symbols on the Hardware Service Manager displays” on page 91.

A failed or non-reporting resource indicates that one of the following has occurred:

- The resource was removed from the system (non-reporting only).
- The resource was powered off at the time of the IPL.
- There is a problem in the signal path between the system and the device.
- There is a resource failure.

Selecting the *Failed and non-reporting hardware resources* option is a quick way to display failed and non-reporting resources on the system. For information on other ways to display failed and non-reporting resources, see “Display failed resources” on page 69 or “Display non-reporting resources” on page 70.

Failed and Non-Reporting Logical Hardware Resources				
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
-	Communications IOP	2626-001	Failed	CC04
-	Communications IOA	2626-001	Failed	LIN04
-	Communications Port	2626-001	Failed	CMN05
-	Communications IOP	? 2626-001	Unknown	CC01
-	Communications IOP	? 2623-001	Unknown	CC03
-	Communications IOP	? 2619-001	Unknown	CC05
-	Communications IOA	? 2626-001	Unknown	LIN01
-	Communications IOA	? 2619-001	Unknown	LIN05
-	Communications IOA	? 2609-001	Unknown	LIN02
-	Communications Port	? 2619-001	Unknown	CMN08
-	Communications Port	? 2626-001	Unknown	CMN02
-	Communications Port	? 2609-001	Unknown	CMN03
-	Communications Port	? 2609-001	Unknown	CMN04
-	Workstation IOP	? 916A-001	Unknown	WS01
-	Workstation IOA	? 916A-001	Unknown	CTL01
-	Display Station	? 3196-0A1	Unknown	DSP001
				More...
F3=Exit		F5=Refresh	F6=Print	F12=Cancel

Figure 12. Example Failed and Non-Reporting Logical Hardware Resources display

If no failed resources or non-reporting resources exist, the following informational message appears:

No failed or non-reporting logical hardware resources were found.

If the system finds only non-reporting resources and no failed resources, the Failed and Non-Reporting Logical Hardware Resources display appears with the list of non-reporting resources and the following message:

No failed logical hardware resources were found.

If the system finds only failed resources and no non-reporting resources, the Failed and Non-Reporting Logical Hardware Resources display appears with the list of failed resources and the following message:

No non-reporting logical hardware resources were found.

The options on the failed or non-reporting displays are the same options that are available for logical resources:

- Change detail
- Remove
- Display detail
- I/O debug
- Verify
- Associated packaging resource(s)

For more information on these options, see “Collecting information and performing functions from the Hardware Service Manager displays” on page 60.

System Power Control Network (SPCN)

The *System Power Control Network (SPCN)* option appears on the Hardware Service Manager display when the system is in the full or limited paging environment. This option is not available on all systems.

Problems that the SPCN reports to the operating system are logged. Select the *System Power Control Network (SPCN)* option to work with the network structure for SPCN. See the Service Action Log to display and work with the log information. For more information on SPCN features and use of this option, see “System Power Control Network (SPCN)” on page 227.

Battery power unit information

The *Battery power unit information* option is available only on models that do not have SPCN installed. This option appears on the Hardware Service Manager display when the system is in the full or limited paging environment.

This option allows you to display the location of the battery power units on the system and the manufacture dates. It also allows you to update the manufacture dates when you install or replace battery power units.

Notes:

1. Non-SPCN units may not have an internal battery, and in that case will not need the battery option set.
2. You do not need to set the date in the *Battery Replacement Notice* field. It automatically displays a date which is four years later than the one in the *Date of Manufacture* field.

When the system is installed, all input fields appear with an (*) symbol. The system does not automatically update the battery information. You must manually

enter the manufacturing date for each battery. If no battery is installed, you must enter blanks in the fields.

```

Battery Power Unit (BPU) Information
Expected battery life (years) . . . . . : 4
Type dates, press Enter.

  BPU      Date of      Battery
  Number   Manufacture  Replacement
           (MM/YY)   Notice
           (MM/YY)   (MM/YY)   Replace
           (MM/YY)   (MM/YY)   Battery

System Unit
1          06/97      06/01      No
2          _/_/___  _/_/___    No

Expansion Unit
1          04/94      04/98      Yes

F3=Exit   F12=Cancel

```

Figure 13. Example Battery Power Unit Information display

Figure 13 shows examples of:

- A battery power unit that is not due for replacement in the system unit
- A battery power unit that is not installed in the system unit
- A battery power unit that is due for replacement in the expansion unit

For more information, press the Help key at the Battery Power Unit Information display.

Work with service action log

The *Work with service action log* option appears on the Hardware Service Manager display when the system is in the full or limited paging environment. When you select this option, the system displays a log of hardware errors that require action from a service representative. A service representative uses the log as a starting point for hardware problem analysis. It provides information on how many times a system reference code appears for a specific resource and shows description and location information for the possible failing items.

The Service Action Log prompts you for a specific time range and allows you to select to view only entries with NEW status. The Service Actions Log Report display shows the following fields for the log entries that require service action for the time that you specify:

- Option
- Status
- Date
- Time
- SRC
- Resource
- Isolated
- Count

Service Action Log Report							
From . . . : 10/07/93 10:50:45 To . . . : 10/08/93 10:50:45							
Select one valid option at a time, Press Enter							
2=Display failing item information				8=Close a NEW entry			
9=Delete a CLOSED entry							
Opt	Status	Date	Time	SRC	Resource	Isolated?	Count
-	NEW	07/25/95	10:49:35	B8016055	CTL02	Y	4
-	NEW	07/25/95	10:49:35	B801605A	LIN03	Y	4
F3=Exit		F12=Cancel					

Figure 14. Example Service Action Log Report display

Option field

Use the Option field to perform the following functions:

- Display the failing item information
This option displays the possible failing items along with part action, description, location, and SRC word information. Choose the Help function key for more information about each of these fields.
- Close a *NEW* entry
After a problem has been fixed, select this option to change the status to *CLOSED*.
This option allows you to mark service action log entries with the appropriate status of the repair. For more information on status, see "Status field."
- Delete a *CLOSED* entry
Select this option to remove a *CLOSED* problem from the service action log. A deleted entry will not appear the next time you view the service action log.

Status field

This field indicates the status of the entry as one of the following:

- *NEW*
This indicates that no action has been taken. The entry has not been closed or deleted.
- *CLOSED*
This indicates that a *NEW* entry has been fixed and closed.
- *DELETED*
This indicates that the entry will not appear the next time you view the service action log.
To remove a *CLOSED* problem from the service action log, select the *Delete a CLOSED entry* option from the Service Actions Log Report display.

Date and time fields

These fields display the time and date of the *first* occurrence of a system reference code (SRC) for a resource during the time range specified.

SRC field

This field shows the system reference code (SRC) that was logged against the resource.

Resource field

This field displays the resource against which the problem was logged.

Isolated field

This field indicates whether or not online isolation functions have been performed on an error.

When *No* is displayed in this field, perform problem analysis to further isolate the error. Note the SRC that is displayed and go to “Starting Point for All Problems” in the Problem Analysis book for your system.

When *Yes* is displayed in this field, it indicates that the system has performed online isolation functions on the error.

Count field

This field indicates the number of SRC occurrences for the resource that is indicated in the Resource field.

Display label location work sheet

The *Display label location work sheet* option appears on the Hardware Service Manager display when the system is in the full or limited paging environment. It allows you to display current configuration location information. You can also print a worksheet that shows location information by selecting the print function on the Label Location Work Sheet display. The work sheet printout contains a field in which you can enter label information.

The system uses description labels to identify hardware. It is the customer’s responsibility to configure and assign labels in the system for cables and devices. The system label must match the (physical) label on the hardware. Prior to a system upgrade procedure, you can select this option to print the label location work sheet. Use the work sheet to list the hardware labels and to verify that the system labels match the hardware labels after the upgrade.

For more information on label locations, see “Work with Hardware Products (WRKHDWPRD) Command” on page 298.

Device concurrent maintenance

Device concurrent maintenance for internal disk units, internal tape units, and internal optical units is available on most iSeries 400 Model 270, 5xx, 6xx, 7xx, 8xx, S20, S30, and S40 systems.

Note: Concurrent maintenance for internal tape units and internal optical units is not available on the 270, 600, 720, 810, 820, and S10 models.

Device concurrent maintenance provides the capability to power down and remove a failed disk unit, tape unit, or optical unit. It also provides the capability to insert and power up a replacement unit or a new unit while the iSeries 400 is powered up and in use. For a configured disk unit device, this concurrent maintenance action is allowed only when the disk unit device has data storage protection, for example, when the disk unit is one member of a mirrored pair or is a member of a data parity array. To determine the storage protection status for disk units on your system, see “Start Disk Service Here” under “Recovery Procedures” in the Problem

Analysis information for your system. For more information on storage protection, see the *Backup and Recovery*, SC41-5304-07 book. This function is also available for nonconfigured units without storage protection.

```
Device Concurrent Maintenance

Type the choices, then press Enter.

Specify either Physical Location or Resource Name.
Physical Location . . . Frame ID:      Position:
OR
Resource Name . . . . . Device Resource Name:

Specify action as  1=Remove device  2=Install device
Action to be performed . . . . . :

Enter a time value between 00 and 19.
Time delay needed in minutes . . . . . : 00

Serial number of frame (not needed if xxxxxxxxxx shown).
Frame serial number . . . . . : xxxxxxxxxx

F3=Exit   F5=Refresh   F12=Cancel
```

Figure 15. Example Device Concurrent Maintenance display

To perform concurrent maintenance on a device, specify the location of the device by providing the physical location (frame ID and card/device position) of the device. If you do not know the location, use the following information to determine the correct location:

Frame ID

The frame ID is a unique identification number for a frame. It is usually on the control panel of the frame.

Position

This field represents the position of the device within the enclosure as labelled on the frame.

Device resource name

This field shows the logical name assigned to the resource that is the target of device concurrent maintenance. An example of the resource name for a disk unit would be 'DD037'. See the information for the specific resource either in the Hardware Service Manager displays or in the Display Disk Configuration displays. As an example, consider the disk unit device information in Figure 16 on page 59.

Frame serial number

In a limited set of service cases, it may be possible for a system to have more than one frame with the same frame ID. This typically happens in a clustered system environment when a system fails and ownership of its frames transfers to a different controlling system in the cluster. When this happens, the new controlling system now may have two frames with the same frame ID but different frame

serial numbers. In this case, you also need to specify the serial number of the CEC that controls the power for the frame on which you want to perform concurrent maintenance.

Usually, the serial number information is not needed, but if the system detects a duplicate Frame ID in your Device Concurrent Maintenance request, you will be returned to this same screen with a blank serial number field. Simply put the serial number for the CEC that originally controlled the frame into this field. This serial number can be found in the Service Action Log FRU Details or in Hardware Service Manager information screens.

```

Disk Unit Hardware Resource Information Details

Type.....: 6713
Model.....: 050
Level.....: 3
Serial Number.....: 68-xxxxx
Resource Name.....: DD037

Physical location:
Frame ID.....: 1
Card position.....:
Device position.....: L01
```

Figure 16. Example Disk Unit Hardware Resource Information Details display

In Figure 16, the disk unit has a Frame ID of 1, a Position of L01, and a Resource Name of DD037. To perform device concurrent maintenance on this unit, fill in the information as shown in Figure 17. Press Enter. If the device is unable to report in or you are installing a device into an empty slot, use Frame ID and Position instead of Resource Name.

Action to be performed

If removing the device, specify 1. If inserting the device, specify 2.

Time delay needed in minutes

Enter 00 in this field if you do not want any delay before the process begins. If you enter a value in this field, the device will wait that long after you press Enter to begin the operation. Typically you will enter a value if the device is at a different location and it will take you a while to get to that location. The device might be in a different room, for example.

Figure 17. Example Device Concurrent Maintenance with data for Frame ID and Position fields

```

Device Concurrent Maintenance

Type the choices, then press Enter.

Specify either Physical Location or Resource Name.
>>> Physical Location . . . Frame ID: 1... Position: L01.. <<<
      OR
      Resource Name . . . . . Device Resource Name: .....

Specify action as 1=Remove device 2=Install device
Action to be performed . . . . . : 1

Enter a time value between 00 and 19.
Time delay needed in minutes . . . . . : 00

Serial number of frame (not needed if xxxxxxxxxx shown).
Frame serial number . . . . . : xxxxxxxxxx

F3=Exit    F5=Refresh    F12=Cancel

```

For information on how to perform concurrent maintenance for internal tape or internal optical units, see “Removable Media (Concurrent)” in the Problem Analysis book for your system.

For information on how to perform concurrent maintenance for internal disk units with storage protection, see “Disk Unit (Concurrent)” in the Problem Analysis book for your system.

On some iSeries 400 models informational SRCs occur during concurrent maintenance. These SRCs indicate when it is safe to perform an action or show the status of the action. See “SPCN informational concurrent maintenance SRCs” on page 197 to see the informational SPCN SRCs. For more information about specific SRCs, go to “(1xxx) System Power Control Network (SPCN) Reference Codes” in the Problem Analysis information for your system.

See “Concurrent maintenance” on page 62 for general information about IOA or IOP concurrent maintenance. For removal and installation procedures, see the applicable card removal and installation procedure in the Problem Analysis information for your system.

Collecting information and performing functions from the Hardware Service Manager displays

You can select *Packaging hardware resources* and *Logical hardware resources* options from the Hardware Service Manager display (see “Packaging hardware resources” on page 47 and “Logical hardware resources” on page 49). This section describes how to collect information and perform specific functions by using the options and function keys from the various packaging and logical hardware resources displays.

Change resource details

From packaging displays:

You can change detailed information about a specific resource by selecting the *Change detail* option or function key. The information varies depending on the device selected.

The following is a Change detail display for a communications IOP packaging hardware resource:

```

Change Packaging Hardware Resource Detail

Description . . . . . : Communications IOP
Type-Model . . . . . : 2620-001
Serial number . . . . . : 10-3157011

Type changes, press Enter.

Resource name . . . . . C17_____
Actual type . . . . . _____
Actual model . . . . . _____
Actual manufacturing ID . . . . . _____
Shared by multiple systems . . . . . 2          1=Yes 2=No
Manufactured by IBM . . . . . 1          1=Yes 2=No
Service provider . . . . . _____

More...

F3=Exit      F5=Refresh      F6=Print
F9=Display detail  F12=Cancel

```

Figure 18. Example Change Packaging Hardware Resource Detail display

For definitions of the fields that appear on this display, see “Display resource details” on page 72.

Note: An asterisk symbol (*) on the left and right side of the value indicates that this resource requires specific information from the user. For more information, see the section entitled “Display resources requiring attention” on page 75.

From logical displays:

You can change the logical resource name of a specific resource by selecting the *Change detail* option or function key. The information varies depending on the device selected.

```

Change Logical Hardware Resource Detail

Description . . . . . : Communications IOP
Type-Model . . . . . : 2620-001
Status . . . . . : Operational
Serial number . . . . . : 10-3157011

Current resource name . . . . . : CC08

Type changes, press Enter.

New resource name . . . . . : CC08

F3=Exit      F5=Refresh      F6=Print
F9=Display detail  F12=Cancel

```

Figure 19. Example Change Logical Hardware Resource Detail display

Concurrent maintenance

From packaging displays

The *Concurrent Maintenance* option is available only on the packaging hardware resources displays.

This option provides the capability to power off a subset of the system and perform service actions on hardware in that subset. Other parts of the system remain powered on and functional. Service actions supported include replacement, upgrade, removal, addition, and movement of hardware.

The subset of system hardware that you power off in order to shut down a particular piece of hardware is known as the *power domain* for that piece of hardware. The power domain of a piece of hardware is determined by the granularity of the power control system. For example, the power domain of an I/O processor on an SPD bus is the frame in which the SPD bus resides. This is because the power control system for SPD busses does not support powering individual I/O processor slots on and off. In contrast, the power control system for PCI busses does support powering individual I/O card slots on and off. Consequently, the power domain for an I/O card on a PCI bus is the card itself.

There are some restrictions on hardware resource concurrent maintenance which are enforced by the operating system.

Some of the more common restrictions are as follows:

- You cannot power off some I/O towers without powering off the entire system.
- If you are powering off a power domain containing configured disk units that are not mirrored in a different power domain, it is likely that a disk unit attention SRC will appear in the operator panel display. Also, some or all system activity could stop until the domain is powered back on and the disk units become available again. The I/O processors and I/O adapters to which these disk units are attached may only be replaced while the domain is powered off.

Any other actions on these hardware resources are unsupported and may cause failures requiring a system IPL to recover. There are no restrictions on the service actions that can be performed on other hardware resources in the power domain.

- A power domain containing hardware resources that are in use by the operating system cannot be powered off. All configuration objects using hardware resources in the power domain must be varied off before the power domain can be powered off.
- You must end all active CRGs (cluster resource groups) prior to attempting to power off a power domain using concurrent maintenance.
- The system you are using must be the SPCN (system power control network) for the selected power domain.
- A power domain containing switchable bus adapters cannot be powered off if any of the bus adapters are owned by a system other than the one you are using.

You can find more information on these restrictions by pressing F1 at the Concurrent Maintenance display.

```

Hardware Resource Concurrent Maintenance
Frame ID: 5
Type options, press Enter.
 2=Toggle LED blink off/on      5=Display detail
 8=Associated logical resource(s) 9=Work with controlling resource

Opt Description                Type-Model  Resource  Card  Device
System Expansion Unit          >           FR07     C01
Backplane                      283B       P08      CB1
Empty Position                 C01
Empty Position                 C02
Empty Position                 C03
Empty Position                 C04
Empty Position                 C05
Empty Position                 C06
Empty Position                 C07
Empty Position                 C08
Backplane                      283F-      P05      DB1
More...

F3=Exit      F5=Refresh      F6=Print      F8=Display power states
F9=Power off domain  F10=Power on domain  F11=In-use resources  F12=Cancel

```

Figure 20. Example Hardware Resource Concurrent Maintenance display

Create frame information

From packaging displays:

If you change detail (see “Change resource details” on page 60) or reserve frame space (see “Reserve frame space” on page 82) for a frame ID that currently does not exist, the following message appears:

Containing hardware resource does not exist. Press F10 to create.

To create the frame information, press the *Create containing hardware resource* function key. The following display appears and allows you to select the type of packaging hardware resource (frame) to contain the resource you selected.

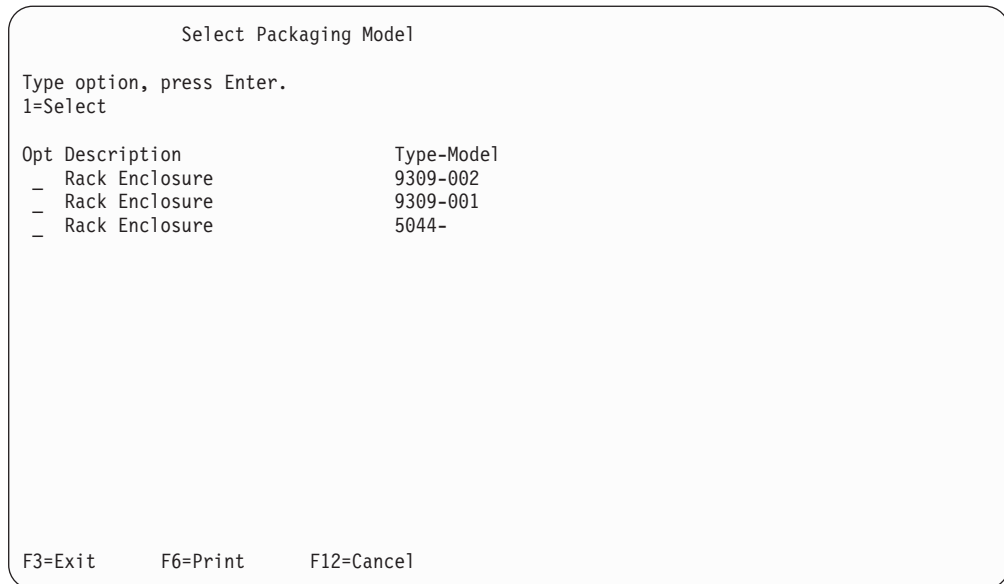


Figure 21. Example Select Packaging Model display

Note: The *Create containing hardware resource* function key is not available for all resources.

After you select the frame information and press Enter, the Define Frame Packaging Detail display appears. This display allows you to define the following frame information:

- Resource name
- Serial number
- Location text
- Service provider
- Alternate remote telephone
- Alternate service node
- Alternate service telephone
- Owning system type
- Owning system model
- Owning system serial number

When you press Enter, the data is verified and used to create a new packaging resource. If no errors are found, you will return to the original change detail or reserve frame space display. Press the Enter key from that display to complete the change and return to the previous packaging list display. You can view this newly created packaging hardware resource in the list of frames on the Packaging Hardware Resource display.

From logical displays:

The *Create containing hardware resource* function key is available only on the packaging hardware resources displays. To access this function from the logical displays, you must select the *Associated packaging resource(s)* option (see “Display associated resources” on page 66).

Debug the resource

From packaging displays:

The *I/O debug* option is available only on the logical hardware resources displays. To access I/O debug from the packaging displays, you must select the *Associated logical resource(s)* option (see “Display associated resources” on page 66).

From logical displays:

The *I/O debug* option is available only on the logical hardware resources displays. This option assists in debugging selected resources.

Note: Attention! Misuse of this option might cause a system software failure.

The I/O Debug display shows the following options as appropriate for the resource selected:

- Read/write I/O processor data
- Dump I/O processor data (see “Performing an IOP dump using hardware service manager (All Models)” on page 275)
- Reset I/O processor - Some debug functions require that the I/O processor be in a disabled state. Select this option to disable the I/O processor. To enable the I/O processor for normal operation, you must select the *IPL I/O processor* option on the Select I/O Debug Function display or IPL the system again.
- IPL I/O processor - Select this option to IPL the I/O processor. It allows you to recover from an intermittent problem, refresh the I/O processor system information, or enable the I/O processor for normal operation after selecting the *reset I/O processor* option. Selecting this option performs the same function as the OS/400 vary command with the *reset* option (see “How to reset an I/O processor card while the system is up and running” on page 291).
- Enable I/O processor trace — Select this option to enable IOP trace.
- Disable I/O processor trace — Select this option to disable IOP trace.
- Enable I/O processor reset — Select this function key to enable IOP reset (one IOP or all IOPs on a bus). **Attention!** This function is for iSeries 400 **development use only** and is not for use in customer installations. **Using this option can disrupt system operations and lead to catastrophic system failures.**
- Disable I/O processor reset — Select this function key to disable IOP reset. **Attention!** This function is for iSeries 400 **development use only** and is not for use in customer installations. **Using this option can disrupt system operations and lead to catastrophic system failures.**
- Enable I/O processor IPL — Select this function key to enable IOP IPL (one IOP or all IOPs on a bus). **Attention!** This function is for iSeries 400 **development use only** and is not for use in customer installations. **Using this option can disrupt system operations and lead to catastrophic system failures.**
- Disable I/O processor IPL — Select this function key to disable IOP IPL. **Attention!** This function is for iSeries 400 **development use only** and is not for use in customer installations. **Using this option can disrupt system operations and lead to catastrophic system failures.**
- Enable bus trace — Select this option to enable a bus trace.
- Take/Release ownership — If this system presently owns the resource, selecting this option will allow the system to release its ownership.

If this system does not presently own the resource, selecting this option will allow the system to take ownership.

For more information on I/O debug, see “Performing an IOP dump using hardware service manager (All Models)” on page 275 and the *iSeries Licensed Internal Code Diagnostic Aids - Volume 1* information.

Display address

From packaging displays:

Each packaging hardware resource has associated address information. The address information is available only on the logical hardware resources displays. To access address information from the packaging displays, you must select the *Associated logical resource(s)* option (see “Display associated resources”).

From logical displays:

Select the *Display detail* option on various logical resources to view address information (see “Display resource details” on page 72).

Notes:

1. The system configuration list printout shows logical address information. For more information, see “Printing the System Configuration List” on page 91.
2. You can also view logical address information from the product activity log (see Chapter 3, “Product Activity Log,” on page 97).

Display associated resources

From packaging displays:

Some packaging hardware resources have associated logical resources. Logical hardware resources represent the function of the hardware. Select the *Associated logical resource(s)* option to show the logical resources that are associated with the packaging resource. The packaging resource might have no associated resources or might be associated with one or more logical resources. (For example, the physical hardware resources for a communications card could have three logical hardware resources associated with it: a communications I/O processor, a communications I/O adapter, and a communications port).

Note: The logical and packaging hardware resources have unique resource names. Packaging hardware resource names are used only by the system. Service representatives and customers use the logical resource names.

The following is an example displaying the associated logical resources for a packaging communications IOP:


```

Logical Resources Associated with a Packaging Resource

Packaging resource:
      Communications IOP      Type-Model  Resource Name
                             2620-001    P17

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  Resource Name  Status
-  Communications IOP        2620-001    CC08           Operational
-  Communications IOA        2620-001    LIN09          Operational
-  Communications Port       2620-001    CMN07          Operational

F3=Exit      F5=Refresh    F6=Print      F12=Cancel

```

Figure 22. Example Logical Resources Associated with a Packaging Resource display

This display shows all the logical hardware resources that are associated with one packaging resource. The first line provides a description, type, model, and resource name of the packaging resource with which all the logical resources are associated.

The options on the Logical Resources Associated with a Packaging Resource display are the same options that are available for logical resources:

- Change detail
- Remove
- Display detail
- I/O debug
- Verify
- Associated packaging resource(s)

From logical displays:

Each logical hardware resource has one or more associated packaging hardware resources. Packaging hardware resources represent the physical packaging of the system hardware. Select the *Associated packaging resource(s)* option to show physical locations and display the packaging resources that are associated with the logical resource. For example, the communications I/O processor is shown as the packaging hardware resource that is associated with the logical communications I/O processor.

```

Packaging Resources Associated with a Logical Resource

Logical resource:
      Communications IOP          Type-Model  Resource Name
                                2620-001    CC08

Type options, press Enter.
2=Change detail  3=Concurrent Maintenance  4=Remove  5=Display Detail
8=Associated logical resource(s)  9=Hardware contained within package

Opt Description          Type-Model  Frame ID  Resource Name
_  Communications IOP    2620-001    1         P17

F3=Exit      F5=Refresh      F6=Print
F10=Non-reporting resources  F12=Cancel      F13=Unresolved locations

```

Figure 23. Example Packaging Resources Associated with a Logical Resource display

This display shows all the packaging hardware resources that are associated with one logical resource. The first line provides a description, type, model, and resource name of the logical resource with which all packaging hardware resources are associated.

Options on the Packaging Resources Associated with a Logical Resource display are the same options that are available for packaging hardware resources:

- Change detail
- Concurrent maintenance
- Remove
- Display detail
- Associated logical resource(s)
- Hardware contained within package

Note: The logical and packaging hardware resources have unique resource names. Packaging hardware resource names are used only by the system. Service representatives and customers use the logical resource names.

Display card gap information

From Hardware Service Manager display:

The *Display card gap information* function key appears on the Hardware Service Manager display. I/O processor cards must be installed in a specified logical order.

Note: SPD system busses require that no empty card positions exist between I/O processors. PCI system busses may have empty card positions.

Select this option to display the gaps in the logical card sequencing. If the cards are not installed in order, system performance might be affected, the cards might be unusable, or SRCs that provide incorrect FRU information might appear.

If the system detects gaps in the logical sequence, the following display appears:

Display Card Gap Information				
Description	Type-Model	Frame ID	Resource Name	Card Position
System Unit	9406-500	1	FR01	2 6 7 8

F3=Exit F5=Refresh F6=Print F12=Cancel

Figure 24. Example Display Card Gap Information display

The Card Position column shows the card location that is empty. One or more card positions might be empty for a single card enclosure.

If no gaps are detected, the following message displays:

No card position gaps were detected in the system

Display failed resources

From packaging displays:

The *Failed resources* function key is available only on the Logical Hardware Resources displays.

From logical displays:

The *Failed resources* function is available only under the *Logical hardware resources* option. This function key displays a list of all failed logical hardware resources. A failed resource indicates that one of the following occurred:

- There is a problem in the signal path between the system and the device.
- There is a resource failure.

You can also select the *Failed and non-reporting resources* option on the Hardware Service Manager display to show failed resources (see “Failed and non-reporting resources” on page 52).

If the system contains no failed resources, the following message displays:

No failed logical hardware resources were found.

Display hardware contained within package

From packaging displays:

The *Hardware contained within package* option is available only on the Packaging Hardware Resources displays. Use this option to view the next level of hardware for the packaging hardware resources. This option functions only when a plus sign

(+) appears after the description. For more information on symbols, see “Symbols on the Hardware Service Manager displays” on page 91.

From logical displays:

The *Display hardware contained within package* option is available only on the Packaging Hardware Resources displays. To access this option from the logical displays, you must select the *Associated packaging resource(s)* option (see “Display associated resources” on page 66).

If the resource is at the lowest level of packaging (contains no other packages), the following message displays:

The selected resource cannot be expanded.

Display location information

From packaging displays:

Each packaging hardware resource has associated location information. To display specific locations, select the *Display detail* option.

From logical displays:

Location information that appears on the logical displays shows the logical address. Physical location information is available only on the Packaging Hardware Resources displays. To access physical location information from the logical displays, you must select the *Associated packaging resource(s)* option (see “Display associated resources” on page 66).

Display non-reporting resources

From packaging displays:

The *Non-reporting resources* function key appears on the Packaging Hardware Resources display (see “Packaging hardware resources” on page 47). It allows you to view a list of the hardware that was detected in the past but is not being detected by the system now. A non-reporting resource indicates that one of the following has occurred:

- The resource might have been removed from the system. (For more information on removing the resource, see “Remove non-reporting resource information” on page 81.)
- The resource might be powered off.
- There is a problem in the signal path between the system and the device.
- There is a resource failure.

You can also select the *Failed and non-reporting resources* option on the Hardware Service Manager display to view non-reporting resources (see “Failed and non-reporting resources” on page 52).

From logical displays:

The *Non-reporting resources* function key appears on various Logical Hardware Resource displays. It allows you to view a list of the logical resources that were

detected in the past but are not being detected by the system now. A non-reporting resource indicates that one of the following occurred:

- The resource might have been removed from the system.
- The resource might be powered off.
- There is a problem in the signal path between the system and the device.
- There is a resource failure.

You can also select the *Failed and non-reporting resources* option on the Hardware Service Manager display to show non-reporting resources (see “Failed and non-reporting resources” on page 52).

If no non-reporting resources are detected, one of the following messages is displayed:

No non-reporting logical hardware resources were found.

or

No non-reporting packaging hardware resources were found.

Display resources associated with IOP

From packaging displays:

The *Resources associated with IOP* option is available only on the Logical Hardware Resources on System Bus display (see “Display system bus resources” on page 78). To access resources associated with the I/O processor, you must select the *Logical hardware resources* option on the main Hardware Service Manager display, and then select the *System bus resources* option.

From logical displays:

The *Resources associated with IOP* option is available only on the Logical Hardware Resources on System Bus display (see “Display system bus resources” on page 78). This option displays the selected IOP and lists all devices that are (logically) attached to it. If more than one IOP is selected, the list contains all the IOPs and their logically-attached resources.

```

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
-    Multiple Function IOP      *  9162-001   Operational CMB01
-    Disk Controller            6606-030   Operational DC02
-    Disk Unit                  *  6606-030   Operational DD002
-    Disk Controller            6605-030   Operational DC01
-    Disk Unit                  6605-030   Operational DD001
-    Tape Controller            6380-001   Operational DC03
-    Tape Unit                  6380-001   Operational TAP01

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 25. Example Logical Hardware Resources Associated with IOP display

Display resource details

From packaging displays:

You can select the *Display detail* option from various packaging resource displays. This option allows you to view additional information about a specific resource. Use this option to display the location information on a specified resource. The information that is displayed varies depending on the type of resource that is chosen. The display below shows detail for a communications IOP packaging hardware resource.

```

Packaging Hardware Resource Detail

Resource name . . . . . : P17
Description . . . . . : Communications IOP

Type-Model . . . . . : 2620-001
Actual type-model . . . . . : -
Serial number . . . . . : 10-3157011
Part number . . . . . : 0000059X4797
Physical location . . . . . :
  Location text . . . . . :
  Frame ID . . . . . : 1
  EIA location . . . . . :
  Card position . . . . . : 2
  Device position . . . . . :
  Manufacturing ID . . . . . :
Actual manufacturing ID . . . . . :
Shared by multiple systems . . . . . : 2          1=Yes 2=No
Manufactured by IBM . . . . . : 1          1=Yes 2=No

More...

F3=Exit    F5=Refresh    F6=Print
F9=Change detail    F12=Cancel

```

Figure 26. Example Packaging Hardware Resource Detail display

The following fields appear on the detail display:

Resource name

This is the resource name that was either created by the system when the hardware was first detected, or was changed to a new value by the user. The packaging hardware resource name is different from the logical hardware resource name.

Description

This field describes the resource as reported by the system or entered manually by the user.

Type-model

This field shows the Type and model of the resource as reported by the system or entered manually by the user.

Actual type-model

This field displays the resource type and model that is shown on the hardware (physically). Entered manually by the user, this value is used to identify a hardware resource that emulates an IBM device.

Serial number

This field shows the serial number of the resource as reported by the system or entered manually by the user. Only serial numbers that were initially detected as zeros can be changed by the user.

Part number

This field shows the part number of the resource as reported by the system or entered manually by the user. Only part numbers that were initially detected as zeros can be changed by the user.

Miscellaneous text

This field displays any information that might be useful. The information is entered manually by the user. It is used only for the reserve frame space function.

Location text

This field shows the text location information that was entered manually by the user. All packages, except stand-alone units, display the location of the frame which contains them. The stand-alone units display the text information for themselves.

Frame ID

This is the identifier of the frame enclosure.

EIA location

This field shows the Electronics Industries Association (EIA) location within the frame. The information is manually entered by the user from the change detail screen. This number represents where the bottom edge of the hardware is located within the frame. This field does not apply to all frames.

Card position

This shows the position of the card within the enclosure. A letter might be included to specify the position of a second level card.

Device position

This field shows the position of the device within hardware package.

Height in EIA units

This number represents the height of the packaging hardware resource as measured in Electronics Industries Association (EIA) units. This value was manually entered by the user on a *Change Detail* screen. This field does not apply to all frames.

Width in mm

This number represents the width of this packaging hardware resource as measured in millimeters. It was manually entered by the user on a *Change Detail* screen.

Manufacturing ID

This field shows the identifier from the manufacturer. The ID of the packaging hardware resource is reported by the system or entered manually by the user.

Actual manufacturing ID

This field shows the actual manufacturing ID of the packaging hardware resource. Entered manually by the user, it is used to identify a hardware resource that emulates an IBM device.

Alternate remote telephone

This shows the telephone number of the alternate remote service machine. This field is for informational use only. It is not used by the system.

Alternate service node

This is the network node address of the alternate service provider. This field is for informational use only. It is not used by the system.

Alternate service telephone

This shows the telephone number of the alternate service provider. This field is for informational use only. It is not used by the system.

Service provider

This field defines the service provider for this resource. If IBM is not the service provider, this field should contain the service provider's name. This field is for informational use only. It is not used by the system.

Manufactured by IBM

This field contains a 1 if the resource was manufactured by IBM or a 2 if it was not.

Shared by multiple systems

This field contains a 1 if the resource is shared between multiple systems or a 2 if it is not.

From logical displays:

You can select the *Display detail* option from various logical resource displays. This option allows you to view additional information about a specific resource.

The following display shows detail for a communications port logical hardware resource:

Note: The information that is displayed varies depending on the type of resource that is chosen.

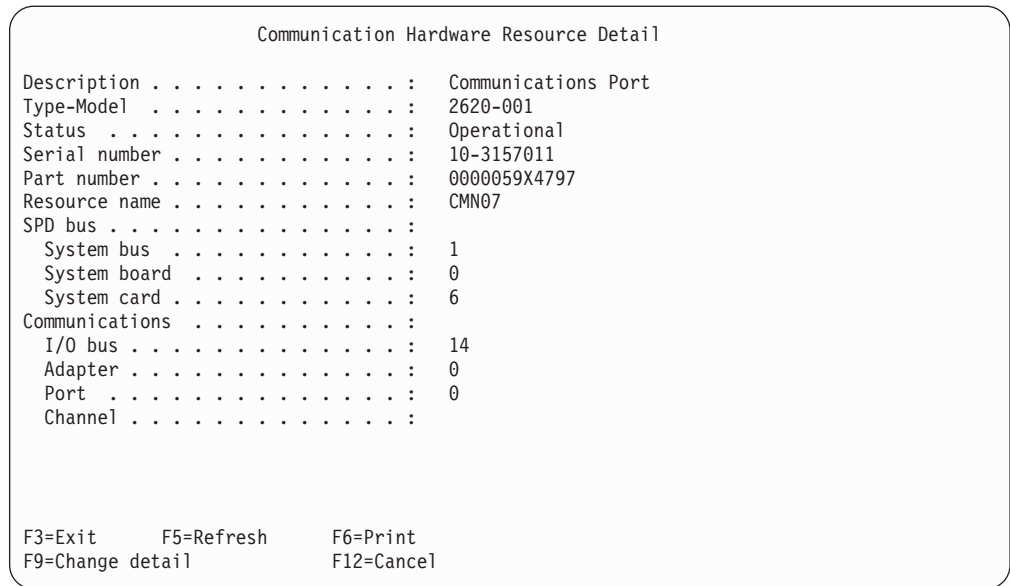


Figure 27. Example Communication Hardware Resource Detail display

The following fields might appear on the detail display. For details on these fields see the section entitled “Display resource details” on page 72.

- Description
- Type-model
- Status (See “Display resource status” on page 77 for details on the values.)
- Serial number
- Part number
- Resource name (logical)

The information in the fields below varies depending on the type of resource that is chosen.

- SPD or PCI bus
 - System bus
 - System board
 - System card
- Communications
 - I/O bus
 - Adapter
 - Port
 - Channel

Display resources requiring attention

From Hardware Service Manager display:

The *Display resources requiring attention* function key appears on the Hardware Service Manager display. Most hardware resources automatically report information to the system, but some resources might require user input. This function scans the system for packaging resources that need more information in order to be correctly displayed on the packaging displays. User input might be required for the following:

- EIA location information is missing.

- Frame ID information is missing.
- The resource cannot determine if it is mounted in a frame (rack-mounted) or if it is a stand-alone unit.

If no resources currently require attention, the following message displays:

No hardware resources currently require attention.

If there are resources that need attention, the Hardware Resources That Require Attention display appears.

To update or change the resource information from the Hardware Resources That

```

Hardware Resources That Require Attention

Type options, press Enter.
2=Change detail    5=Display message(s)

Opt  Description          Type-Model  Frame ID  Resource Name
-----
    Disk Controller      9337-220   DE01
    Disk Controller      9337-020   DE02
    Disk Controller      9337-480   DE04
    Disk Controller      9337-222   DE03
    Disk Controller      9337-240   DE05
    Disk Controller      9337-240   DE06

F3=Exit    F5=Refresh    F6=Print
F10=Packaging hardware resources    F12=Cancel

```

Figure 28. Example Hardware Resources That Require Attention display

Require Attention display, select the *Change detail* option (see “Change resource details” on page 60). Asterisks (*) might appear on both sides of a value that appears on the Change Packaging Hardware Resource Detail display. This shows the value that is causing the resource to need attention.

Note: If no action is taken, the following information applies:

- The resource does not appear on the packaging resource displays or printouts. On some resources displays you can press the *Unresolved locations* function key to view the unresolved locations information.
- The system operates normally. The information requested for these resources is for display purposes only.

To display detailed messages that indicate why this resource might need attention, select the *Display message(s)* option on the Hardware Resources That Require Attention display.

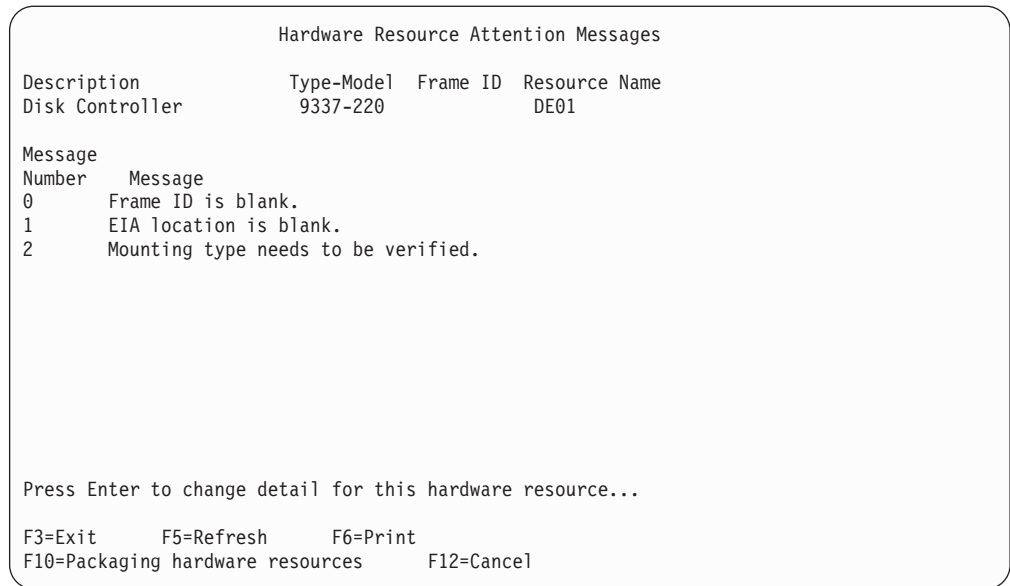


Figure 29. Example Hardware Resource Attention Message display

To update or change the resource information from the Hardware Resources That Require Attention Messages display, press Enter (see “Change resource details” on page 60).

Display resource status

From packaging displays:

Resource status information is available only on the *Logical Hardware Resources* displays. To access status information from the Packaging displays, you must select the *Associated logical resource(s)* option (see “Display associated resources” on page 66).

From logical displays:

The status of each logical hardware resource is shown next to the description, type, and model information on various *Logical Hardware Resources* displays. You can also select the *Display detail* option (see “Display resource details” on page 72) to view the resource status. This indicates the current status of the resource as reported by the hardware.

Status values:

- **Unknown** - Cannot determine status. The resource may be non-reporting or unable to communicate status.
- **Operational** - Resource is functioning normally.
- **Failed** - Resource has failed and is not functional.
- **Errors** - Card or device has detected errors but may still be functional.
- **Not Connected** - Functional connection to the card or device has been closed or has failed. For bus resources, this condition indicates that wrap plugs are installed.
- **Degraded** - Optical bus conditions indicating that the redundant path is being used.

- **Powered Off** - Resource has been powered off or no power is being supplied to the unit.
- **Disabled** - Resource has been reset or suspended. This is an I/O processor status to indicate that the IOP is disabled except for bus level service or maintenance (I/O debug functions). To recover from disabled status, perform another IPL on the IOP (see “Debug the resource” on page 64 or “How to reset an I/O processor card while the system is up and running” on page 291).
- **Software Error** — System licensed internal code associated with this hardware resource has incurred a program exception.

Display serial/part numbers, logical address, and status/resource name information

From packaging displays:

You can display serial and part number information on various Packaging Hardware Resources displays by selecting the *Display detail* option (see “Display resource details” on page 72). To access address and status information from the Packaging Hardware Resources displays, select the *Associated logical resource(s)* option (see “Display associated resources” on page 66).

The *Display serial/part numbers*, *Display logical address*, and *Display status/resource name* function keys are available only on the Logical Hardware Resources displays.

From logical displays:

The *Display serial/part numbers*, *Display logical address*, and *Display status/resource name* function key is available only on the *Logical Hardware Resources on System Bus* and *Logical Hardware Resources Associated with IOP* displays. This function key toggles the display to show serial and part number information, logical address information, or the default status and resource name.

For more information on status, see “Display resource status” on page 77.

Display system bus resources

From the Logical Hardware Resources display:

The *System bus resources* option is available only on the Logical Hardware Resources display (see “Logical hardware resources” on page 49). From the Logical Hardware Resources on System Bus display, you can perform the following:

- Perform the following I/O debug functions:
 - Read/write I/O processor data (see “Debug the resource” on page 64)
 - Dump I/O processor data (see “Performing an IOP dump using hardware service manager (All Models)” on page 275)
 - Reset I/O processor (see “Debug the resource” on page 64)
 - IPL I/O processor (see “Debug the resource” on page 64)
 - Enable I/O processor IPL (see “Debug the resource” on page 64)
 - Disable I/O processor IPL (see “Debug the resource” on page 64)
 - Enable I/O processor reset (see “Debug the resource” on page 64)
 - Disable I/O processor reset (see “Debug the resource” on page 64)
 - Enable bus trace (see “Debug the resource” on page 64)

- Take/Release ownership (see “Debug the resource” on page 64)

Note: Some functions are not available on all models.

- Display failed and non-reporting logical hardware (see “Display failed resources” on page 69 and “Display non-reporting resources” on page 70)
- Remove non-reporting logical hardware (see “Remove non-reporting resource information” on page 81)
- Display serial number and part number (see “Display serial/part numbers, logical address, and status/resource name information” on page 78)
- Display resource status (see “Display resource status” on page 77)
- Display resource name (see “Display serial/part numbers, logical address, and status/resource name information” on page 78)
- Display or change resource detail (see “Display resource details” on page 72 and “Change resource details” on page 60)
- Display system information (see “Display system information” on page 80)

```

Logical Hardware Resources on System Bus

System bus(es) to work with . . . . . *ALL *ALL, *SPD, *PCI, 1-511
Subset by . . . . . *ALL *ALL, *STG, *WS, *CMN, *CRP

Type options, press Enter.
  2=Change detail    4=Remove    5=Display detail    6=I/O Debug
  7=Display system information
  8=Associated packaging resource(s)    9=Resources associated with IOP

Opt Description                Type-Model Status      Resource
-   System Bus                  -          Operational LB01
-   Multiple Function IOP      *  9162-001  Operational CMB01
-   Multiple Function IOP      ?  9162-001  Unknown     CMB02
-   Communications IOP        ?  2619-001  Unknown     CC05
-   Communications IOP        ?  2619-001  Operational CC02
-   Storage IOP                ?  6512-001  Operational SI01
-   Communications IOP        ?  2626-001  Unknown     CC01
-   Workstation IOP           <  916A-000  Operational WS02
                                     More...

F3=Exit    F5=Refresh    F6=Print    F8=Exclude non-reporting resources
F9=Failed resources    F10=Non-reporting resources
F11=Display serial/part numbers    F12=Cancel

```

Figure 30. Example Logical Hardware Resources on System Bus display

The Logical Hardware Resources on System Bus display shows the logical hardware resources in levels, beginning with the system bus. For example, a system bus might have one or more IOPs attached, an IOP might have an associated controller, or a controller might have an associated device. All associated first level logical hardware resources are shown. Option nine allows you to see the resources that are associated with each I/O processor.

Logical hardware resources on system bus (frames with a PCI system bus)

For frames with a PCI system bus, the Logical Hardware Resources on System Bus display shows the logical hardware resources in levels, beginning with the HSL I/O bridge. As depicted in the following example, an HSL I/O bridge will have one or more bus expansion adapters. A bus expansion adapter will have one system bus. A system bus will have one or more multi-adapter bridges. A multi-adapter bridge might control one or more IOPs.

```

Logical Hardware Resources on System Bus

System bus(es) to work with . . . . *ALL *ALL, *SPD, *PCI, 1-511
Subset by . . . . . *ALL *ALL, *STG, *WS, *CMN, *CRP

Type options, press Enter.
2=Change detail    4=Remove    5=Display detail    6=I/O Debug
7=Display system information
8=Associated packaging resource(s)    9=Resources associated with IOP

Opt Description                Type-Model  Status      Resource
-  HSL I/O Bridge                3333-333   Operational BC01
-  Bus Expansion Adapter         5533-333   Operational BCC01
-  System Bus                    5533-333   Operational SPD03
-  Multi-adapter Bridge          5544-444   Operational PCI01D
-  Multiple Function IOP        * 9162-001   Operational CMB01
-  Communications IOP           2619-001   Operational CC02
-  Communications IOP           2629-001   Operational CC01
-  Communications IOP           2626-001   Operational CC03
-  Workstation IOP              < 916A-001   Operational WS01
-  Multi-adapter Bridge          5566-666   Operational PCI16D
-  Communications IOP           2222-222   Operational CC04
-  Bus Expansion Adapter         5577-777   Disabled    BCC011
-  System Bus                    5577-777   Disabled    SPD04
-  Multi-adapter Bridge          5588-888   Disabled    PCI02D
-  Communications IOP           1222-222   Unknown     CC05
-  Multi-adapter Bridge          5599-999   Disabled    PCI30D
-  Communications IOP           3222-222   Unknown     CC16

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 31. Example Logical Hardware Resources on System Bus display (frames with a PCI system bus)

Display system information

The *Display system information* option is available from the Logical Hardware Resources displays. This option allows you to view the system type and system serial number of the iSeries 400 system that controls the SPCN (System Power Control Network) for the selected resource. It also allows you to view the system type and system serial number of the iSeries 400 system that is an alternate owner of the resource. If no system presently owns the selected resource, the current owner of the resource is indicated. The iSeries 400 system that last had ownership of the resource is indicated as the owner.

Display unresolved locations

From packaging displays:

The *Unresolved locations* function key is available only on the Packaging Hardware Resources displays. This function key displays the packaging hardware resources for which the system cannot fully determine the location information. Select this function key to view the hardware resources that may require user intervention to display correctly on the Packaging Hardware Resources displays.

When you select the *Packaging hardware resources* option on the Hardware Service Manager display, the system scans the packaging resources. If location information is missing, the following message appears:

There are resources with unresolved locations. Press F13 to see list.

Select the *Unresolved locations* function key to view the Hardware with Unresolved Locations display.

To update or change the location information, select the *Change detail* option on the Hardware with Unresolved Locations display.

Note: If you take no action, the following applies:

- The resource does not appear on the packaging resource displays or print-outs. On some resource displays you can press the *Unresolved locations* function key to view the unresolved locations information.
- The system operates normally. The information that is requested for these resources is for display purposes only.

From logical displays:

The *Unresolved locations* function key is available only on the Packaging Hardware Resources displays. To access unresolved location information from the logical displays, you must select the *Associated packaging resource(s)* option (see “Display associated resources” on page 66).

Print

From packaging and logical displays:

The *Print* function key produces a printout of the information displayed. You can select this option from various displays.

Select the *Print* (F6) function key from the *Hardware Service Manager* display to print the system configuration list. The system configuration list includes system information and the packaging and logical information. For more information on printing the system configuration list, see “Printing the System Configuration List” on page 91.

Refresh the display

From packaging and logical displays:

Select the *Refresh* function key to access the data again. Use the *Refresh* function key when a change was made from this display. For example, select this function key if power is restored to a non-reporting resource.

Remove non-reporting resource information

From packaging and logical displays:

The *Remove* option is available on both the packaging and logical hardware resources displays.

This option allows you to remove non-reporting resources (hardware that has not reported to the system) and user-created frame information. Non-reporting resources are identified with a question mark (?) next to the description field (see “Symbols on the Hardware Service Manager displays” on page 91). For more information on non-reporting resources, see “Display non-reporting resources” on page 70. Selecting this option removes this hardware resource and the associated

logical or packaging resources information. Use this option after performing a hardware upgrade when hardware resources were removed.

Reserve frame space

From packaging displays:

The *Reserve frame space* function key appears only on the Packaging Hardware Resources display. Select the *Reserve frame space* function key to access the Reserve Frame Space display. The Reserve Frame Space display allows you to enter details for a section of a frame (type 9309 or 5044) that you want to reserve for future use. You can also use the *Reserve frame space* function key to keep an inventory of hardware that does not appear on the packaging hardware resources displays.

After you type the requested information, press Enter. The data is verified and used to create a new packaging resource with the new description.

If no errors are found, the new data is created, and the original Packaging Hardware Resources display appears. If you enter a Frame ID that does not currently exist, the following message appears:

Containing hardware resource does not exist. Press F10 to create.

For information on creating frame information, see “Create frame information” on page 63.

From logical displays:

The *Reserve frame space* function key appears only on the Packaging Hardware Resources display.

Using High-Speed Link (HSL) specific options

You can access options for High Speed Link (HSL) resources from the *High Speed Link resources* option on the Logical Hardware Resources display.

Note: In V5R1, the term *High Speed Link (HSL)* replaces the term *System Interconnect (SI)*.


```

Work With High-Speed Link (HSL) Resources

Type options, press Enter.
1=Enable HSL OptiConnect      2=Change detail      3=Disable HSL OptiConnect
4=Remove                      5=Display detail     8=Associated packaging resources
9=Resources associated with loop 12=Display port information

Opt Description              Resource Name  Hardware Status  Loop Number  HSL OptiConnect Status
- Local HSL NIC             BCC01        Operational  Disabled
- HSL Loop                  SB01         Operational  256      Not Available
- HSL Loop                  SB02         Operational  257      Enabled
- Local HSL NIC             BCC02        Operational  Disabled
- HSL Loop                  SB03         Operational  258      Not Available
- HSL Loop                  SB04         Operational  259      Disabled
- Local HSL NIC             ? BCC03      Unknown     Disabled
- HSL Loop                  ? SB05       Unknown     260      Not Available
- HSL Loop                  ? SB06       Unknown     261      Not Available

F3=Exit   F5=Refresh   F6=Print   F8=Exclude non-reporting resources
F10=Non-reporting resources   F12=Cancel

```

Figure 32. Example Work With High Speed Link (HSL) Resources display

The Work With High Speed Link (HSL) Resources display appears when you select the *High Speed Link resources* option on the Logical Hardware Resources display.

The Work With High Speed Link (HSL) Resources display allows you to display information and perform functions that are specific to HSL.

The options below are unique for HSL:

- *Display detail* (when you select it from *HSL Loop*) - Select this option to display the details of the logical hardware resource. The information is device-dependent (meaning it may be different depending on the hardware resource selected.)
- *Display port information* - Select this option to display the physical cabling between resources within a given HSL loop.
- *Resources associated with loop* - Select this option to display the selected loop and a list of all resources logically attached to it. If more than one loop is selected with this option, the list will contain all of these loops and their logically attached resources.

Display detail

When you select the *Display detail* option for an HSL loop, an *HSL Loop*, an *HSL I/O Bridge*, or a *Remote HSL NIC*, one of the following three screens will appear. A detailed description of the fields on these screens follows the displays.

Display details on an HSL loop resource: Choosing the *Display details* option on an HSL loop resource will cause the following screen to appear. This screen is also displayed when F7 is selected and the previous resource is the beginning of the loop and when F8 is selected and the next resource is the beginning of the loop.

```

Display HSL Information
HSL loop number . . . . . : 257

HSL loop resource
Type-model . . . . . : 224E          Status . . . . . : Operational
Serial number . . . . . : 10-9309001  Part number . . . . . : 111222333444
Resource name . . . . . : SB02
HSL OptiConnect status: Not Available

Leading port to next resource . . . . . :
Link status . . . . . : Operational    Link type . . . . . : Copper
Type of connection .: Internal         Link type . . . . . : 500

Trailing port from previous resource . . . . . :
Link status . . . . . : Operational    Link type . . . . . : Copper
Type of connection .: Internal         Link type . . . . . : 500

F3=Exit  F6=Print  F7=Follow trailing port  F8=Follow leading port
F9=Include non-reporting resources          F12=Cancel

```

Figure 33. Example Display High-Speed Link (HSL) Information display

This display shows the detail for an HSL loop. It also allows you to display each resource in the HSL loop.

Display details on an HSL I/O bridge: Choosing the *Display details* option on an HSL I/O bridge resource will cause the following screen to appear. This screen is also displayed when F7 is selected and the previous resource is an HSL I/O bridge and when F8 is selected and the next resource is an HSL I/O bridge.

```

Display HSL Information
HSL loop number . . . . . : 257

HSL I/O bridge resource
Type-model . . . . . : 1999-999          Status . . . . . : Operational
Serial number . . . . . : 21-1111111    Part number . . . . . : 11111111111
Resource name . . . . . : BC06          Mode: . . . . . : Private

Leading port to next resource . . . . . :
Link status . . . . . : Operational    Link type . . . . . : Copper
Type of connection .: Internal         Link type . . . . . : 500

Trailing port from previous resource . . . . . :
Link status . . . . . : Operational    Link type . . . . . : Copper
Type of connection .: Internal         Link type . . . . . : 500

F3=Exit  F6=Print  F7=Follow trailing port  F8=Follow leading port
F9=Include non-reporting resources          F11=Display system information  F12=Cancel

```

Figure 34. Example Display High Speed Link (HSL) Information display

This display shows the details of an HSL I/O bridge resource.

Display details on a remote HSL NIC resource: Choosing the *Display detail* option on a remote HSL NIC resource will cause the following screen to appear. This screen is also displayed when F7 is selected and the previous resource is a remote HSL NIC and when F8 is selected and the next resource is a remote HSL NIC.

```

Display HSL Information
HSL loop number . . . . . : 257

HSL I/O bridge resource
Type-model . . . : 1999-999          Status . . . . : Operational
Serial number . . : 21-1111111      Part number . . : 11111111111
Resource name . . : BC06

Leading port to next resource . . . . . :
Link status . . . . : Operational    Link type . . . : Copper
Type of connection .: Internal       Link type . . . : 500

Trailing port from previous resource . . . . . :
Link status . . . . : Operational    Link type . . . : Copper
Type of connection .: Internal       Link type . . . : 500

F3=Exit  F6=Print  F7=Follow trailing port  F8=Follow leading port
F9=Include non-reporting resources  F11=Display system information  F12=Cancel

```

Figure 35. Example Display High Speed Link (HSL) Information display

The following fields appear on the Display HSL Information displays:

HSL loop number: The HSL loop number is the numerical value of the HSL loop to which the resource belongs.

HSL resource information: The next several fields display detailed information about the resource:

Type-model

This field contains the type and model numbers as reported by the hardware.

Status This field indicates the current status of the logical resources as reported by the hardware. The list below states the possible values for this field:

Unknown

The system cannot determine status. The resource may be non-reporting or unable to communicate status.

Operational

The resource is functioning normally. For HSL loops, this also means that all links are connected and all resources are operational.

Not operational

This system does not own or control this resource.

Failed

The resource has failed or been powered off for concurrent maintenance.

Serial number: This field represents the serial number of the logical hardware resource.

Part number: This field represents the part number of the logical hardware resource.

Resource name: The resource name is the symbolic name of the logical hardware resource. The resource name was either created by the system when the hardware

was first sensed, or was updated to a new value by a user on a change screen. The logical hardware resource name is autonomous from the packaging hardware resource name.

HSL OptiConnect Status: This field represents the status for networking. To be network capable a loop must contain at least two systems. It may also contain I/O towers. There are five possible values for this field:

Not Available

The loop contains hardware which is not network capable.

Enabled

This logical partition is participating in the HSL OptiConnect system area network on this loop.

Enabling

The user selected option 1 on this resource and the system is performing the function.

Disabled

This logical partition is not participating in the HSL OptiConnect system area network on this loop.

Disabling

The user selected option 3 on this resource and the system is performing the function.

Mode: The mode field indicates whether or not the ownership of this resource can be switched to another system. The possible values are *Private* or *Switchable*. *Private* indicates that the ownership of this resource cannot be changed. *Switchable* indicates that the ownership of this resource is changeable.

Leading port to next resource: The leading port connects to the next resource in the loop. This field shows the port number to which another resource in the loop is connected. However, the loop is redundant so indicating direction is arbitrary. This field will be blank if the link is an internal link.

Trailing port from previous resource: The trailing port connects to the previous resource in the loop. This field shows the port number to which another resource in the loop is connected. However, the loop is redundant so indicating direction is arbitrary. This field will be blank if the link is an internal link.

Link status: Current[®] status of the link as reported by the hardware. Possible values for status are as follows:

Unknown

The system cannot determine status of the resource. A resource may be non-reporting or unable to communicate its status.

Operational

The link is operating normally.

Failed The link is broken, disconnected, or does not exist. This also may mean that the resource to which the link is connected may have failed or is powered off.

Link type: This field shows the type of link to which this port connects. Possible values are optical or copper.

Type: The port may be connected to another resource via two possible connections: internal or external.

Internal

The user cannot see an internal connection. It is internal to the resource. If the connection is internal, the port number field will be blank.

External

The user can see an external connection. The port number field will contain a value.

Link Speed

This is the present speed at which the link is operating.

Display system information

The Display HSL System Information screen is available for an HSL I/O bridge resource.

```
Display HSL System Information

Local system type . . . . . : 9401
Local system serial number: 10-4ZD8M

HSL loop number . . . . . : 256

HSL I/O bridge resource
Type-model . . . . . : 25B9
Serial number . . . : 18-0166003
Resource name . . . : BC01
Status . . . . . : Operational
Part number . . . : 04N3903
Mode . . . . . : Private

SPCN system information
System type . . . . . : 9401
System serial number . : 10-4ZD8M
Owner

Alternate system information
System type . . . . . :
System serial number . :

F3=Exit   F6=Print   F11=Display port information   F12=Cancel
```

Figure 36. Example of a Display HSL System Information display

These are the potential fields and functions which may appear:

Local system type and serial number: Displays the system type and serial number for this system, the system on which Hardware Service Manager is being run.

HSL loop number: The numerical value of the High Speed Link (HSL) loop to which the resource belongs.

Serial number: This field represents the serial number of the logical hardware resource.

Part number: This field represents the part number of the logical hardware resource.

Resource name: The resource name is the symbolic name of the logical hardware resource. The resource name was either created by the system when the hardware was first sensed, or was updated to a new value by a user on a change screen. The logical hardware resource name is autonomous from the packaging hardware resource name.

Mode: The mode field indicates whether or not the ownership of this resource can be switched to another system. The possible values are *Private* or *Switchable*. *Private* indicates that the ownership of this resource cannot be changed. *Switchable* indicates that the ownership of this resource is changeable.

SPCN system information: Displays the system type and system serial number for the system providing the SPCN connection for this resource.

Alternate system information: Displays the system type and system serial number for a second system (other than the SPCN system) to which this resource may be connected.

A function key is provided to return to the display HSL Information screen.

Display port information

This display shows the connection information for an HSL loop. For each link, the display shows information about the connection from the previous resource in the loop as well as information about the connection to the next resource in the loop.

Port Connection Information						
HSL loop number : 258						
-----From-----		-----To-----		Type of	Status	
Resource Name	Port	Resource Name	Port	Connection		
SB01		BC01		Internal	Operational	
BC01	A0	BC04	01	External	Failed	
BC04	00	BC05	01	External	Unknown	
BC05	00	BC02	E1	External	Failed	
BC02	E0	BC03	01	External	Operational	
BC03	00	SB01	A1	External	Operational	
F3=Exit F5=Refresh F6=Print F8=Include non-reporting resources F12=Cancel						

Figure 37. Example Port Connection Information display

The fields for this display are as follows:

HSL loop number: The numerical value of the High Speed Link (HSL) loop to which the resource belongs.

From and to information: For each link, the *From* field shows the connection from the previous resource in the loop. The *To* field shows the connection to the next resource in the loop.

Resource name: See “Resource name” on page 85.

Port: This field shows the port number to which another resource in the loop is connected. This field is blank if the link is an internal link.

Type: See “Type” on page 86.

Status: The current status of the link as reported by the hardware. Possible values for the status field are:

Unknown

Cannot determine status. A resource may be non-reporting or unable to communicate status.

Operational

The link is operating normally.

Failed The link is broken, disconnected, or does not exist. This also may mean that the resource to which the link is connected may have failed.

Resources associated with loop

When the *Resources associated with loop* option is selected on loops 256 or 257 from the Work With High Speed Link (HSL) Resources display, the Logical Hardware Associated With HSL Loops display appears. Use this display to work with the High Speed Link (HSL) resources associated with an HSL loop.

```
Logical Hardware Associated With HSL Loops

Type options, press Enter.
1=Enable HSL OptiConnect      2=Change Detail      3=Disable HSL OptiConnect
4=Remove                     5=Display detail     6=I/O Debug
7=Display System Information  8=Associated packaging resource(s)
9=Resources associated with this resource 12=Display port information

Opt  Description                    Resource Name      Status           Loop Number
-    HSL Loop                        SB01              Operational     256
-    HSL I/O Bridge                 BC01              Operational
-    HSL I/O Bridge                 BC02              Operational
-    HSL I/O Bridge                 BC03              Operational
-    HSL Loop                        SB02              Operational     257
-    HSL I/O Bridge                 BC06              Operational
-    HSL I/O Bridge                 BC07              Operational
-    Remote HSL NIC                 BC08              Operational
-    HSL I/O Bridge                 BC09              Operational
-    HSL I/O Bridge                 BC10              Operational

F3=Exit   F5=Refresh   F6=Print   F8=Include non-reporting resources
F10=Non-reporting resources F11=Display tower information F12=Cancel
```

Figure 38. Example Logical Hardware Associated With HSL Loops display

See “Using High-Speed Link (HSL) specific options” on page 82 for a description of the options on this display.

When F11 *Display tower information* is selected from the Logical Hardware Associated With HSL Loops display, the following display appears.

```

Logical Hardware Associated With HSL Loops

Type options, press Enter.
1=Enable HSL OptiConnect      2=Change Detail      3=Disable HSL OptiConnect
4=Remove                      5=Display detail     6=I/O Debug
7=Display System Information  8=Associated packaging resource(s)
9=Resources associated with this resource  12=Display port information

Resource
Opt  Description          Name      Tower
-   HSL Loop              SPD01    9406-XXX
-   HSL I/O Bridge       BC01     9406-XXX
-   HSL I/O Bridge       BC02     5075
-   HSL I/O Bridge       BC03     5075
-   HSL Loop              SPD02    9406-XXX
-   HSL I/O Bridge       BC06     9406-XXX
-   HSL I/O Bridge       BC07     5075
-   Remote HSL NIC       BC08     9406
-   HSL I/O Bridge       BC09     5075
-   HSL I/O Bridge       BC10     5075

F3=Exit   F5=Refresh   F6=Print   F8=Include non-reporting resources
F10=Non-reporting resources F11=Display status/loop number F12=Cancel

```

Figure 39. Example Logical Hardware Associated With HSL Loops display

This screen works with the HSL I/O bridge and remote HSL Network Interface Controller (HSL NIC) resources associated with a High Speed Link (HSL) Loop. See “Using High-Speed Link (HSL) specific options” on page 82 for a description of the options on this display.

Verify resources

From packaging displays:

The *Verify* option is available only on the Logical Hardware Resources displays. To access status information from the Packaging displays, you must select the *Associated logical resource(s)* option (see “Display associated resources” on page 66).

From logical displays:

The *Verify* option is available on various Logical Hardware Resources displays. It is used on device-level resources (see “Display resources associated with IOP” on page 71).

Note: The *Verify* option is not available on the Logical Hardware Resources on System Bus display.

This option allows you to select hardware diagnostic tests that are defined for the selected logical hardware resource. The tests are limited to most communication ports, cartridge tape units, optical storage units, diskette units, and File Server adapters. For information on how to run a verification procedure, see “Verification procedures” on page 93.

Symbols on the Hardware Service Manager displays

The symbol field is next to the description field on several displays. The following list describes these indicators:

Symbol

Description

- + This symbol appears only under the *Packaging hardware resources* option. It indicates that the packaging hardware resource contains other resources that are not shown. Select the *Hardware contained within package* option to view details.
- ? Indicates a non-reporting resource that the system detected previously, but does not detect now. These resources also appear on the non-reporting packaging and logical hardware resources list. Select the *Non-reporting resource* function key to view details.
- * Indicates that this resource is the load source disk unit or the IOP to which the disk unit is attached.
- < Indicates that the resource is associated with the system console I/O processor.
- % Indicates that the resource is a potential unit that might be used for the alternate IPL. This unit might not have been used for the last IPL.
- = Indicates that the resource is the unit that is used for the alternate IPL. This unit was used for the last IPL.

For more information on determining the alternate IPL device, see the alternate IPL device section in the Problem Analysis information for your system.
- & Indicates that the resource is an Original Equipment Manufacturer (OEM)-supplied resource.
- / Indicates that this resource is switchable.

These and other symbols may also appear on screens which are used for a specific function, for example for concurrent maintenance. See the Help text for these screens for a description of these symbols for these specific functions.

Printing the System Configuration List

The System Configuration List printout consists of the following sections (80-character width):

1. System information
 - System type, model, serial number, and release
For details on how to interpret the Release field, see “Determining the dominant operating system” on page 124.
2. Packaging hardware resource information
 - Resource name, type-model, serial number, part number, frame ID, card position, and device position
3. Logical hardware resource information
 - Resource name, type-model, serial number, and logical address
4. Legend
 - Descriptions of the indicators

- Logical address format information

132-character width printouts consist of the following:

- description
- type-module
- serial number
- location data
 - frame ID
 - device position
 - card position
- logical resource name
- part number
- logical address

You can sort the printout by location or logical address data.

To print the system configuration list, perform the following procedure:

1. On the Start a Service Tool display, select the *Hardware service manager* option.
2. Select the *Print* (F6) function key on the Hardware Service Manager display (see Figure 5 on page 46) to request a printout.
3. The Print Format Options display appears. You can sort the information by location or logical address.

Note: The logical address sort and location sort are available only in 132-character width.

4. Look for the system configuration list printout.

Notes:

- a. If you select the *Print* function key from a display other than the Hardware Service Manager display, only the information that appears on the display will print.
- b. Use the last page of the printout (the legend) to assist in interpreting the information.
- c. The logical and packaging hardware resources have unique resource names.
- d. You can also view logical address information online from the product activity log (see Chapter 3, “Product Activity Log,” on page 97).

This ends the procedure.

To collect more details on the information that is listed on the system configuration list, select the *Print* function key from a display other than the Hardware Service Manager display.

Note: The entire system configuration list will not print. Only the information that appears on the display will print.

For details (that include descriptions) on the system bus, main storage, or processor, perform the following procedure:

1. Select the *Logical hardware resources* option on the Hardware Service Manager display.
2. On the Logical Hardware Resources display, select one of the following options to display details:

- System bus resources
 - Processor resources
 - Main storage resources
 - High-speed link resources
3. Use the *Print* function key to print the information.

This ends the procedure.

Verification procedures

You can check communications and various hardware units and devices for correct operation by performing verification procedures.

Note: There are two primary methods used to verify communications and hardware:

1. Hardware Service Manager - Verify
2. Verify Communications (VFYCMN)

Verification support for a hardware type is generally available under one or the other, but not both. Verification for most Version 4 or newer hardware is available under the Hardware Service Manager - Verify option, which can be run from either DST or SST (see “Hardware Service Manager — Verify”). If you need to run the VFYCMN command, you must IPL up to OS/400. (For more information on running VFYCMN, see “Verify communications” on page 304.)

Hardware Service Manager — Verify

To verify communications or devices on any iSeries 400 model using the Hardware Service Manager *Verify* option, perform the following procedure:

Note: Before running a verification test, ensure that the customer is not using the resource you want to test and that all communication jobs on the resource to be tested are ended.

1. From the Start a Service Tool display, select the *Hardware Service Manager* option.
2. From the Hardware Service Manager display, select the *Logical hardware resources* option.
3. From the Logical Hardware Resources display, select the *System bus resources* option.

This display lists all the I/O processors.

4. Select the *Resources associated with IOP* option for the attached IOP in the list.
5. Select the *Verify* option for the communications, tape, optical storage unit, diskette equipment, or File Server adapter that you want to test.
6. When the test completes, the system responds with either a Test is successful message or a Test failed message.

This ends the procedure.

Notes:

1. Hardware units might perform automatic self-tests when they are powered on.
2. You can test some workstations by using the *Test Request* function key while the operating system Sign On display is shown.
3. See the specific device information for possible off-line tests that you can run.

Verify optical storage unit

You can check optical storage units for correct operation by performing the verification procedure (see “Hardware Service Manager — Verify” on page 93).

Optical storage unit test descriptions

When you select the *Verify* option (see “Verification procedures” on page 93) on an optical resource that supports a verification function, the test performs the following:

- Writes to the test media if writeable (and supported).
- Reads the test media
- Verifies that the interface between the system and the optical storage unit is valid

Verify diskette

You can check diskette subsystems for correct operation by performing the verification procedure.

Diskette test descriptions

When you select the *Verify* option (see “Verification procedures” on page 93) on a diskette resource that supports a verification function, the test performs the following:

- Runs the diskette controller hardware test
- Reads a diskette to verify that the system data area is valid
- Runs simple operations to verify that the diskette unit is operating correctly

The test does not:

- Verify write operations for the diskette unit
- Calculate the number of read errors for a specific diskette

If the test fails, an entry might be created in the product activity log. Use the information in the product activity log to assist in problem analysis (see Chapter 3, “Product Activity Log,” on page 97).

Verify tape

You can check tape subsystems for correct operation by performing the verification procedure.

Tape test descriptions

When you select the *Verify* option on a tape resource that supports a verification function (for example, type 6380), the test performs the following:

- Runs a read, write, or erase function on the tape.
- Tests the interface between the system and the tape unit.
- Runs simple operations to verify that the tape unit is operating correctly.

If the test fails, the system will display a message that describes the failure. An entry might also be created in the product activity log. Use the message or the information in the product activity log to assist in problem analysis (see Chapter 3, “Product Activity Log,” on page 97).

For more information, see “Verification procedures” on page 93.

Verify communications

You can check communications for correct operation by performing the verification procedure.

Communications test descriptions

When you select the Hardware Service Manager *Verify* option (see “Hardware Service Manager — Verify” on page 93 for details) or run VFYCMN (see “Verify communications” on page 304) on communications, you can test the correct operation of the following hardware:

- Communications I/O adapter card
- Communications cable
- Local or remote modem
- External token ring

You can get additional problem analysis information by running more than one test.

Chapter 3. Product Activity Log

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Introduction

You can select the *Product activity log* option from the *Start a Service Tool* display. It allows you to display or print system, Licensed Internal Code, software components, subsystem, and I/O device data that has been logged. It also provides data summaries, allows data to be sorted, displays reference code descriptions, and allows you to work with removable media statistics.

Use the options and function keys to view the log online. Function keys, such as the *Alternate view* key, allow you to page through the various log fields. For more information on the product activity log options and function keys, see “Options and function keys” on page 100. If a printer is available, you can create a printout of the product activity log (see Figure 48 on page 107).

```
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

F3=Exit      F12=Cancel
```

Product Activity Log (PAL®)

The PAL is the general use system log containing entries for informational events, thresholding incidents, dumps, and errors that need to trigger service actions. The entries are full of basic and detailed information on the event in a somewhat raw form.

This option is selected from the *Start a Service Tool* menu. It allows you to display or print data that has been logged for various components of the system. It also provides data summaries, allows data to be sorted, and allows you to work with removable media statistics and display reference code descriptions. It was formerly called the Error Log Utility.

Note: Some PAL entries regarding secondary logical partitions are written to the PAL with respect to the primary partition.

Use the *Product Activity Log* option to:

- Analyze the log data of a specific subsystem. Some subsystem selections are:
 - All logs
 - Processor
 - Magnetic media
 - Local workstation
 - Communications (SDLC, BSC, X.25, token ring, remote workstation, IDLC, if supported by the system).
 - Power
 - Licensed program
 - Licensed Internal Code
- Analyze all log data associated with the same log ID. The user must know the log ID to use this function.
- Display summary information.
- Display information about a specific entry or a group of entries.
- Change Product Activity Log sizes.
- Display information about volume statistics for removable media.
- Review session or lifetime counters for a specific volume or removable media type.
- Delete or print volume statistics lifetime counters.
- Display reference code descriptions

You can send output to a:

- Printer (if available)
- Console display

In the limited paging environment, you cannot change PAL area sizes, work with tape or diskette statistics, or examine session or lifetime counters for a specific volume or removable media type.

The Service Action Log (SAL)

The Service Action Log (SAL) is a subset of the PAL. To access the SAL, select the following options, in order, from a DST or SST menu:

- Start a service tool

- Hardware service manager
- Work with service action log

The SAL is a utility that scans the PAL and displays entries that require service representative action. It pulls out the relevant information from those entries and formats it to the display to show service information, such as failing resource names, field replaceable unit (FRU) part numbers, and FRU locations. If FRU part numbers and locations cannot be determined, the SAL display shows symbolic FRU names, which then correspond to problem analysis procedures for the service representative. The SAL runs before the operating system is up.

A **shadow** log is maintained by LIC on the load source disk. The 128 K-byte shadow log contains a duplicate of the most recent or latest Product Activity Log entries that occurred before IPL began and those entries that were logged since the beginning of IPL. The *Product Activity Log* option uses the shadow log when the system is operating in limited paging environment.

If Product Activity Log initialization is not complete, only the shadow log is accessible to this option. Also, the *Product Activity Log* menu offers only a few specific Product Activity Log options. The Main menu informs the user that log initialization has not completed, that all Product Activity Log entries are not accessible, and to IPL the operating system to complete initialization. If initialization completes after the *Product Activity Log* option has been selected, the option must be selected again to make all Product Activity Log options available for use and to generate reports that show all the log entries.

Product Activity Log location

The Product Activity Log is maintained by the Licensed Internal Code EREP component. The log files can be stored on any disk unit, so the system must IPL past storage management recovery to view the data.

Recovering from Product Activity Log errors while in DST

DST uses the LIC code; however, there is limited operating system support in the DST. Because there is limited operating system support, there is limited Product Activity Log entry handling support. Most Product Activity Log entries in DST are catastrophic to the function running, however, DST should continue to function. LIC log entries are created only if the system is in the full paging environment. In the limited paging environment, you are limited to messages sent to the display or the SRC on the control panel. If a Product Activity Log entry occurs while dumping information to removable media, go to “Work with removable media lifetime statistics” on page 102.

Paging environment

The product activity log is maintained by the system Licensed Internal Code. The storage management recovery step of the IPL process must be complete to allow you to view all the data in the log. If the error log initialization (ELI) IPL step is not complete, only the shadow log is accessible. The *Product Activity Log* display under the shadow log contains a subset of the options that are allowed when the operating system is available. A message on the *Product Activity Log* display informs the user that the error log is not initialized and that all log records are not accessible. The log files can be stored on any disk unit.

The Licensed Internal Code maintains a 128KB shadow log on the load-source disk. The log contains a duplicate copy of the latest entries. When you perform an IPL to Dedicated Service Tools (DST), the *Product activity log* option uses this shadow log.

Note: The shadow log is not available in the stand-alone environment (Type-D IPL). In the limited paging environment, some options are not available. For more information on paging environments, see "System paging environments" on page 2.

Options and function keys

The *Product Activity Log* display has the following options:

- Analyze log
- Display or print data by log ID
- Change log sizes
- Work with removable media lifetime statistics
- Display or print removable media session statistics
- Reference code description

The *Product Activity Log* display allows you to display or print information for a selected log entry (or a combination of entries). Online help is available for each option on the *Product Activity Log* display.

The function keys that appear at the bottom of the screen vary for each display. Function keys allow you to gather more information about the entry. Examples of function keys include the following:

- Alternate view
- Sort by...
- Address information
- Display hexadecimal report

Analyze log

Select this option from the *Product Activity Log* display. This option allows you to:

- Display or print a list of entries for one or all subsystems in a one-line-per-entry format.
- Analyze entries that have specific reference codes, or sort by reference codes.
- Analyze entries for specific devices, for groups of devices at the same logical address, or for groups of devices of the same type.
- Display or print the detailed reports, including the hexadecimal data, for individual entries. You can display or print the formatted report. For large reports, the print option is recommended.
- Summarize entries by using the following parameters:
 - Time and date
 - Device type
 - Resource name
 - Reference code
 - Subsystem
- Sort entries by using the following parameters:
 - Time and date

- Time of day
- Logical address (see “Logical address format” on page 111)
- Class
- Resource name

Note: To gather information by using the resource name, select the *Display summary* option. Then select the F9 key (Sort by...) and sort by resource name. The *Log Summary by Resource Name* display appears and shows a summary of the resources and the number of entries (see Figure 43 on page 104).

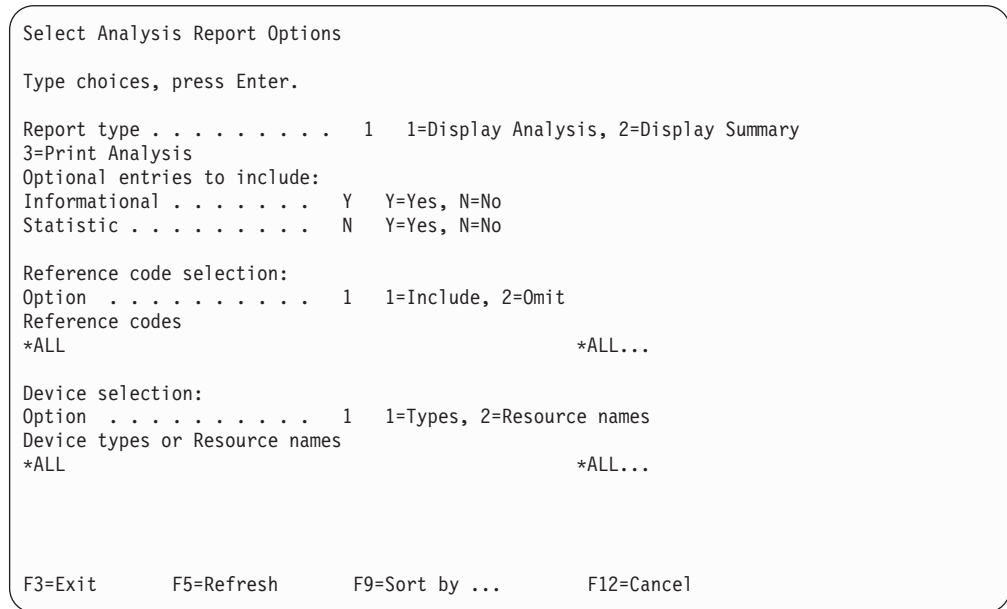


Figure 40. Example Select Analysis Report Options display

The *Analyze log* option on the *Product Activity Log* display allows you to display or print log entries in a summarized form. The summary report contains a one-line entry for each requested group or subgroup of log entries and displays a count of the log entries.

You can use an asterisk (*) to request log entries for the device and reference code selections on the Select Analysis Report Options displays. The asterisk symbol must be the rightmost character of the specified string. The string, including the asterisk symbol, cannot exceed the total number of characters that are allowed in that string. For example, a request of A00* displays all the log entries that begin with A00.

You can sort each analysis report by date, time, logical address, entry classification, or resource name. The selected sort option determines how the log entries are grouped in the summary report. For more information on the sort function, see “Sort by ... function” on page 103.

Display or print by log ID

Select this option from the *Product Activity Log* display. This option allows you to analyze all data that is associated with the same log ID. The system logs related events that have the same log ID.

Note: Events that are related use the same log ID. For example, if a workstation controller has an error that causes an automatic dump, both the permanent error and the IOP dump have the same log ID.

Change Product Activity Log sizes

Select this option from the *Product Activity Log* display. This option allows you to change log area sizes.

Note: To change the size of all the logs at one time, select the *Change all* function.

Work with removable media lifetime statistics

Select this option from the *Product Activity Log* display. This option allows you to perform the following:

- Work with the removable media lifetime statistics
- Display volume statistics information
- Review lifetime counters for a specific volume
- Delete volume statistics lifetime counters
- Sort lifetime statistics by error rates or volume IDs

You can send the output of this option to a printer (if available) or to the console.

Select the *Work with removable media lifetime statistics* option to display a lifetime entry report.

Figure 41 shows an example of a lifetime entry report. This report contains information about various volume IDs. The customer might want to exchange media that has a high number of read or write errors. To ensure accurate statistics, each media must have a unique volume ID.

```

Work with Lifetime Statistics

Removable media . . . . . : Self-configured tape device and 1/4 inch cartridge tape

Type options, press Enter.
4=Delete entry  6=Print entry

Volume      ---Temporary Errors---      -----M Bytes-----
Option  ID          Read      Write      Read      Written
>>KEN          23452450      23450      23457      97689
DENNIS           2           0           14           0
NANCY            0           3           214          137
LARRY            0           0            1            0
VIDYA            0           0            1            0
BOB              0           0            1            0
SCOTT            0           0            1            0
PTFFIX           0           0            1            1

F3=Exit          F5=Refresh          F10=Delete all
F11=Print all    F12=Cancel

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```

Figure 41. Example Lifetime Report

If the following symbols appear before the volume ID on the *Work with Lifetime Statistics* display, perform the suggested action:

Symbol	Explanation	Action
>>	Media replacement recommended	Copy the contents to the new media and discard the old media.
>	Media approaching replacement criteria	<ul style="list-style-type: none"> • Replace the media if the format is: <ul style="list-style-type: none"> – QIC-120 – 7208 2.3GB – 6250 bpi density • If the format is anything other than above, monitor the media.

Display or print removable media session statistics

Select this option from the *Product Activity Log* display. This option allows you to:

- Display or print session statistics for a diskette or tape unit
- Select a specific media type
- Select a time range
- Select a volume ID
- Review session counters for a specific volume or removable media

You can send the output of this option to a printer (if available) or to a workstation.

Reference code description

Select this option from the *Product Activity Log* display. This option allows you to view a description of the code that appears in the reference code field.

Sort by ... function

Each analysis report can be sorted by date, time, logical address, entry classification, or resource name. The selected sort option determines the order of the log entries and the type of summary report that is displayed or printed.

The sort option is used for problem analysis and preventive maintenance. The following are examples of sorted entries:

```

Log Summary by Class

From . . . : 01/11/93 11:13:39      To . . . : 02/22/93 11:13:39

Type options, press Enter.
5=Display  6=Print

Opt      Class / System Reference Code          Count
*ALL . . . . . 100
Machine Check . . . . . 1
B600 0219 . . . . . 1
Permanent . . . . . 19
B005A416 . . . . . 15
2621B000 . . . . . 2
6380FF04 . . . . . 2
Temporary . . . . . 20
B0051A06 . . . . . 20
Informational . . . . . 20

F3=Exit      F5=Refresh      F12=Cancel

```

Figure 42. Example Log Summary by Entry Classification and Reference Code

```

Log Summary by Resource Name

From . . . : 01/06/94 20:41:20      To . . . : 01/07/94 20:41:21

Type options, press Enter.
5=Display  6=Print

Opt      Resource Name                          Count
*ALL . . . . . 60
. . . . . 12
CTL01 . . . . . 31
DC01 . . . . . 1
DC03 . . . . . 10
WS01 . . . . . 6

F3=Exit      F5=Refresh      F12=Cancel

```

Figure 43. Example Log Summary by Resource Name

Address information function

Press the *Address Information* function key to display configuration information. Use the details to determine the location of the card.

For details on the logical address format as it appears on the printout, see “Logical address format” on page 111.

You can also display logical address information from the hardware service manager function (see Chapter 2, “Hardware Service Manager,” on page 45).

Note: The logical address field that appears on the *Display Address Information for Resource* display does not list the address in the BBCb format.

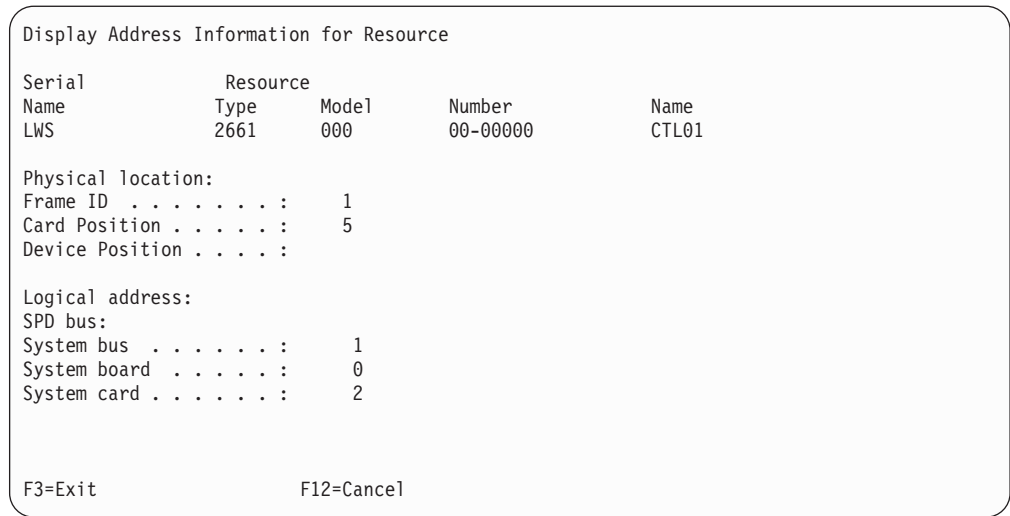


Figure 44. Example Address Information for Resource

View description function

Press the F11 function key to step through screens to view the following information:

- Class (entry classification)
- Library
- Logical address
- Physical location
- Component information
- Reference code description
- Resource name/type

Hexadecimal Product Activity Log data

Use the *Display Hexadecimal Report Function* or follow the steps below to display hexadecimal error log dump data.

Perform the following:

1. Find an entry in the Product Activity Log for the symptom (SRC) you are using to locate the problem.
 - a. Select System Service Tools (SST).
If you cannot get to SST, select DST (see “Accessing Dedicated Service Tools” on page 4).
 - Note:** Do not IPL the system to get to DST.
 - b. On the *Service Tools* display, select the *Start a service tool* option (see “Start a service tool” on page 28).
 - c. Select the *Product activity log* option on the *Start a Service Tool* display.
 - d. Select the *Analyze log* option on the *Product Activity Log* display.
 - e. On the *Select Subsystem Data* display, select the option to view *All Logs*.

Note: If the SRC you are using occurred more than 24 hours ago, change the “From:” and “To:” Dates and Times from the 24-hour default.

- f. Use the defaults on the *Select Analysis Report Options* display by pressing the Enter key.
 - g. Find the entry in the Product Activity Log that matches that SRC.
2. Select the *Display Detail Report for Resource* display. (See the example of this display below.)

```

Display Detail Report for Resource

Name          Type      Model      Serial      Resource
STORAGE       6512     001        10-4294009  SI05

Log ID . . . . . : 06020132  Sequence . . . . . :      2248
Date . . . . . : 05/20/95  Time . . . . . : 08:37:55
Reference code . . . . . : 3400  Secondary code . . . . . : 00000000
Table ID . . . . . : 65120001  IPL source/state . . . . . : B/7

Class . . . . . : Permanent
System Ref Code . . . . . : 65123400
I/O processor card detected device error

Press Enter to continue.

F3=Exit                      F6=Hexadecimal report
F9=Address Information        F10=Previous detail report  F12=Cancel

```

Figure 45. Example Hexadecimal Detail Report for Resource

3. Press **F6** to display the hexadecimal report.
 - The direct select address (DSA) is in the format BBBB-Cc-bb:
 - BBBB = hexadecimal offsets 4C and 4D
 - Cc = hexadecimal offset 51
 - bb = hexadecimal offset 4F

```

Display Hexadecimal Report for Resource

Name          Type      Model      Serial      Resource
STORAGE       6512     001        10-4294009  SI05

Offset        0 1 2 3 4 5 6 7 8 9 A B C D E F  EBCDIC
000000       C5D3F0F4 00000160 00E00180 77B7695E  EL04...-.....;
000010       E8A70000 000008C8 20E00602 01320000  Y.....H.....
000020       34000000 11000000 00000000 009C0000  .....
000030       F6F5F1F2 F0F0F140 F1F060F4 F2F9F4F0  6512001 10-42940
000040       F0F9F6F5 F1F20000 00000001 00060000  096512.....
000050       00020000 FFFFFFFF FFFFFFFF FFFF0000  .....
000060       00000000 00000000 00000000 F4404040  .....4
000070       40000000 00000000 00000000 00000000  .....
000080       00000000 00000000 00000000 00000000  .....
000090       00000000 00000000 00000000 00000000  .....
0000A0       00000000 00000000 00000000 00000000  .....
0000B0       00000000 00000000 40404040 40404040  .....
More...
Press Enter to continue.

F3=Exit          F12=Cancel

```

Figure 46. Example Hexadecimal Report for Resource

4. Page forward until you locate the offset location X'000180'.

The unit address is hexadecimal offset 18C through 18F.

Record this address information. Return to the procedure that sent you here, if one.

```

Display Hexadecimal Report for Resource

Name          Type      Model      Serial          Resource
STORAGE      6512      001        10-4294009     SI05

Offset        0 1 2 3 4 5 6 7 8 9 A B C D E F  EBCDIC
000180      D0007800 65120001 34000620 1100FFFF }.....
000190      FFFFFFFF 31090000 00001100 03C00000 .....{..
0001A0      00000000 00000000 00000000 00000000 .....
0001B0      00000000 00000000 00000000 00000000 .....
0001C0      00000000 00000000 00000000 00000000 .....
0001D0      00000000 00000000 00000000 00000000 .....
0001E0      00000018 00000002 E00401F0 10002000 .....0...
0001F0      00000000 40000000 00000000 000002CC .....
000200      CCC00000 00000000 00800000 00000000 .....
000210      08100000 00000000 F0200040 00800000 .....0..
000220      00000000 04000000 08000040 E000E221 .....S.
000230      800084F3 00000002 0000001B 110003C0 ...3.....{
More...
Press Enter to continue.

F3=Exit      F12=Cancel

```

Figure 47. Hexadecimal Report for Resource Offset Location Example

This ends the procedure.

For information on interpreting the hexadecimal report, see “Hexadecimal report” on page 113.

Interpreting Product Activity Log reports

The data in the product activity log wraps. The newest log entries overlay the older ones. There is not an option to delete or clear data, but you can reduce the log sizes so that they wrap more quickly. Figure 48 is an example of a printed product activity log report. You can display the same information online by selecting various options and function keys.

```

Product Activity Log          Page . . . : 2
Analysis Report             CUSTSYS1 05/05/91 08:00:00

System
Ref Code  Date      Time      Class Logical Address      Resource  Type/Mod  Serial          Physical Location
-----  -
2661B000  05/05/94  08:07:13  PERM  1/ 1/0/ 0-1/1/ 0/ 0/ 0/1 COM1      2661 001  00-010111  80000010  5
2661B000  05/05/94  08:08:13  PERM  1/ 1/0/ 0-1/1/ 0/ 0/ 0/1 COM1      2661 001  00-010111  80000040
B900FDC0  05/05/94  08:09:13  SOFT                                     MS  LIC      80000080

```

Figure 48. Example Product Activity Log Printed Analysis Report

Some considerations when interpreting Product Activity Log reports

If you update an operating system release or apply a new operating system version to the system, the product activity log data might be cleared. (If you need the data in the product activity log, print it before you install the new operating system.)

Entries in the log might have been previously resolved (for example, machine check entries).

For more information on resource names, see “Resource name.”

For more information on interpreting disk storage log entries, see the error information sections under “Recovery Procedures” in the *Repair and Parts* information.

If the system cannot display a character in any of the following fields, it displays an asterisk (*) instead of that character:

Resource
Type
Model
Serial number
Volume ID

You can use the *Log Analysis* report to analyze problems that occur over a period of time. Look for error patterns such as multiple I/O processor errors that occur at the same time, or errors caused by the environment that occur at the same time of the day or week. Figure 49 shows an example of entries that were logged in a 24-hour period. As you cycle through the different views of the *Log Analysis Report* screens, note that F11 shows variable text: Such as *View Description*, *View Logical Address*, *View Physical Location*, *View Component Information*, and *View Resource Identification*.

```

Log Analysis Report

From . . . : 08/26/94 10:00:00      To . . . : 08/27/94 10:00:00

Type option, press Enter.
5=Display report 6=Print report

System
Opt  Ref Code   Date      Time      Class  Name      Resource
-   -   -   -   -   -   -   -   -
-   2661B000    08/26/94 12:53:20 Perm  CTL01     2661
-   2661B000    08/26/94 13:03:19 Perm  CTL01     2661
-   2661B000    08/26/94 13:15:44 Perm  CTL01     2661
-   2661B000    08/26/94 13:43:37 Perm  CTL01     2661
-   2661B000    08/26/94 13:49:22 Perm  CTL01     2661
-   6380FF04    08/26/94 14:13:43 Perm  DC01      6380

F3=Exit                      F5=Refresh
F11=View description         F12=Cancel
  
```

Figure 49. Example Log Analysis Report

Resource name

The *Name* or *Resource name* field contains a description of the resource that is associated with the entry.

The system assigns a resource name, but that name might be changed to a new value by the customer. Depending on the data, the following priority scheme is used for the name field:

1. Device name

Class

The *Class* field describes the event that logged the entry. Some events are related to errors that were detected, and some events are activities that normally occur. The meaning of *Class* varies depending on the system, subsystem, or device against which the entry was logged. Perform a service action only when directed by a system operator message, the directed service procedures, or your next level of support.

The events that can appear in the *Class* field are:

Data protection lost

An error occurred in hardware that has data protection (mirroring). This function continues to operate, but service is required. A second failure in this area might result in the loss of the function and the data.

Description

Explains the reference code (appears only for OS/400).

Dump A storage dump was taken.

Hardware redundancy lost

An error occurred in redundant (back-up or duplicate) hardware. This function continues to operate, but service is required. A second failure in this hardware results in a loss of the function.

Informational

Indicates that an event of importance occurred that was not an error.

LIC An error occurred due to a Licensed Internal Code problem.

Machine check

Either an error occurred that caused the system not to operate, or an SRC was present on the control panel when the system was re-IPLed (from a function 03 or a programmed IPL). These errors are logged during the next IPL if the system was not powered off. They are logged with the data that was displayed in control panel functions 11 through 19 at the time you performed another IPL on the system.

Predictive analysis

Indicates that a system component detected a condition that might cause a problem, if it is not corrected.

Permanent

An error that could not be recovered.

Qualified

An error occurred that is described (qualified) more in the *Description* field. See the Problem Analysis information for your system or the device service information for a complete listing of reference codes.

Recoverable

An error occurred, and the condition was recovered either automatically or through user intervention (printer out of forms, for example).

Remote

Indicates buffered errors from remote devices or input/output processors.

Software

An error occurred due to a software problem.

Statistic

Indicates that this entry contains statistical information (for example, the number of bytes that were read or written).

Temporary

A previously-detected error condition was no longer present when the operation was retried (a successful additional attempt occurred).

Threshold

Indicates that the system reached a service action point. The occurrence of temporary errors was more than the limit specified for that type of error condition.

Vary on

Indicates that a vary-on operation occurred.

System reference code

The system reference code identifies a unique logging condition. The system reference code field consists of a four-character hardware or software table ID, followed by a four-character unit reference code.

Multiple SRC entries

System Licensed Internal Code entries might appear more than once for a single problem. This occurs when the original system reference code is permanent or temporary and additional data is logged at the same time. The additional data can be informational, temporary, an IOP dump, or any other classification. Errors with the same Log ID are generally associated with the same problem. An exception to this would be when the Log ID counter reaches the maximum value and starts over, possibly resulting in a new error being assigned a Log ID that is also used by an existing older entry. Errors that have the same Log ID, but dates that are months or years apart, are indicative of this situation.

Logical address format

Use the logical address (see Figure 48 on page 107) to identify the resource entry. To sort by logical address, select the *Analyze log* option on the Product Activity Log display. Then select the F9 key (Sort by...) and sort by logical address. For more information on the address, use the address information function (see "Address information function" on page 104).

The logical address format, A/B/C/D-E/F/G/H/J/K, has the following definitions:

- A** Type of I/O bus (transport)
- B** System bus number
- C** System board number (for busses that connect card enclosures)
- D** System card (bus unit) number
- Separates the bus address from the unit address
- E** Unit address type
- FGHJK** Unit address data

The values of F, G, H, J, and K vary, depending on the unit address type (E). Use the following information to determine the Unit address data (FGHJK) representation.

Table 6. Unit address (E) definitions

Unit Address Value	Unit Address Definition	Unit Address Data				
E		F	G	H	J	K
0	Reserved	-	-	-	-	-
1	Communications	I/O bus	Adapter	Port	Channel	-
2	Storage	I/O adapter	I/O bus	Controller	Device	-
3	Workstation	I/O bus	Adapter	Port	Device	Session
4	Auxiliary Processor	I/O bus	Auxiliary Processor	Adapter	Port	-
5	Library	I/O adapter	I/O bus	Library	Controller	Device
6	Cryptography	I/O bus	Adapter	Device	-	-

The *Logical address* field contains the bus address and the unit address. The bus address describes the hardware bus, board, and card information. The unit address describes the subsystem and identifying data (see Table 6).

Note: Use the physical address information to locate a device or card that is within the system unit.

Sequence number

The sequence number increases by two each time an entry is placed in the log.

Secondary code

The secondary code is a 4-byte hexadecimal value that provides additional detailed entry information. The secondary code can be the I/O adapter return code that is used for communications protocol or Licensed Internal Code problems. The secondary code is used for problem analysis.

Table ID

The table ID identifies a group of reference codes for the system or device. See the Problem Analysis information for your system or the device service information for a complete listing of reference codes.

IPL source/state

The IPL source indicates the IPL mode (A, B, or D) that was selected at the time the entry was logged.

The state shows the system status at the time the entry was logged. The values of the *State* field include:

- 0 (Not used)
- 1 During IPL
- 2 During power down
- 3 System in full paging
- 4 During diagnostic tests

- 5 Occurred prior to IPL
- 6 During DST
- 7 System in limited paging
- 8 System in pre-limited (static) paging
- 9 System has not entered pre-limited paging

Hexadecimal report

Press **F6** (Display hexadecimal report) to view the hexadecimal dump information (see Figure 50 on page 109). This function is optional for this report, but it might provide additional information. Figure 46 on page 106 shows an example of the first page of information logged in the hexadecimal dump.

Note: If a character in the *EBCDIC* field cannot be displayed, a period (.) displays instead of that character.

To interpret the information in the hexadecimal dump, read the *Description* column in Table 7 on page 113 or Table 8 on page 114 until you find the item you want (for example, reference code). Read across to the leftmost column to find the hexadecimal offset.

Table 9 on page 115 is generally reserved for engineering use. However, to get additional information for IOP product activity log entries at DST when using a D-IPL (which begins at offset hex 000180), see “More information from hexadecimal reports” on page 115.

Table 7. Hexadecimal dump byte assignments for keyed data

Hexadecimal offset	Length in bytes	Description
0000	4	Internal release level
0004	4	Length of component specific data
0008	2	Non-keyed data start @
000A	2	Component specific start @
000C	8	Time stamp
0014	4	Sequence number
0018	1	Subsystem type
0019	1	Analysis done
001A	4	System log ID
001E	2	Reserved
0020	2	Reference code
0022	2	Reserved
0024	1	Class
0025	1	Reserved
0026	8	SRID
002E	2	Reserved
0030	4	Device type
0034	4	Model number
0038	10	Serial number
0042	4	IOP type
0046	4	I/O adapter type
004A	10	I/O processor direct select address
	2	Transport type
	2	Bus
	2	Board
	2	Card

Table 7. Hexadecimal dump byte assignments for keyed data (continued)

Hexadecimal offset	Length in bytes	Description
	2	Reserved
0054	12	Unit address
0060	4	Reserved
0064	6	Power address
006A	2	Reserved
006C	5	Card position
0071	5	Device position
0076	10	Reserved
0080	10	Network interface name
008A	10	Line name
0094	10	Controller description
009E	10	Device description
00A8	15	Reserved
00B7	1	Overlay flag
00B8	40	Volume ID/JOB information

Table 8. Hexadecimal dump byte assignments for non-keyed data

Hexadecimal offset	Length in bytes	Description
00E0	8	Reference code translate table (RCTT) name
00E8	2	Reserved
00EA	4	Product ID
00EE	4	Component ID
00F2	8	Version/Release/Modification
00FA	50	Resource paths
012C	10	Power controlling system (PCS) name
0136	10	Power controlling system (PCS) serial number
0140	10	Resource at log time
014A	4	Frame ID
014E	2	EIA location
0150	12	Part number
015C	1	Protocol
015D	1	Format of data
015E	1	Delayed reporting
015F	1	Signal event
0160	4	Secondary code
0164	2	Flags
0166	2	State at log time
0168	4	Power controlling system (PCS) type
016C	4	Power controlling system (PCS) model
0170	8	Reserved
0178	2	Component record format
017A	2	Statistics offset
017C	4	Component data length

Table 9. Hexadecimal dump byte assignments for variable component specific data

Hexadecimal Offset	Length in Bytes	Description
0180		This field is different for each log entry and is intended for engineering use only. However, see "More information from hexadecimal reports" for examples of how the hexadecimal information can be interpreted for a D-IPL.

More information from hexadecimal reports

You can get additional information for IOP 90xx reference code product activity log entries at DST by using a D-IPL.

Note: The term I/O processor may indicate an IOP or an IOA. Below are examples of how to interpret hexadecimal information for a D-IPL.

Note: Formatting is available (F4=Additional Information) for IPL from disk (A- or B-IPL). Formatting is not available in DST from a D-IPL.

Use the information below and the example displays on the following pages to interpret the hexadecimal dump information that begins at offset hex 000180. If the characters at offset 00019F are:

- 01** Device formatting
- 02** Array Member formatting
- 03** Configuration formatting
- 04** Array addendum formatting
- Other** Not described in this document

Device Formatting Log Example (unformatted information):

Display Hexadecimal Report for Resource							
Name	Type	Model	Serial Number				Resource Name
STORAGE	6607	070	00-68753				
Offset	0 1 2 3	4 5 6 7	8 9 A B	C D E F	EBCDIC		
000180	F8407800	65320001	90920210	010400FF	8 .....k.....		
000190	66070000	00001306	87531400	123D0001	.....g.....	
0001A0	00000000	00000000	CA000003	00000000	.....	
0001B0	65320001	07050011	00000000	00000000	.....	
0001C0	00000004	00000003	00000000	00000000	.....	
0001D0	F6F6F0F7	13068753	010400FF	00000000	6607..g.....		
0001E0	00000000	65320001	07050011	47000001	.....	
0001F0	07069205	C0004000	00000021	00000030	..k.{.		
000200	00000000	00000000	F6F6F0F7	00071575	.....6607....	
000210	010300FF	00000000	00000000	65320001	.....	
000220	07050011	47000001	07069205	C0004000	.....k.{. .	
000230	00000000	00000000	00000000	00000000	.....	
000240	F6F6F0F7	00259DE8	010200FF	00000000	6607...Y.....		
000250	00000000	65320001	07050011	47000001	.....	
000260	07069205	C0404040	00000000	00000000	..k.{.		
000270	00000000	00000000	E2E5C3C4	D6C3E2C3	.....SVCDOCSC	
000280	D7D7F2F9	C1F800D5	00000000	00000000	PP29A8.N.....		
000290	00000000	00000000	00000000	00000000	.....	
0002A0	00000000	00000000	00000000	00000000	.....	
0002B0	00000000	00000000	00000000	00000000	.....	
0002C0	00000000	00000000	00000000	00000000	.....	
0002D0	00000000	00000000	C3D7D7F8	F9F2F9D5	.....CPP8929N	
0002E0	F6F5F3F2	F9F0F9F2	F0F0F0F0	F0F0F0F0	6532909200000000		
0002F0	F0F0F0F0	F0F1F6C3	F0F1F3F3	0000D5D5	0000016C0133..NN		
000300	00000000	00000000	00000000	00000000	.....	

Figure 51. Example Hexadecimal Report, Device Formatting Log (unformatted information)

Device Formatting Log Template:

Display Hexadecimal Report for Resource																
Name	Type	Model	Serial Number										Resource Name			
STORAGE	6607	070	00-68753													
Offset	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
000180	-----															
000190	-----															
0001A0	-----															
0001B0	-----															
0001C0	# errors detected		# errors logged		-----											
0001D0	Device1 Type	Device1 Serial	Device1 UnitAddr	Device1 Type	New Dev1	-----										
0001E0	New Dev1 Serial	IOP type & model	IOP Serial	IOP Type/Mod	Cache	-----										
0001F0	Cache Serial	-----														
000200	-----		-----		Device2 Type	Device2 Serial	-----									
000210	Device2 UnitAddr	New Dev2 Type	New Dev2 Serial	New Dev2 & model	IOP type	-----										
000220	IOP Serial	Cache Type/Mod	Cache Serial	-----												
000230	-----															
000240	Device3 Type	Device3 Serial	Device3 UnitAddr	Device3 Type	New Dev3	-----										
000250	New Dev3 Serial	IOP type & model	IOP Serial	IOP Type/Mod	Cache	-----										
000260	Cache Serial	-----														

Figure 52. Example Hexadecimal Report, Device Formatting Log Template

Device Formatting Log Example (As formatted information for A or B IPL):

Display Additional Information for Resource														
Name	Type	Model	Serial Number										Resource Name	
STORAGE	6607	070	00-68753											
Device Errors detected :												4		
Device Errors logged :												3		
Device :												1	2	3
Unit Address :												010400FF	010300FF	010200FF
Type :												6607	6607	6607
Serial Number :												13068753	00071575	00259DE8
New Device Information:														
Type :												****	****	****
Serial Number :												00000000	00000000	00000000
I/O Processor Information:														
Type :												6532	6532	6532
Serial Number :												07050011	07050011	07050011
Cache Adaptor Card Information:														
Type :												4700	4700	4700
Serial Number :												07069205	07069205	07069205

Figure 53. Example Hexadecimal Report, Device Formatting (As formatted information for A or B IPL)

Array Member Formatting Log Example (unformatted information):

Display Hexadecimal Report for Resource							
Name	Type	Model	Serial Number				Resource Name
STORAGE	6532	001	00-50011				
Offset	0 1 2 3	4 5 6 7	8 9 A B	C D E F	EBCDIC		
000180	F4407800	65320001	90210210	0FFFFFFF	4		
000190	00000000	00000000	00001400	12400002	.....	
0001A0	00000000	00000000	CA000003	00000000	.....	
0001B0	65320001	07050011	00000000	00000000	.....	
0001C0	F6F6F0F7	0025ED09	000200FF	000200FF	6607.....		
0001D0	F6F6F0F7	00158135	000100FF	000100FF	6607..a.....		
0001E0	F6F6F0F7	00259DE8	010200FF	00000000	6607...Y.....		
0001F0	F6F6F0F7	00008326	010100FF	00000000	6607..c.....		
000200	F6F6F0F7	00071575	010300FF	00000000	6607.....		
000210	F6F6F0F7	13068753	010400FF	00000000	6607..g.....		
000220	00000000	00000000	00000000	00000000	.....	
000230	00000000	00000000	00000000	00000000	.....	
000240	00000000	00000000	00000000	00000000	.....	
000250	00000000	00000000	00000000	00000000	.....	
000260	000000FF	00000004	00000000	00000000	.....	
000270	00000000	E2E5C3C4	D6C3E2C3	D7D7F2F9	...SVCD0CSCPP29		
000280	C1F800D5	00000000	00000000	00000000	A8.N.....		
000290	00000000	00000000	00000000	00000000	.....	
0002A0	00000000	00000000	00000000	00000000	.....	
0002B0	00000000	00000000	00000000	00000000	.....	
0002C0	00000000	00000000	00000000	00000000	.....	
0002D0	00000000	C3D7D7C5	C1F0F2D5	F6F5F3F2	...CPPEA02N6532		
0002E0	F9F0F2F1	F0F0F0F0	F0F0F0F0	F0F0F0F0	9021000000000000		
0002F0	F0F0C4F4	F0F1F3F3	0000D5D5	00000000	00D40133..NN....		
000300	00000000	00000000	00000000	00000000	.....	

Figure 54. Example Hexadecimal Report, Array Member Formatting Log (unformatted information)

Array Member Formatting Log Template:

Display Hexadecimal Report for Resource									
Name	Type	Model	Serial Number						Resource Name
STORAGE	6532	001	00-50011						
Offset	0	1	2	3	4	5	6	7	8 9 A B C D E F
000180	-----								
000190	-----								
0001A0	-----								
0001B0	-----								
0001C0	Member0	Member0	Expected	Current					
	Type	Serial	Address	Address					
0001D0	Member1	Member1	Expected	Current					
	Type	Serial	Address	Address					
0001E0	Member2	Member2	Expected	Current					
	Type	Serial	Address	Address					
0001F0	Member3	Member3	Expected	Current					
	Type	Serial	Address	Address					
000200	Member4	Member4	Expected	Current					
	Type	Serial	Address	Address					
000210	Member5	Member5	Expected	Current					
	Type	Serial	Address	Address					
000220	Member6	Member6	Expected	Current					
	Type	Serial	Address	Address					
000230	Member7	Member7	Expected	Current					
	Type	Serial	Address	Address					
000240	Member8	Member8	Expected	Current					
	Type	Serial	Address	Address					
000250	Member9	Member9	Expected	Current					
	Type	Serial	Address	Address					

Figure 55. Example Hexadecimal Report, Array Member Formatting Log Template

Array Member Formatting Log Example (As formatted information for A or B IPL):

Display Additional Information for Resource									
Name	Type	Model	Serial Number						Resource Name
STORAGE	6532	001	00-50011						
Array Member	. . . . .	:	0	1	2	3	4		
Type	. . . . .	:	6607	6607	6607	6607	6607		
Serial Number	. . . . .	:	0025ED09	00158135	00259DE8	00008326	00071575		
Unit Address:									
Current	. . . . .	:	000200FF	000100FF	00000000	00000000	00000000		
Expected	. . . . .	:	000200FF	000100FF	010200FF	010100FF	010300FF		
Array Member	. . . . .	:	5	6	7	8	9		
Type	. . . . .	:	6607	****	****	****	****		
Serial Number	. . . . .	:	13068753	00000000	00000000	00000000	00000000		
Unit Address:									
Current	. . . . .	:	00000000	00000000	00000000	00000000	00000000		
Expected	. . . . .	:	010400FF	00000000	00000000	00000000	00000000		

Figure 56. Example Hexadecimal Report, Array Member Formatting (As formatted information for A or B IPL)

Configuration Formatting Log Example (unformatted information):

Display Hexadecimal Report for Resource						
Name	Type	Model	Serial Number	Resource Name		
STORAGE	6532	001	00-50011			
Offset	0 1 2 3	4 5 6 7	8 9 A B	C D E F	EBCDIC	
000180	50407800	65320001	90120210	0FFFFFFF	&	
000190	00000000	00000000	00001400	123C0003	.....
0001A0	00000000	00000000	CA000003	00000000	.....
0001B0	65320001	07050011	00000000	00000000	.....
0001C0	00000000	00000000	47000001	07069205	.....k.	
0001D0	F8F6C7F8	F1F4F9C3	D7D7F8F9	F8F100D5	86G8149CPP8981.N	
0001E0	00000000	00000000	00000000	00000000	.....
0001F0	00000000	00000000	00000000	00000000	.....
000200	00000000	00000000	00000000	00000000	.....
000210	00000000	00000000	00000000	00000000	.....
000220	00000000	00000000	00000000	00000000	.....
000230	C3D7D7C5	C1F0F2D5	F6F5F3F2	F9F0F1F2	CPPEA02N65329012	
000240	F0F0F0F0	F0F0F0F0	F0F0F0F0	F0F0C4F4	0000000000000D4	
000250	F0F1F3F4	0000E8D5	00000000	00000000	0134..YN.....	

Figure 57. Example Hexadecimal Report, Configuration Formatting log (unformatted information)

Configuration Formatting Log Template:

Display Hexadecimal Report for Resource						
Name	Type	Model	Serial Number	Resource Name		
STORAGE	6532	001	00-50011			
Offset	0 1 2 3	4 5 6 7	8 9 A B	C D E F		
000180	-----	-----	-----	-----		
000190	-----	-----	-----	-----03		
0001A0	-----	-----	-----	-----		
0001B0	Current IOP type & model	Current IOP serial	Current IOP type	Current Cache serial		
0001C0	Expected IOP type & model	Expected IOP serial	Expected Cache type	Expected Cache serial		

Figure 58. Example Hexadecimal Report, Configuration Formatting Log Template

Configuration Formatting Log Example (As formatted information for A or B IPL):

Display Additional Information for Resource				
Name	Type	Model	Serial Number	Resource Name
STORAGE	6532	001	00-50011	
Configuration			Current	Expected
I/O Processor Information:				
Type			6532	0000
Serial Number			07050011	00000000
Cache Adaptor Card Information:				
Type			0000	4700
Serial Number			00000000	07069205

Figure 59. Example Hexadecimal Report, Configuration Formatting Log (As formatted information for A or B IPL)

Array Addendum Formatting Log Example (unformatted information):

Display Hexadecimal Report for Resource						
Name	Type	Model	Serial Number	Resource Name		
STORAGE	2757	001	10-0322005	DC03		
Offset	0 1 2 3	4 5 6 7	8 9 A B	C D E F	EBCDIC	
000000	C5D3F0F5	000000A0	00E00180	82745D0F	EL05.....b.)	
000010	1FD78000	00002CE0	20100084	049F0000	.P.....d....	
000020	902F0000	11000000	00000000	00C70000	.....G..	
000030	F2F7F5F7	F0F0F140	F1F060F0	F3F2F2F0	2757001 10-03220	
000040	F0F50000	0000F2F7	F5F70002	00020000	05....2757.....	
000050	00200000	0002FFFF	FFFFFFFF	0004FFFF	.....
000060	00000000	00000000	00000000	40404040	.....
000070	40404040	40400000	00000000	00000000	.....
000080	00000000	00000000	00000000	00000000	.....
000090	00000000	00000000	00000000	00000000	.....
0000A0	00000000	00000000	00000000	00000000	.....
0000B0	00000000	00000000	40404040	40404040	.....
0000C0	40404040	40404040	40404040	40404040		
0000D0	40404040	40404040	40404040	40404040		
0000E0	F2F7F5F7	F0F0F0F1	0000E2D3	C9C3C9D6	2757001..SLICIO	
0000F0	4040E5F5	D9F2D4F0	40400000	00000000	V5R2M0	
000100	00B90000	00000000	000000C7	00000000	.....G....	
000110	00000000	00000000	00000000	00000000	.....
000120	00000000	00000000	00000000	00000000	.....
000130	00000000	00000000	00000000	00000000	.....
000140	C4C3F0F3	40404040	40404040	40404040	DC03	
000150	D5C5C5C4	E5C1D3C9	C4D740D5	00070001	NEEDVALIDP N....	
000160	00000000	A0200007	00000000	00000000	.....
000170	00000000	00000000	0003001E	000000A0	.....
000180	A0407800	27570001	902F0200	4FFFFFFF	. ....*.....|...
000190	00000000	00000000	00001400	623E0004	.....
0001A0	F6F6F0F7	0026121D	410500FF	410500FF	6607.....	
0001B0	F6F6F0F7	00248B85	410400FF	410400FF	6607...e.....	
0001C0	F6F6F0F7	0014BE1F	410300FF	410300FF	6607.....	
0001D0	F6F6F0F7	0014C0F0	410200FF	410200FF	6607..{0.....	
0001E0	F6F6F0F7	001403C8	410100FF	410100FF	6607...H.....	
0001F0	F6F6F0F7	0014BEA4	410800FF	410800FF	6607...u.....	
000200	00000000	00000000	00000000	00000000	.....
000210	00000000	00000000	00000000	00000000	.....

Figure 60. Example Hexadecimal Report, Array Addendum Formatting Log (unformatted information)

Array Addendum Log Template:

Display Hexadecimal Report for Resource				
Name	Type	Model	Serial Number	Resource Name
STORAGE	6532	001	00-50011	
Offset	0 1 2 3	4 5 6 7	8 9 A B	C D E F
000180	-----	-----	-----	-----
000190	-----	-----	-----	-----04
0001A0	Member10	Member10	Expected	Current
	Type	Serial	Address	Address
0001B0	Member11	Member11	Expected	Current
	Type	Serial	Address	Address
0001C0	Member12	Member12	Expected	Current
	Type	Serial	Address	Address
0001D0	Member13	Member13	Expected	Current
	Type	Serial	Address	Address
0001E0	Member14	Member14	Expected	Current
	Type	Serial	Address	Address
0001F0	Member15	Member15	Expected	Current
	Type	Serial	Address	Address
000200	Member16	Member16	Expected	Current
	Type	Serial	Address	Address
000210	Member17	Member17	Expected	Current
	Type	Serial	Address	Address

Figure 61. Example Hexadecimal Report, Array Addendum Formatting Log Template

Array Addendum Log Example (as formatted information for A or B IPL):

Display Additional Information for Resource						
Name	Type	Model	Serial Number	Resource Name		
STORAGE	2757	001	10-0322005	DC03		
Array Member	. . . . .	:	10	11	12	13
Type	. . . . .	:	6607	6607	6607	6607
Serial Number	. . . . .	:	0026121D	00248B85	0014BE1F	0014C0F0
Unit Address:						
Current	. . . . .	:	410500FF	410400FF	410300FF	410200FF
Expected	. . . . .	:	410500FF	410400FF	410300FF	410200FF
Array Member	. . . . .	:	15	16	17	
Type	. . . . .	:	6607	****	****	
Serial Number	. . . . .	:	0014BEA4	00000000	00000000	
Unit Address:						
Current	. . . . .	:	410800FF	00000000	00000000	
Expected	. . . . .	:	410800FF	00000000	00000000	

Figure 62. Example Hexadecimal Report, Array Addendum Formatting (as formatted information for A or B IPL)

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Setting the system date and time

Attention: Customer applications may be sensitive to system date and time settings. Incorrect date and time settings may cause data loss. Ensure that the customer knows the date and time that you have set.

Use one of the following methods to set the date and time:

- If the system is powered off, perform a Manual mode (attended) IPL. You can set the date and time on the IPL Options display. See the *iSeries Information Center* for information.
- If the system is powered on, perform the following procedure:
 1. To set the correct date, enter the system command:

```
CHGSYSVAL QDATE VALUE('mmdyy')
```

where:

mm = month

dd = day

yy = year

Press the Enter key.

Note: This sample uses the month, day, and year format. To determine the format for your system, enter DSPSYSVAL QDATE.

2. To set the correct time, enter the system command:

```
CHGSYSVAL  
QTIME VALUE('hhmmss')
```

where:

hh = 24-hour time

mm = minutes

ss = seconds

Press the Enter key.

This ends the procedure.

Determining the dominant operating system

The operating system is a collection of system programs that control the overall operation of the iSeries 400. OS/400 is an example of an operating system that can be used on iSeries 400 systems. iSeries 400 systems can run one or more operating systems. When there is more than one operating system, OS/400 is the dominant operating system.

The Hardware Service Manager function (under Start a Service Tool) indicates which operating system is dominant on the system. The *Release* field on the *Hardware Service Manager* display or printout shows the following values:

0 Unknown

This indicates that an alternate IPL was performed.

1 OS/400 is dominant

This indicates that either OS/400 is the only operating system installed, or that more than one operating system is installed (and OS/400 is dominant).

For more information on the Hardware Service Manager function, see Chapter 2, "Hardware Service Manager," on page 45.

System password

If a system password is required, the Verification of System Password Failed display appears just prior to the IPL or Install the System display.

If the Verification of System Password Failed display appears after a repair action, contact your next level of support for assistance.

Verification of System Password Failed

The system was not able to verify the system password.

One of the following conditions exists:

- o A service repair action was performed.
- o A system model upgrade was performed.
- o System password entered is not valid.
- o System serial number stored is not correct.
- o System is already in system password bypass mode.
- o System password version changed.

Type choice, press Enter.

1. Change the system password
2. Bypass the system password

Selection

—

F3=Exit F12=Cancel

When the factory knows the end user, it ships new systems with the correct system password already installed.

The system requires a new system password each time someone enters the system serial number and at each model and processor card feature change. The new system password, which is required at the time of the first IPL, is provided by IBM if IBM knows the end user. Customers who do not have the system password when they need it must contact their marketing representative to place a system password order.

If the correct system password is not entered, you can select a system password bypass period to allow time to obtain the correct system password from the marketing representative. If the bypass period expires, the system will not complete the next IPL unless the correct system password is entered. While in bypass mode, by way of control console messages, the system indicates the amount of time that remains before the bypass period expiration date.

Note: If the system password was changed at the most recent IPL, performing a fast power off (control panel function 08) might cause that new password information to be lost.

System unique identifier

The system unique identifier (SUID) is a 12 character ID that is assigned by the iSeries 400 manufacturer. New systems are shipped with the specific value assigned. The SUID is used by specific software support to identify that a system object model (SOM[®]) was generated.

A new SUID can be assigned for the following reasons:

- If the serial number that was entered is not the serial number that was previously assigned and stored on the system.
- If 256 Licensed Internal Code (scratch) installs were performed on the system.

The SUID is needed only to support SOM software functions. An incorrect SUID does not affect other system functions. To order a new SUID, contact the marketing representative (hardware feature code 1311).

Determining a primary or alternative console

Introduction

A console is a workstation that allows you to view and control system operations. The *primary* console is the first workstation that the system identifies. It is attached to the first input/output adapter (IOA) or input-output processor (IOP) that supports workstations. The *alternative* console is the workstation that functions as the console when the primary console is not operational. The system can assign up to two alternative consoles. The first alternative console can only be a twinaxial workstation that is attached to the same IOP as the primary console. The next alternative console is a workstation that is attached to the next IOA or IOP that is capable of supporting workstations.

The IOA or IOP that supports a console must be on the system bus (bus 1).

If a workstation is not correctly attached to the first IOA or IOP that is capable of attaching workstations, the system will not assign a primary console. If it does not assign a primary console, the system displays a reference code on the control panel. If the system is set for Manual mode, it stops during the IPL.

For more information on how to determine the primary and alternative consoles, see "Identifying the consoles when the system is operational."

Primary console requirements

For a workstation to be the primary console, it must be operational and attached to the system bus. It must also have the correct port and address assigned. If the workstation is a personal computer, it must also have an active workstation emulation program.

The workstation requirements are:

- Twinaxial workstation
 - Port 0, Address 0, Bus 1
- ASCII workstation
 - Port 0, Bus 1
- Personal computer attached to ASCII IOP
 - Port 0, Bus 1
 - Personal computer software to emulate a 316x or 3151 terminal
- Personal computer attached to Twinaxial IOP
 - Port 0, Address 0, Bus 1
 - 5250 emulator software active on personal computer

For more information on how to determine the primary and alternative consoles, see "Identifying the consoles when the system is operational."

Identifying the consoles when the system is operational

When the system is operational, you can determine the primary and alternative consoles by performing one of the following:

- Look at the display.

- If the dominant operating system is OS/400, look for a sign-on display that shows DSP01 in the upper right-hand corner. DSP01 is the name that the system assigns to the primary console.

Note: This resource name might have been changed by the customer.

- Use system commands to assist in identifying the consoles. See the system operation information for more details on commands.
- Use the Hardware Service Manager function to assist in identifying the consoles:
 1. Select the *System bus resources* option on the *Hardware Service Manager* display. The *System Bus Resources* display allows you to view the logical hardware resources for the system bus.
Look for a (<) symbol next to an IOP. The (<) symbol indicates that the console attaches to this IOP.
 2. Select the *Resources associated with IOP* and the *Display detail* options to collect more information about the consoles.

For more details, see Chapter 2, “Hardware Service Manager,” on page 45.

Locating the system’s load source from the system console

Use this procedure to locate the iSeries 400 system load-source and alternate load-source input/output processors (IOPs), load-source I/O adapter, and load-source disk unit.

1. From either the System Service Tool (SST) display or the Dedicated Service Tools (DST) display, select the *Start a service tool* option.
2. At the Start a Service Tool display, select the *Hardware service manager* option.
3. At the Hardware Service Manager display, select the *Logical hardware resources* option.
4. At the Logical Hardware Resources display, select the *System bus resources* option.
5. At the Logical Hardware Resources on System Bus display, search for an I/O processor, combined function I/O processor, or multifunction I/O processor that contains an asterisk (*) in the description. This special character (*) indicates that this I/O processor is the load-source I/O processor.
The special characters percent (%) and equals (=) might also appear in the description of logical hardware resources. These characters indicate that those resources are alternate IPL resources. To better understand the special characters that indicate load-source resources and alternate load-source resources, use the Help function key (F1).
6. Move the cursor to the load-source IOP. To determine the location of the load-source IOP:
 - a. Select the *Associated packaging resources* option.
 - b. At the Packaging Resources Associated with a Logical Resource display, select the *Display detail* option. Listed on the Packaging Hardware Resource Detail display is the frame ID and card position of the FRU that contains the load-source IOP.
 - c. Select the Cancel function to return to the Packaging Resources Associated with a Logical Resource display.
 - d. Select the Cancel function to return to the Logical Hardware Resources on System Bus display.
7. Select the *Resources associated with IP* option for the load-source IOP.

8. Page down until you find the disk unit with the special character * in its description. This is the load-source disk unit.
9. Move the cursor to the load-source disk unit. To determine the location of the load-source disk unit:
 - a. Select the *Associated packaging resources* option.
 - b. At the Packaging Resources Associated with a Logical Resource display, select the *Display detail* option. Listed on the Packaging Hardware Resource Detail display is the frame ID and card position of the FRU that contains the load-source disk unit.
 - c. Select the Cancel function to return to the Packaging Resources Associated with a Logical Resource display.
 - d. Select the Cancel function to return to the Logical Hardware Resources on System Bus display.
10. Search for the I/O adapter that is above and closest to the load-source disk unit on the display. This is the load-source IOA.
11. Move the cursor to the load-source IOA. To determine the location of the load-source IOA:
 - a. Select the *Associated packaging resources* option.
 - b. At the Packaging Resources Associated with a Logical Resource display, select the *Display detail* option. Listed on the Packaging Hardware Resource Detail display is the frame ID and card position of the FRU that contains the load-source IOA.
 - c. Select the Cancel function to return to the Packaging Resources Associated with a Logical Resource display.
 - d. Select the Cancel function to return to the Logical Hardware Resources on System Bus display.

History file

The history file provides a high-level audit trail of the actions that are performed by the system. The history file information can assist the system operator, the data processing manager, and the service representative.

The commands that are used to display the history file vary depending on your operating system. For information on service commands, see “Commonly used OS/400 service commands” on page 292.

Data is sent to the history file when:

- Fixes are loaded to the system
- Fixes are temporarily or permanently applied
- Fixes are temporarily or permanently removed

Notes:

1. The term *fix* refers to a program temporary fix (PTF) to the Licensed Internal Code, operating system, or other licensed programs.
2. You should submit a copy of the history file with every authorized program analysis report (APAR).
3. 99xx messages can contain SRC information.

Continuously Powered Main Storage (CPM)

Continuously powered main storage applies only to models 170, 250, 6xx, 7xx, SB1, S10, S20, and S30. When utility power is lost or a thermal fault occurs on a model with System Power Control Network (SPCN), the system applies power from the internal batteries (BBU) to the main storage cards. This process is known as continuously powered main storage (CPM).

CPM increases system availability. It provides full operating power for a short time to allow a system shut-down procedure to run. This situation is indicated by a D6xx xxxx SRC on the control panel display. When the system is powered down, CPM then maintains power for a varied amount of time (for example, one day) only to the main storage cards.

CPM allows the customer data to be stored and minimizes recovery time. When normal power returns, the system brings the battery-stored data into disk storage, loads the Licensed Internal Code, and performs an IPL.

Note: For the system to automatically perform an IPL after a power loss, you must select Normal or Auto mode and set the system value QPWRRSTIPL to the *allow* option.

CPM is available automatically at each IPL and is enabled only when utility power is lost or a thermal fault occurs. It might be necessary to disable CPM to perform a specific repair on the system.

Low-level debug and data collecting procedures

Introduction

Use these procedures to collect data for problems with Licensed Internal Code or hardware that you have been unable to solve with other methods.

The low-level debug functions (Functions 54-64) use subfunctions. This means that these functions have a function range inside them (00-FF) where you can display or enter information.

Getting started

Before you start, ensure that Manual mode is selected.

To enable the low-level debug functions, perform the following steps:

1. At the control panel, select function 25.
2. Press Enter on the control panel.
3. Press the Increment (↑) button again. The number 26 appears in the Function/Data display.
4. Press Enter on the control panel. The low-level debug functions are now enabled.

Displaying data for functions 54 through 58, 63, and 64 (Models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, and Sxx)

Use this procedure to collect data. Each function has a different amount of data to collect. Collect the data for the range that is listed for each function in the following table.

Table 10. Data collection ranges for odels 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, and Sxx. Functions 54 through 58, 63, and 64

Function	Description	Range
54	I/O configuration table	5400, 5401, 5402...continue until you get 0000 0000 two times or FF.
55	Service Processor (SP™) card log buffer	550A to 5518
56	SP code area	5600 to 56FF
57	IPL message save area	5700 continue until you get 0000 0000 four times or FF
58	IPL parameters area	5800 to 5808
63	Status SRCs trace	6300 to 6318
63	Final status SRC only	6318 to 6320
64	Diagnostic status SRC trace	6400 to 6420
64	Final diagnostic SRC only	6418
64	All words of final diagnostic SRC	6418 to 6420

Use the following procedure and record the data as shown.

1. Press the Increment (↑) button until the function you want appears in the Function display (example: 54).
2. Press Enter on the control panel; ** appears next to the function number to indicate that you are in the subfunction mode. This is the *entry* point and *exit* point for subfunction mode).
If the data is *xx _ _ _ FF* (where *xx* = the function number), this function is not available.
3. Press the Increment (↑) button until 00 is next to the function number.
4. Press Enter on the control panel. Data appears in the display. Record the data.
5. Press the Increment (↑) button to continue to the next subfunction (example: 5401).
6. Press Enter on the control panel. Record the data.
7. Repeat steps 5 and 6, increasing the subfunction number one at a time and recording the data until all the suitable data is collected.
8. Press the Increment (↑) or Decrement (↓) buttons to move from the last subfunction back to ** (example: 543F to 54**).
9. Press Enter on the control panel. Doing this takes you out of subfunction mode, and ** no longer appears.

Repeat steps 1 through 9 for additional data that you were instructed to collect.

Call your next level of support and give them the information you collected to write a LIC APAR.

Displaying data for functions 57, 63, and 64 (Models 270, 8xx, SB2, and SB3)

Use this procedure to collect data. Each function has a different amount of data to collect. Collect the data for the range that is listed for each function in the following table.

Table 11. Data Collection Ranges for Models 270, 8xx, SB2, and SB3. Functions 57, 63, and 64

Function	Description	Range
57	Addresses of service processor data structures	5700 continue until you get 0000 0000 four times or FF
63	Status SRC trace	6300 to 6318
64	Diagnostic SRC trace	6400 to 6420

Use the following procedure and record the data as shown.

1. Press the Increment (↑) button until the function you want appears in the Function display (example: 63).
2. Press Enter on the control panel; ** appears next to the function number to indicate that you are in the subfunction mode. This is the *entry* point and *exit* point for subfunction mode).
If the data is *xx _ _ _ FF* (where *xx* = the function number), this function is not available.
3. Press the Increment (↑) button until 00 is next to the function number.
4. Press Enter on the control panel. Data appears in the display. Record the data.
5. Press the Increment (↑) button to continue to the next subfunction (example: 5401).
6. Press Enter on the control panel. Record the data.
7. Repeat steps 5 and 6, increasing the subfunction number one at a time and recording the data until all the suitable data is collected.
8. Press the Increment (↑) or Decrement (↓) buttons to move from the last subfunction back to ** (example: 633F to 63**).
9. Press Enter on the control panel. Doing this takes you out of subfunction mode, and ** no longer appears.

Repeat steps 1 through 9 for additional data that you were instructed to collect.

Call your next level of support and give them the information you collected to write a LIC APAR.

Changing the address in functions 59 through 61 (Models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, and Sxx)

Introduction

For this procedure, use the address you were given when you were sent to this procedure. The address consists of 4 bytes.

For **Motorola** 68020 processor-based IOPs**, you cannot control the first byte; 00 displays.

The *xx*, *yy*, and *zz* represent parts of the address.

For example, the address of 00002C80 has:

- 00 in the *xx* position
- 2C in the *yy* position
- 80 in the *zz* position

For **PowerPC-based IOPs**, you set all four bytes of the address (wwxx yyzz). Set ww with the first use of function 59. Set xx with the second use of function 59. Set the yy with Function 60 and zz with Function 61 as described in “Changing the address.”

Changing the address

For PowerPC-based IOPs: Setting the ww Position:

1. Press the Increment (↑) or Decrement (↓) switch until 59 appears in the Function display.
2. Press Enter on the control panel; ** appears next to the function number.
3. Press the Increment (↑) or Decrement (↓) switch until the value of ww appears next to the function number.
4. Press Enter on the control panel.
5. Press the Increment (↑) or Decrement (↓) switch until ** appears next to the function number (59**).
6. Press Enter on the control panel.

To continue, follow the steps in “For Motorola** 68020 Processor-based IOPs” below.

For Motorola** 68020 Processor-based IOPs: Setting the xx Position:

1. Press the Increment (↑) or Decrement (↓) switch until 59 appears in the Function display.
2. Press Enter on the control panel; ** appears next to the function number.
3. Press the Increment (↑) or Decrement (↓) switch until the value of xx appears next to the function number.
4. Press Enter on the control panel.
5. Press the Increment (↑) or Decrement (↓) switch until ** appears next to the function number (59**).
6. Press Enter on the control panel.

Setting the yy Position:

7. Press the Increment (↑) or Decrement (↓) switch until 60 appears in the Function display.
8. Press Enter on the control panel; ** appears next to the function number.
9. Press the Increment (↑) or Decrement (↓) switch until the value of yy appears next to the function number.
10. Press Enter on the control panel.
11. Press the Increment (↑) or Decrement (↓) switch until ** appears next to the function number (60**).
12. Press Enter on the control panel.

Setting the zz Position:

13. Press the Increment (↑) or Decrement (↓) switch until 61 appears in the Function display.
14. Press Enter on the control panel; ** appears next to the function number.
15. Press the Increment (↑) or Decrement (↓) switch until the value of zz appears next to the function number.
16. Press Enter on the control panel. Record the data from the display as the base address.

17. Press the Increment (↑) or Decrement (↓) switch until ** appears next to the function number (61**).
18. Press Enter on the control panel.

You just entered your address into the system. Now use the “Displaying data from function 62” on page 134 procedure to obtain the information from function 62.

Changing the address in functions 58 through 61 (Models 270, 8xx, SB2, and SB3)

Introduction

For this procedure, use the address you were given when you were sent to this procedure. The address consists of 4 bytes.

The ww, xx, yy, and zz represent parts of the address.

Set all 4 bytes of the address (wwxx yyzz) as described in “Changing the address.”

- Set the ww with function 58.
- Set the xx with function 59.
- Set the yy with Function 60.
- Set the zz with Function 61.

Changing the address

Setting the ww Position:

1. Press the Increment (↑) or Decrement (↓) switch until 58 appears in the Function display.
2. Press Enter on the control panel; ** appears next to the function number.
3. Press the Increment (↑) or Decrement (↓) switch until the value of ww appears next to the function number.
4. Press Enter on the control panel.
5. Press the Increment (↑) or Decrement (↓) switch until ** appears next to the function number (58**).
6. Press Enter on the control panel.

Setting the xx Position

1. Press the Increment (↑) or Decrement (↓) buttons until 59 appears in the Function display.
2. Press Enter on the control panel; ** appears next to the function number.
3. Press the Increment (↑) or Decrement (↓) buttons until the value of xx appears next to the function number.
4. Press Enter on the control panel.
5. Press the Increment (↑) or Decrement (↓) buttons until ** appears next to the function number (59**).
6. Press Enter on the control panel.

Setting the yy Position

1. Press the Increment (↑) or Decrement (↓) buttons until 60 appears in the Function display.
2. Press Enter on the control panel; ** appears next to the function number.

3. Press the Increment (↑) or Decrement (↓) buttons until the value of yy appears next to the function number.
4. Press Enter on the control panel.
5. Press the Increment (↑) or Decrement (↓) buttons until ** appears next to the function number (60**).
6. Press Enter on the control panel.

Setting the zz Position

1. Press the Increment (↑) or Decrement (↓) buttons until 61 appears in the Function display.
2. Press Enter on the control panel; ** appears next to the function number.
3. Press the Increment (↑) or Decrement (↓) buttons until the value of zz appears next to the function number.
4. Press Enter on the control panel. Record the data from the display as the base address.
5. Press the Increment (↑) or Decrement (↓) buttons until ** appears next to the function number (61**).
6. Press Enter on the control panel.

You just entered your address into the system. Now use the “Displaying data from function 62” procedure to obtain the information from function 62.

Displaying data from function 62

To obtain information from function 62, do the following steps:

1. Press the Increment (↑) button until 62 appears in the Function display. Press Enter on the control panel.
2. Press the Increment (↑) button until 6200 appears. Press Enter on the control panel and record the data.
3. Press the Increment (↑) button until 01 appears after the function number (6201). Press Enter on the control panel and record the data.
4. Continue until you have the needed data.
5. When you are done, press the Increment (↑) or Decrement (↓) buttons until 62** appears. Press Enter on the control panel.
6. Starting with “Changing the address” on page 132, repeat this procedure until you have recorded all the needed data as defined by the procedure that sent you here.

Call your next level of support and give them the information you collected to write a LIC APAR.

Logical partitions

Logical partitions are the distribution of resources within a single iSeries 400 to make it operate as if it were two or more independent systems.

Attention: The userid/password used to sign on to SST or DST to perform logical partition operations requires ‘System partitions - operations’ or ‘System partitions - administration’ service tools user privileges. Check with the customer on the proper userid/password to use when performing logical partition procedures.

Note: If the system has logical partitions, the terms: **console, alternative console, IPL, SST, DST, load source, alternate load source, power off, power on, panel function, product activity log, service action log, Licensed Internal Code log, and operating system** refer to the logical partition that you are servicing (unless otherwise stated in a procedure, Failing Item, or Symbolic FRU).

Primary: If you are performing service in the primary partition, then the terms **control panel, panel, panel functions, power off, power on, and system** refer to the system unit and its control panel.

Secondary: If you are performing service in a secondary partition, then the terms **control panel, panel, panel functions, power off, power on, and system** refer to the partition status functions available under the *Work with system partitions* option on the SST/DST display of the secondary partition's console or the primary partition's console.

Failed partition: Failures can be reported from the partition that experienced the problem with a resource or from the primary partition or from a partition that shares the bus. Attempt to service from the failed partition unless otherwise directed.

System Attention Light: For secondary partitions, the system attention light is represented as the partition's *State* on the Work with Partition Status display.

Powering off and on: Powering off and powering on a system with multiple partitions are different than a system with a single partition. Read and understand the power-off and power-on procedures referenced when a procedure directs you to power on or power off a system or partition.

Attention: Doing a dump or re-IPL of the primary partition will cause all secondary partitions to power down immediately. Be certain that all secondary partitions are able to be powered off at that time. Do not do a dump or re-IPL of the primary partition until the customer will allow all logical partitions to be powered off. To prevent abnormal IPLs in the secondary partitions, power down all secondary partitions before doing a dump or re-IPL of the primary partition. See "Performing an IPL to DST for secondary partitions" on page 6.

Note: When servicing any logical partition, you must use the service documentation that supports the version and release of the logical partition. See "Determining the release level of a logical partition" on page 136.

Examples: Missing or non-reporting system bus resources

On most systems with logical partitions, it is common to have one or more missing or non-reporting system bus resources under Hardware Service Manager. The following examples show some of the reasons why the system might show missing resources and corresponding actions to take.

- Residual resource names in primary or secondary partitions after a reconfiguration of resources. When resources are removed from a partition, there are two options:
 - **1=Remove** leaves the resource names (usually when switching resources across partitions temporarily. This option is used when the customer intends to switch the resources back to the original partition sometime in the future

and wants to use the same resource names when the future switch occurs). If this option is selected, the resource names will show as non-reporting in the partition that they were removed from following the next IPL of that partition.

- **2=Remove and clear hardware resource(s)** removes the resource names (when permanently moving or removing the resource).

Corrective action: Work with the customer to understand why the option to leave resource names was selected. These resources should be left as is if the customer intends to switch the resource back to the partition from which they were removed. If they are removed and the resource is switched back to that partition, a new resource name is created and the resource name is incremented. This will cause problems with the device descriptor that uses this resource; for example, TAP01 being used by multiple partitions.

- The resource has actually failed or has been removed from the system.

Corrective action: Find out why each missing or non-reporting resource exists. Follow normal problem-determination procedures including analyzing the service action log. You can then clear non-reporting resources by following the steps in the *Troubleshoot logical partitions* topic of the *iSeries Information Center*(*Systems management --> Logical Partitions*).

Determining the release level of a logical partition

Use this procedure to determine the release level of the primary and any secondary partition.

1. From the SST or DST display of the partition's console or the primary partition's console, select *Work with system partitions*.
2. At the Work with System Partitions display, the number of partitions and the partition manager release are shown. This is the release level of the primary partition.
3. At the Work with System Partitions display, select the *Display partition information* option.
4. At the Display Partition Information display, select the *Display partition operating environment* option. The partition identifier, name, and version/release level are shown.

Locating a secondary partition's console

Use this procedure to locate a logical partition's console and alternative console in a system that has logical partitions, using the primary partition's console.

Note: The logical *partition identifier (ID)* or *partition name* is required to perform this procedure.

1. Go to the console of the primary partition.
2. From the SST or DST display, select the *Work with system partitions* option.
3. At the Work with System Partitions display:
 - a. Record the partition manager release.
 - b. Record the number of partitions.
 - c. Select *Display partition information*.
4. At the Display Partition Information display, select *Display Allocated I/O Resources*.
 - a. Locate the secondary partition and look for its console. The console and alternative console are tagged on the screen under the logical partition's

IOP information. The console is tagged with a (<) character and the alternative console is tagged with a (>) character. Note that the logical partition may not have an alternative console. Note the **logical address** of the console and alternative console. Use the **logical address** to determine where the physical console is located.

5. If the logical partition does not have an alternate console but one is needed:
 - a. Determine if the customer has a workstation controller that can be switched to this logical partition.
Does the customer have a workstation controller that can be switched?
Yes No
↓ There is no alternate console for the logical partition.
 - b. Have the customer switch the input-output processor (IOP) with an available workstation to the logical partition that requires an alternate console. Have the customer mark the IOP as the alternate console and note the IOP's physical location.

Locating a secondary partition's load source

Use this procedure to locate a logical partition's load source from the logical partition's console.

1. Are you using the primary partition's console?
No Yes
↓ From the primary partition's console, go to "Locating a secondary partition's load source from the primary partition's console" on page 138..
2. From the secondary partition's console, go to "Locating a secondary partition's load source from the secondary partition's console."

Locating a secondary partition's load source from the secondary partition's console

Use this procedure to locate a logical partition's load source from the logical partition's console.

1. Go to the console of the logical partition.
2. From the SST or DST display, select the *Start a service tool* option.
3. Select *Hardware Service Manager*.
4. Look for the load source. The load source is tagged with an asterisk (*) on the screen under the IOP information. Note that the partition may not have an alternate load source.
Does the logical partition have an alternate load source?
No Yes
↓ Note the **logical address** of the alternate load source. Use the **logical address** to determine where the physical load source is located.
5. Is an alternate load source required?
Yes No
↓ **This ends the procedure.**
6. Determine if the customer has an available alternate load source on an IOP in another logical partition that can be switched to this logical partition.

Does the customer have an available alternate load source that can be switched?

Yes **No**

↓ There is no alternate load source for the logical partition.

7. Have the customer switch the IOP with an available alternate load source to the logical partition that requires an alternate load source. Have the customer mark the IOP as the alternate IPL resource and note the alternate load source-**physical** location.

Locating a secondary partition's load source from the primary partition's console

Use this procedure to locate a logical partition's load source and alternate load source in a system that has logical partitions by using the console of the primary partition.

Note: The logical *partition identifier* or *partition name* is required to perform this procedure.

The *partition number* is the last two digits in the logical serial number of the logical partition.

1. Go to the console of the primary partition.
2. From the SST or DST display, select the *Work with system partitions* option.
3. At the Work with System Partitions display:
 - a. Record the partition management release.
 - b. Record the number of partitions.
 - c. Select *Display partition information*.
4. At the Display Partition Information display, select *Display allocated I/O resources*.
 - a. Locate the secondary partition and look for its load source. The load source and alternate IPL resource are tagged on the screen under the logical partition's IOP information. Note that the logical partition may not have an alternate IPL resource. Note the **logical address** of the load source and alternate IPL resource. Use the **logical address** to determine where the **physical** load source is located.
 - b. If the logical partition does not have an alternate IPL resource and one is needed, perform the following:
 - 1) Determine if the customer has an alternate IPL resource that can be switched to this logical partition.

Does the customer have an available alternate IPL resource that can be switched?

Yes **No**

↓ There is no alternate IPL resource for the logical partition.
 - 2) Have the customer switch the IOP with an available load source to the logical partition that requires an alternate IPL resource. Have the customer mark the IOP as the alternate IPL resource and note the alternate IPL resource-**physical** location.

Querying logical partition time and date

Use this procedure to determine the local partition time and date values for the primary partition.

1. From the iSeries 400 Main Menu, select *Define or change the system*.
2. From the Define or Change the System display, select *Work with system values*.
3. From the Work With System Values display, enter the *Display* option for the QDATE and QTIME system values.

Converting secondary partition time and date to primary partition time and date

Use the “Querying logical partition time and date” procedure to determine the time and date values for the primary partition and any other logical partition that you are working with.

1. Record the difference in time between the primary partition and each secondary partition with which you are working. You can use the following table to do this.

Table 12. Time and date conversion table

Secondary partition time and date		Primary partition time and date (record immediately after recording secondary partition time and date)	Conversion value = primary time and date minus the secondary time and date (Primary - Secondary)
Partition name and number	Partition time and date		

The *Service Action Log (SAL) Entry Timestamps* for any logical partition that you are working with are converted to primary partition time by adding the conversion value in the last column of the table to the SAL entry time.

Finding the SRC history list for a secondary partition

Use this procedure to find the SRC history list that is created during an IPL of a secondary partition.

1. From the SST or DST display on the primary partition’s console, select *Work with system partitions*.
2. At the Work with System Partitions display, select *Display partition information*.
3. At the Display Partition Information display, select *Display secondary partition reference code history*. Page down to the partition ID for which you want the reference code history. Use the function key labeled *Include reference code detail* to expand the display of SRC information from only word 1 to all words of the SRC.

Closing related problems in other logical partitions

Look in the SALs of other logical partitions where problems may have been logged by the same failing item just replaced. Search the primary partition. If the failure was I/O related, then search any logical partition that shares the bus with the I/O failure. For any problems that were caused by the failing item that was just replaced, close the problem. Use the following procedure:

Note: To locate the console for a secondary partition, go to “Locating a secondary partition’s console” on page 136.

1. Convert the time and date of the SAL entry for the failing item that you replaced to the primary partition’s time and date by using the conversion procedure “Converting secondary partition time and date to primary partition time and date” on page 139.
2. Complete Table 12 on page 139 by calculating the conversion value for each of the logical partitions that own resources on the same bus.
3. Convert the time and date of SAL entries in those logical partitions to the primary partition’s time and date by adding the conversion value for the SAL’s logical partition.
4. If any SAL entries in those logical partitions were logged at approximately the same time and they appear to be related to the problem just repaired, close the entry.

Accessing the panel functions of a logical partition

Use this procedure to find panel functions for secondary partitions.

If the required panel function is not available from the console of the secondary partition, then go to the primary partition’s console to access that panel function for the secondary partition.

You must be on the primary partition’s console to power on a secondary partition.

Note: To locate a secondary partition’s console or alternate console, go to “Locating a secondary partition’s console” on page 136.

1. Go to the console of the secondary partition, or the console of the primary partition.
2. From the SST or DST display, select the *Work with system partitions* option.
3. At the Work with System Partitions display:
 - a. Select *Work with Partition Status*.

Additional panel functions and information are available by pressing the function keys for:

- *Monitor Partition Status*
- *Work with Partition Configuration*
- *More Options*

For panel functions 1 through 9 and 20:

- Press the function key for *Monitor Partition Status*.
- Press the function key for *Include Reference Code Detail*.
- For panel function 20, use the system control panel or option 20 on the Work with Partition Status display.

Determining which logical partition owns a FRU or a system I/O resource

This procedure helps you locate the logical partition that owns a FRU or system I/O resource. It is used to direct you to the correct logical partition in which to conduct a repair or exchange action.

Note: If you are locating a FRU, you are required to have the logical address or both the serial and the part number.

1. Go to the console of the primary partition.
2. From the SST or DST display, select the *Work with system partitions* option.
3. At the Work with System Partitions display:
 - a. Record the partition manager release.
 - b. Record the number of partitions.
 - c. Select *Display partition information*.
4. At the Display Partition Information display, select *Display allocated I/O resources*.
5. Select ***ALL** for which logical partitions to display, select ***ALL** for the level of detail to display.
6. If the display does not show serial and part information, press the function key for *Display Serial/Part Numbers*.
7. If you are locating a FRU, page forward until you locate the serial number and part number.
 If you are locating a resource, page forward until you locate the resource name.
 Record the logical partition in which the FRU or resource is located. Press the function key for *Display logical address* to record the logical address of the FRU or resource.

Selecting IPL source and mode for a secondary partition

Use this procedure to set the IPL source and IPL mode for a secondary partition.

1. Go to the console of the primary partition.

Note: If the secondary partition is running, you can select the IPL source and IPL mode from the console of the secondary partition. See "Locating a secondary partition's console" on page 136.
2. From the SST or DST display, select the *Work with system partitions* option.
3. At the Work with System Partitions display:
 - a. Record the partition manager release.
 - b. Record the number of partitions.
 - c. Select *Work with partition status*.
 - d. At the Work with Partition Status display, the IPL source and IPL mode are options for the secondary partition.

Options on the Work with Partition Status display

Use this procedure to start the Work with Partitions Status display

1. Start SST or DST.
2. Select the *Work with system partitions options*. option.
3. From the Work with System Partitions display, select the *Work with partition status* option.

```

Work with Partition Status
System: S1021B9M

Type options, press Enter.
1=Power on      3=IPL restart  7=Delayed power off  8=Immediate power off
9=Mode normal  10=Mode manual 11=Mode auto         12=Mode secure
A=Source A     B=Source B     C=Source C           D=Source D

  Partition
Opt Identifier Name  IPL  IPL  State  Sys IPL  Reference
-   0     PRIMARY B    Manual On    IPL
-   1     MUM511 B    Manual On    IPL
-   2     MAN522 B    Manual On    IPL
-   3     MAN531 B    Manual On    IPL
-   4     MUCK  B    Manual On    IPL
-   5     SUSEQ  C    Manual Off   IPL
-   6     SUSEQP2 D    Manual Failed Hold   B206 6905
-   7     MAN531 B    Manual On    IPL

F3=Exit  F5=Refresh  F10=Monitor partition status
F11=Work with partition configuration  F12=Cancel  F23=More options

```

Figure 63. Example of Work with Partitions Status display

```

Work with Partition Status
System: S1021B9M

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          33=Reorder SPCN addressing

  Partition
Opt Identifier Name  IPL  IPL  State  Sys IPL  Reference
-   0     PRIMARY B    Manual On    IPL      11
-   1     MUM511 B    Manual On    IPL
-   2     MAN522 B    Manual On    IPL
-   3     MAN531 B    Manual On    IPL
-   4     MUCK  B    Manual On    IPL
-   5     SUSEQ  C    Manual Off   IPL
-   6     SUSEQP2 D    Manual Failed Hold   B206 6905
-   7     MAN531 B    Manual On    IPL

F3=Exit  F5=Refresh  F10=Monitor partition status
F11=Work with partition configuration  F12=Cancel  F23=More options

```

Figure 64. Example of Work with Partitions Status display (continued)

```

Work with Partition Status
System: S1021B9M
Type options, press Enter.
34=Force CPM or MSD IPL retry      51=Display processor status
65=Deactivate remote service      66=Activate remote service
67=Disk unit IOP reset/reload     68=Power off domain

  Partition
Opt  Identifier  Name  IPL  IPL  State  Sys IPL  Reference
    0  PRIMARY    B    Manual On  IPL      11
    1  MUM511     B    Manual On  IPL
    2  MAN522     B    Manual On  IPL
    3  MAN531     B    Manual On  IPL
    4  MUCK       B    Manual On  IPL
    5  SUSEQ      C    Manual Off  IPL
    6  SUSEQP2    D    Manual Failed Hold  B206 6905
    7  MAN531     B    Manual On  IPL

F3=Exit   F5=Refresh      F10=Monitor partition status
F11=Work with partition configuration  F12=Cancel  F23=More options

```

Figure 65. Example of Work with Partitions Status display (continued)

```

Work with Partition Status
System: S1021B9M
Type options, press Enter.
69=Power on domain      70=Dump MFIOP

  Partition
Opt  Identifier  Name  IPL  IPL  State  Sys IPL  Reference
    0  PRIMARY    B    Manual On  IPL      11
    1  MUM511     B    Manual On  IPL
    2  MAN522     B    Manual On  IPL
    3  MAN531     B    Manual On  IPL
    4  MUCK       B    Manual On  IPL
    5  SUSEQ      C    Manual Off  IPL
    6  SUSEQP2    D    Manual Failed Hold  B206 6905
    7  MAN531     B    Manual On  IPL

F3=Exit   F5=Refresh      F10=Monitor partition status
F11=Work with partition configuration  F12=Cancel  F23=More options

```

Figure 66. Example of Work with Partitions Status display (continued)

The following panel type functions are available to the primary and secondary partitions with some restrictions as covered in previous topics.

- **1 = Power on**

Use this option to start an IPL on a secondary partition that is in the *off* state.

- **3 = IPL restart**

CAUTION:

Using this option may cause damage to system and user data.

Use this option to start an IPL for a partition that is not in the off state. This option is similar to panel function 3, so a normal shutdown is not performed for the partition and the IPL is immediately restarted.

- **7 = Delayed power off**

Use this option to power off a partition that has finished an IPL and is up and running. This option is similar to a white button *power off* from the panel. The

system will attempt to write changed data to disk units, but the operating system may not reach a normal job termination. This may cause an abnormal IPL on the next restart.

- **8 = Immediate power off**

CAUTION:

Using this option may cause damage to system and user data.

Use this option to immediately power off a partition. This is similar to a panel function 8, so a normal shutdown is not performed for the partition.

- **9 = Mode normal**

Use this option to change the partition mode to normal. When in normal mode most of the panel functions will not be allowed for that partition.

- **10 = Mode manual**

Use this option to change the partition mode to manual. When in manual mode all panel options will be allowed for that partition.

- **11 = Mode auto**

Use this option to change the partition mode to auto. When in auto mode most of the panel functions will not be allowed for that partition.

- **12 = Mode secure**

Use this option to change the partition mode to secure. When in secure mode most of the panel functions will not be allowed for that partition. If the primary partition is in the secure mode you must then use the DST or the control panel to change modes. Panel functions will not be allowed for ANY partition if using this service function in SST on the primary partition. If a secondary partition is in secure mode, it can only be changed from the primary partition.

- **13 = IPL partition on system IPL**

Use this option to mark a secondary partition to automatically IPL on the next primary partition IPL. This option can only be changed from the primary partition.

- **14 = Hold partition on system IPL**

Use this option to mark a secondary partition to NOT automatically IPL on the next primary partition IPL. The partition will have to be started using option = 1, power on partition. This option can only be changed from the primary partition.

- **20 = Display system type/model**

Use this option to display the system type, model, and feature code.

- **21 = Force Dedicated Service Tools**

If enabled, use this option to force DST for a partition.

Attention: Place DST in debug mode or an abnormal termination of interactive jobs may occur.

If possible, end any active service functions that may be running under SST in the partition before entering option 21. Some service functions, including this one, only support one session per partition. If the interactive job terminates abnormally, the sessions will remain active for as long as system values QDEVRCVACN and QDSCJOBTV dictate. This prevents DST access to these service functions after option 21 is entered.

- **22 = Force main storage dump**

Use this option to force a main storage dump (MSD) for a partition.

- **33 = Reorder SPCN addressing**

Use this option to put the rack addresses in the correct order to show their position in the System Power Control Network (SPCN) after adding or removing racks.

- **34 = Force CPM or MSD IPL retry**

If enabled, use this option to retry a continuously powered main storage (CPM) or MSD IPL if the previous attempt has hung or failed so the dump is not lost.

- **51 = Display processor status**

Use this option to help determine the cause of processor loop conditions. The task dispatching element (TDE) address and the next instruction address (NIA) is shown for each processor assigned to the partition selected.

- **65 = Deactivate remote service**

If enabled, use this option to deactivate a remote service connection.

- **66 = Active remote service**

If enabled, use this option to activate a remote service connection.

- **67 = Disk unit IOP reset / reload**

If enabled, this option allows you to use specific disk unit reference codes (URCs) to initiate a disk unit IOP reset or reload in an attempt to recover from a failure.

- **68 = Power off domain**

If enabled, use this option to power off the power domain of a failed disk unit I/O processor so the IOP can be replaced. This is enabled only when a disk unit attention reference code for a failure is displayed for a partition.

- **69 = Power on domain**

If enabled, use this option to power on the last domain that was powered off through option 68 or hardware service manager concurrent maintenance. This is enabled only when a domain is powered off through one of these methods, and is disabled once the domain is powered back on.

- **70 = Dump MFIOP**

Use this option to dump the contents of storage in the Multiple Function IOP (MFIOP) to the load source disk unit for problem determination.

Guest partitions

Guest partition - this is a secondary partition which is running an operating system other than OS/400. The guest partition requires another partition to host it. The purpose of the hosting partition is to supply paths from virtual I/O in the guest partition's operating system to real I/O hardware drivers in the hosting partition. The guest partition requires a console in order to provide an interface to DST console functions. TELNET is used to establish a guest console from the hosting partition. The guest partition's console should not be confused with the console used by the operating system running in the guest partition. They are separate console sessions.

- A user can create a guest partition or change a partition to/from OS/400 and guest
- An OS/400 can host a guest partition providing resources and operational support.

Within a hosting secondary LAPR service function session, the hosted guest partition can work with the hosted guest partition IPL status. View hosting information using option 9 on the **Display Partition Information** menu

- A console log is kept for guest partitions, and can be viewed using option 10 on the **Display Partition Information** menu

- A debug command may be sent to a guest partition using hidden option 14 on the Work with Partition Configuration menu

Determining if the system has guest partitions

This procedure instructs the user on how to determine if the system has Guest Partitions.

1. Go to the Primary partition system console.
2. From the SST or DST screen, select the **Work with system partitions** option.
3. At the **Work with system partitions** display, the number of partitions and the partition manager release level are shown. This is the release level of the Primary partition.
 - a. Select the **Display partition information** option.
4. At the **Display partition information** display, select the **Display partition operating environment** option.
5. At the **Display partition operating environment** display, the partition identifier, partition name, operating system type ("OS/400" or "Guest"), and operating system version / release are displayed for each system partition.
 - Any partition with an indication that the partition is a "Guest" means that the system has guest partitions.
6. Record the partition ID, partition name, operating system type, and version/release of the guest partition(s) for later use.

Determining the release level of a guest partition

This procedure instructs the user on how to determine the release level of the operating system environment in a guest partition.

1. Go to the Primary partition system console or the console of the hosting partition for a guest partition. For information on determining the hosting partition for a guest partition see "Determining the hosting partition of a guest partition."

Note: The hosting partition may not have a console session established via TELNET. In that case use the Primary partition's console.

2. From the SST or DST screen select the **Work with system partitions** option.
3. At the **Work with system partitions** display, select the **Display partition information** option.
4. At the **Display partition information** display, select the **Display partition operating environment** option.
5. At the **Display partition operating environment** display, the operating system (Kernel) and the Kernel's version level are displayed.

Note: The guest partition must have been IPL'd at least once for the version to be displayed / correct.

6. Record the partition ID, partition name, operating system and operating system version of the of the guest partition for later use.

Determining the hosting partition of a guest partition

Hosting partition - This is a partition, either the Primary or a secondary partition that is not a guest partition. The hosting partition has the real I/O devices that the virtual I/O device drivers in a guest partition connect to. The hosting partition also supplies the guest partition's DST console session via a TELNET connection into the hosting partition. The guest partition's console is not part of the hosting

partition's console. The host partition's console, the guest partition's console session and the guest partition's operating system's console are all different console sessions.

This procedure instructs the user on how to determine the partition ID and partition name of the hosting partition of a guest partition.

1. Go to the Primary partition system console.
2. From the SST or DST screen select the Work with system partitions option.
3. At the **Work with system partitions** display, select the **Display partition information** option.
4. At the **Display partition information** display, select the **Display guest environment host information** option.
5. At the **Display guest environment host information** display, the hosting partition for a guest partition is displayed.
6. Record the hosting partition information of the guest partition you are working on for later use.

IASP/Clustering Service Reference Procedures

Determining if a tower is configured as switchable under iSeries 400 OptiConnect

You can determine if a tower is configured as a switchable tower under iSeries 400 OptiConnect by performing the following procedure.

Note: To perform this procedure, you must have the resource name of the high speed link (HSL) I/O bridge resource.

1. Move to the console of the system where you know the name of the HSL I/O bridge resource in the tower.
2. Sign on to the System Service Tool (SST) or Dedicated Service Tool (DST).
3. From the SST or DST, select **Start a service tool**, then **Hardware Service Manager**.
4. From the Hardware Service Manager, select **Logical Hardware Resources**.
5. From the Logical Hardware Resources display, select **High Speed Link Resources**.
6. From the High Speed Link Resources display, select the function **Include non-reporting resources**.
7. Move the cursor to the HSL I/O bridge resource of the tower and select the **Display detail** option. The Display HSL Information display appears.

```

Display HSL Information

HSL loop number . . . . . : 257

HSL I/O bridge resource
Type-model . . . : 1999-999          Status . . . . . : Operational
Serial number . . : 21-1111111      Part number . . . : 11111111111
Resource name . . : BC06           Mode: Switchable

Leading port to next resource . . . . . :
Link status . . : Operational      Link type . . . : Copper
Type of connection . . . . . : Internal

Trailing port from previous resource . . . . . : A1
Link status . . : Disabled        Link type . . . : Optical
Type of connection . . . . . : External

F3=Exit  F6=Print  F7=Follow trailing port  F8=Follow leading port
F9=Include non-reporting resources  F11=Display system information
F12=Cancel

```

Figure 67. Example Display High Speed Link (HSL) Information display

8. At the Display HSL Information display, locate the **Mode** information of the resource.

Note: If you cannot locate the **Mode** information, then this HSL resource is not part of a Cluster Resource Group (CRG) and the tower where this HSL I/O bridge resource is located cannot be configured as switchable under iSeries 400 OptiConnect.

9. Is the mode listed as *Private* or is the mode not displayed for this resource?
- **Yes** = the tower where this HSL I/O bridge resource is located cannot be configured as switchable under iSeries 400 OptiConnect. **This ends the procedure.**
 - **No** = the HSL I/O bridge resource has a mode of *switchable*. The tower is configured as a switchable tower under iSeries 400 OptiConnect. Continue with the next step of this procedure.

10. Record the HSL loop number, the type-model, and the serial number of the HSL I/O bridge resource.

Note: You will need the type-model and serial number to identify the HSL I/O bridge on the other system that can own this resource.

Determining the power controlling and current logical system ownership of a tower

You can determine the power controlling system of a tower by performing the following procedure.

1. From the Logical Hardware Resources screen, select **High-Speed Link Resources**.
2. Go to the HSL Loop with the tower you wish to learn about. Select **option 5** (Display detail) and press **Enter**.
3. Press **F8** (Follow Leading Port) until you reach the tower you want to learn about.

4. Press **F11** (Display System Information). There will be a section called SPCN System Information. That will have the system serial number for the power controlling system. The current logical owning system will be labeled as "owner."

Determining the resource name and HSL loop number of an HSL I/O bridge

To determine the resource name and HSL loop number of the HSL I/O bridge resource in the alternate system that can own a selected HSL I/O bridge resource, complete the following procedure.

1. Move to the console of the alternate system that can own the resources in the tower.
2. Sign on to the System Service Tool (SST) or Dedicated Service Tool (DST).
3. Select **Start a Service Tool**.
4. Select **Hardware Service Manager**.
5. Select **Logical hardware resources**.
6. Select **High speed link resources**.
7. Select the function **Include non-reporting resources**.
8. Search for the HSL I/O bridge resource name by selecting the **Display detail** option for each HSL I/O bridge resource until you find the HSL I/O bridge resource that has the same type-model and serial number you recorded for the HSL I/O bridge resource (See the procedure "Determining the power controlling and current logical system ownership of a tower" on page 148).

```

Display HSL Information

HSL loop number . . . . . : 257

HSL I/O bridge resource
Type-model . . . : 1999-999          Status . . . . . : Operational
Serial number . . : 21-1111111      Part number . . . : 11111111111
Resource name . . : BC06           Mode: Switchable

Leading port to next resource . . . . . :
Link status . . : Operational      Link type . . . : Copper
Type of connection . . . . . : Internal

Trailing port from previous resource . . . . . : A1
Link status . . : Disabled        Link type . . . : Optical
Type of connection . . . . . : External

F3=Exit  F6=Print  F7=Follow trailing port  F8=Follow leading port
F9=Include non-reporting resources  F11=Display system information
F12=Cancel

```

Figure 68. Example Display High Speed Link (HSL) Information display

9. Record the **HSL loop number** and **Resource name** for the HSL I/O bridge resource from the Display HSL Information display.
10. Select the function **Display system information** from the Display HSL Information display.

```

Display HSL System Information

Local system type . . . . . : 9406
Local system serial number: 10-0033333

HSL loop number . . . . . : 257

HSL I/O Bridge resource
Type-model . . . . . : 1999-999      Status . . . . . : Operational
Serial number . . . . . : 21-1111111  Part number . . . . . : 1111111111111
Resource name . . . . . : BC06       Mode . . . . . : Switchable

SPCN system information
System type . . . . . : 9406
System serial number : 10-0033333  Owner

Alternate system information
System type . . . . . : 9406
System serial number : 10-1234567

F3=Exit  F6=Print  F11=Display port information  F12=Cancel

```

Figure 69. Example Display High Speed Link (HSL) Information display

11. Record the local system type and local system serial number with the HSL I/O bridge resource and the HSL loop number you recorded for this system earlier.

This ends the procedure.

Switching ownership of a tower's switchable resources

It may be necessary for the local system to take or release ownership of a switchable resource. You can use the *Take/release ownership* option on the Select I/O Debug Function display to have the local system take ownership of a resource or to have the local system release its ownership of a resource. Ownership of a resource indicates which system controls the functions of a resource. Ownership may be released only by the system that presently owns it.

The following procedure will direct you to switch ownership of switchable resources in a tower from the current owner to the alternate system that can own those resources. To perform this procedure, you must know:

- The system that currently owns the switchable resources in a tower. This is the system that you are going to *release* the resources from.
- The alternate system that can *take* ownership of the switchable resources.
- The resource name of the high speed link (HSL) I/O bridge resource and the HSL loop number on the currently owning system that will *release* ownership.
- The resource name of the high speed link (HSL) I/O bridge resource and the HSL loop number on the system that will *take* ownership.

Attention: Perform this procedure only if you are not able to switch the ownership of the resource using the iSeries 400 OptiConnect user interface. Cluster Resource Group (CRG) problems may occur as the result of using this procedure when the iSeries 400 OptiConnect user interface is available.

1. Determine the current owner of the switchable resources in the tower if you have not already done so. (See the procedure "Determining the power controlling and current logical system ownership of a tower" on page 148.)
2. Move to the console of the system that is the current owner of the switchable resources in the tower.
3. Sign on to System Service Tool (SST) or Dedicated Service Tool (DST).

4. Select **Start a service tool**.
5. Select **Hardware Service Manager**.
6. Select **Logical Hardware Resources**.
7. Select **High speed link resources**.
8. Select the function **Include non-reporting resources**.
9. Move the cursor to the HSL I/O bridge resource in the tower. Search for the resource name that the currently owning system assigned to the HSL I/O bridge resource.
10. Select the **I/O Debug** option.
When you select the I/O debug option on an HSL I/O bridge that has the capability of being switched, the following screen is displayed:

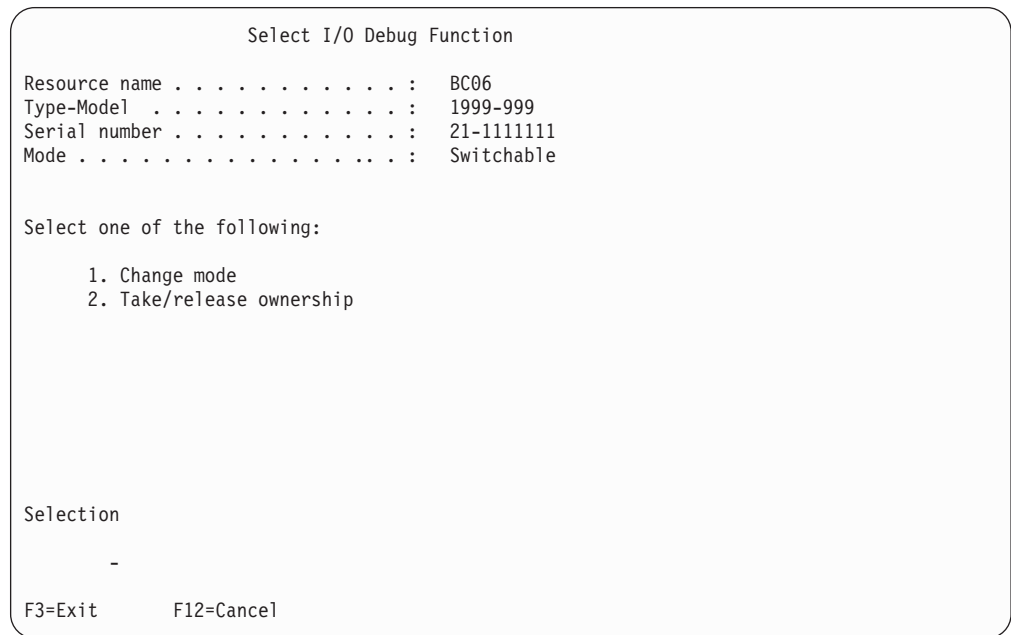


Figure 70. Example I/O Debug Function display

11. From the Select I/O Debug Function display, select the **Take/release ownership** option. The following display appears:

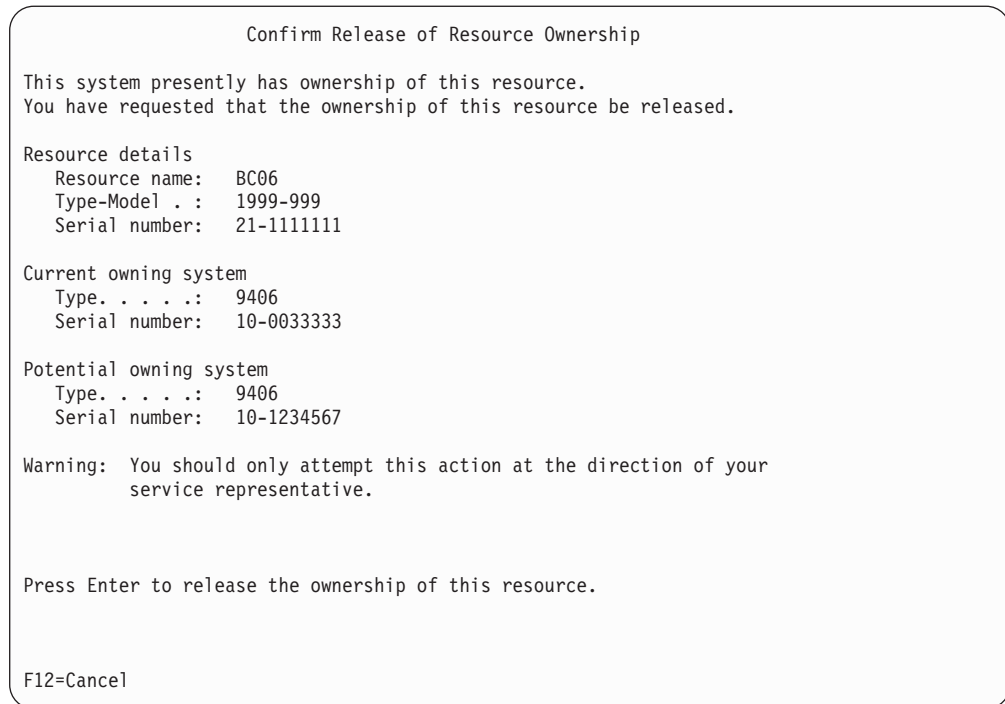


Figure 71. Example Confirm Release of Resource Ownership display

Note: If you select option two to release ownership of the resource and another system currently owns it, the following message appears at the bottom of the screen:

Ownership of this resource cannot be released. It is owned by another system.

12. Record the **type-model** and the **serial number** of the HSL I/O bridge resource if you have not already done so.
13. Press **Enter** to confirm releasing the resource.
14. Move to the console of the other system that can take ownership of the switchable resources in the tower.
15. Sign on to System Service Tool (SST) or Dedicated Service Tool (DST).
16. Select **Start a service tool**.
17. Select **Hardware Service Manager**.
18. Select **Logical Hardware Resources**.
19. Select **High speed link resources**.
20. Select the function **Include non-reporting resources**.
21. Move the cursor to the HSL I/O bridge resource in the tower. Search for the resource name that this system assigned to the HSL I/O bridge resource.
22. Select the **I/O Debug** option.
23. From the Select I/O Debug Function display, select the **Take/release ownership** option. The following screen will appear:

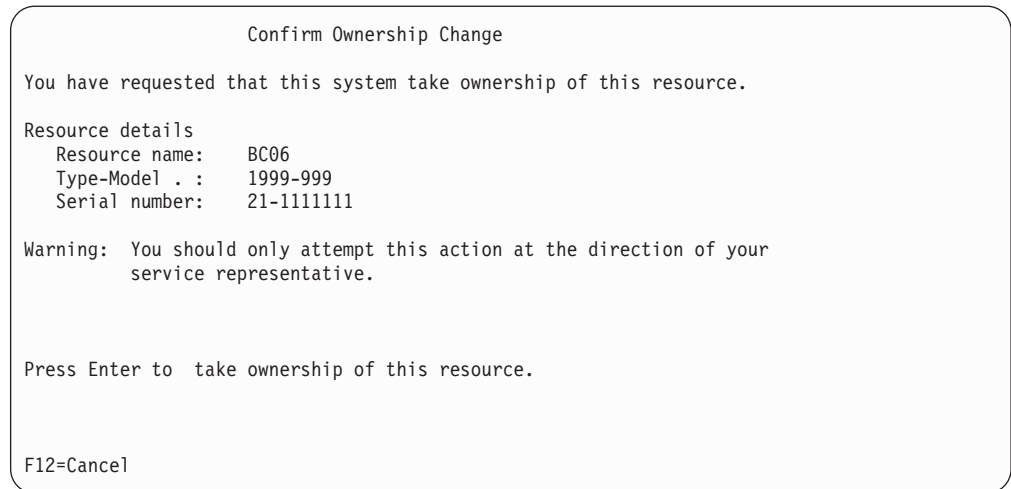


Figure 72. Example Confirm Ownership Change display

24. Press **Enter** to confirm the ownership change.

This ends the procedure.

Switching the mode of a tower's switchable resources

This procedure provides instructions on how to switch the mode of switchable resources in a tower.

Note: To perform this procedure, the switchable resources in the tower must be owned by the power controlling system for the tower. For information on switching ownership of the switchable resources in a tower, see the procedure "Switching ownership of a tower's switchable resources" on page 150..

Attention: Perform this procedure only if you are not able to end the Cluster Resource Group (CRG) using the iSeries 400 OptiConnect user interface. CRG problems may occur as the result of using this procedure when the iSeries 400 OptiConnect user interface is available.

1. Move to the console of the power controlling system of the tower.
2. Sign on to System Service Tool (SST) or Dedicated Service Tool (DST).
3. Select **Start a service tool**.
4. Select **Hardware Service Manager**.
5. Select **Logical hardware resources**.
6. Select **High speed link resources**.
7. Select the function **Include non-reporting resources**.
8. Move the cursor to the HSL I/O bridge resource in the tower. Search for the resource name that the currently owning system assigned to the HSL I/O bridge resource.
9. Select the **I/O Debug** option.
10. From the **Select I/O Debug Function** display, select the **Change mode** option. The following display appears:

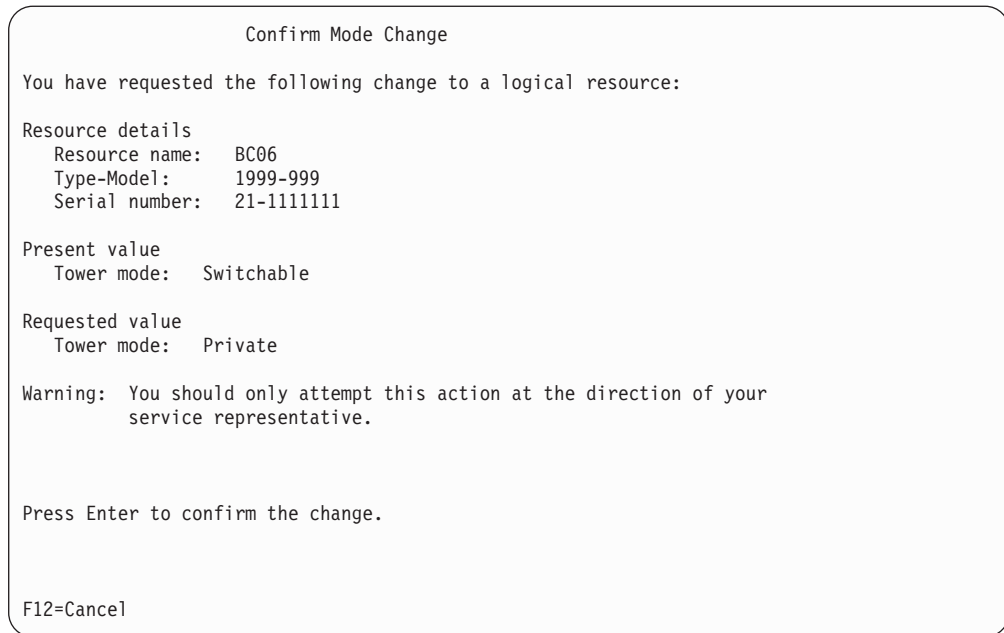


Figure 73. Example Confirm Mode Change display

11. Is the present value of the tower mode a value that you want to change?
 - **Yes** = proceed to the next step.
 - **No** = The power is already in the mode you want it to be in. **This ends the procedure.**
12. Press **Enter** to confirm changing the mode of the resource.

If you press Enter at the Confirm Mode Change display, one of the following messages will appear:

 - Change mode was successful.
 - Unable to change mode for this hardware resource.

This ends the procedure.

Chapter 5. Control Panel Functions

Values for IPL types, key modes, and speeds	155	Low-Level Debug (LLD) panel functions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)	167
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Values for IPL types, key modes, and speeds

Table 13, Table 14, and Table 15 describe the valid IPL types, key modes, and speeds that are used in control panel functions 01 and 02.

Table 13. IPL types

IPL type	Action or description
A	IPL from disk using copy A of the system Licensed Internal Code.
B	IPL from disk using copy B of the system Licensed Internal Code.
C	Reserved for hardware service use only under the direction of Rochester development support. Attention: Severe data loss can occur with improper use of this function.
D	IPL from media other than load-source disk. Alternate IPL for code installation support.

Table 14. Key mode values

Key mode	Action or description
Manual (M)	Allows you to access DST and perform an attended IPL .
Normal (N)	Allows you to access the operating system and perform an unattended IPL .
Secure	Locks the control panel on the system unit. Found only on systems with an electronic keystick.
Auto	Locks most control panel functions. Automatic IPLs are allowed. Found only on systems with an electronic keystick.

Table 15. IPL speeds

IPL speed	Action or description	Details
F:	Fast override for one IPL.	Fast IPL run. Some hardware diagnostics are skipped.

Table 15. IPL speeds (continued)

IPL speed	Action or description	Details
S:	Slow override for one IPL.	Full hardware diagnostics run. Use whenever hardware is changed, for intermittent hardware failure, and on the first installation IPL. The following diagnostics are run: <ul style="list-style-type: none"> • Main storage tests. • CEC Inter-chip interface tests (wire test). • Extended Logical Built-in Self Tests.
SE:	Hardware upgrade.	Support-directed procedure only.
V=F:	Use system-defined speed.	Fast IPL set by system value (displayed at function 01).
V=S:	Use system-defined speed.	Slow IPL set by system value (displayed at function 01).
V	Fast IPL or slow IPL set by the system value (selected at function 02).	Function 02 selection or the system default at each IPL.

Control Panel Functions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)

The control panel functions and descriptions are listed in Table 16. For more details about the functions, begin at “Control panel function descriptions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)” on page 158.

Notes:

1. Some control panel functions might not be available on all system types.
2. The x can be any number 0 through 9, any letter A through F, or a blank.
3. If the customer was performing the function, find out why the customer selected the function and verify whether it is complete.
4. If you cannot change the *Function/Data* display or complete the selected function, go to “Starting Point for All Problems” in the Problem Analysis information for your system.

Table 16. Control panel (8-character) function codes

Function code	Function selected
01	Pressing the Enter button toggles between: <ol style="list-style-type: none"> 1. Display the currently selected IPL type (and logical key mode on some system types). 2. Display the currently selected IPL speed override for the next IPL.
02	<ol style="list-style-type: none"> 1. Pressing the Enter button once allows selection of the IPL type (and logical key mode on some system types). 2. When the system power is off, pressing the Enter button twice allows selection of an IPL speed override for the next IPL.
03	Start an IPL to load the system. The IPL uses the selected IPL options.
04	Lamp test; all displays and indicators will be switched on.
05	System Power Control Network (SPCN) system reference code (SRC); displays an SRC on the control panel.

Table 16. Control panel (8-character) function codes (continued)

Function code	Function selected
06	Disable CPM.
07	Pressing the Enter button allows execution of the following subfunctions to restore system power and perform concurrent maintenance: ** Cancel Request 01 System Power On 02 Fan Power Off 03 Bulk Power Off 04 Fan Power On 05 Bulk Power On
08	Fast power off; to perform a fast power off, see "Powering Off and Powering On the System" in the Problem Analysis information for your system.
09 through 10	Reserved.
11 through 19	System reference code (SRC); displays an SRC on the control panel.
20	Display the machine type, model, and processor feature code.
21	Causes the Use Dedicated Service Tool (DST) display to appear on the system console; to exit DST, select the <i>Resume operating system display</i> option.
22	Force system main storage dump. First see "Function 34–Retry MSD or CPM IPL" on page 166. To perform a system main storage dump, see "Performing a main storage dump to disk (manual MSD)" on page 267.
23	Reserved.
24	Reserved.
25	Use Service switches 1 and 2 to enable or disable functions 50 through 99.
26	Use Service switches 1 and 2 to enable or disable functions 50 through 99.
27 through 32	Reserved.
33	Reorder SPCN addressing.
34	Retry MSD or CPM IPL.
35 through 49	Reserved.
50	System processing unit stop.
51	System processing unit status; displays the following values: B0 register contents, Next Instruction Address (NIA), and current Task Dispatching Element (TDE) contents.
52	System processing unit start.
53	Resets the control panel interface.
54	Display low-level diagnostic I/O configuration table.
55	Display low-level diagnostic service processor log buffer.
56	Display low-level diagnostic service processor code area.
57	Display low-level diagnostic IPL message save area.
58	Display low-level diagnostic IPL parameters area.
59	Set the first two characters of the base address for the function 62 display.
60	Set third character of base address for function 62 display.
61	Set fourth character of base address for function 62 display.
62	Display multiple function I/O processor storage.

Table 16. Control panel (8-character) function codes (continued)

Function code	Function selected
63	System status SRC trace.
64	Service processor diagnostic status SRC trace.
65	Deactivate remote service.
66	Activate remote service.
67	Disk unit IOP reset/reload; enabled only by specific disk unit SRCs.
68	Concurrent Maintenance power domain Power Off.
69	Concurrent Maintenance power domain Power On.
70	Dump MFIOP control storage.
<p>If you cannot find the function code in this chart, the customer support for added features or devices might not have been available when this information was produced. Look for any supplemental unit function code information for the function code you displayed on the control panel. If you do not find any additional function code information, go to "Function 04-Lamp Test" on page 161 and verify that the lamps are working correctly.</p>	

Ways to access the control panel (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)

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)?

Yes No

↓ The logical key mode (M or N only) is displayed in function 01. The *Auto* and *Secure* key modes are not supported. Follow function 01 and 02 procedures for **system types that do not use a keystick**.

2. Insert the keystick.

Press the Mode-selection button to select the key mode. Follow function 01 and 02 procedures for **systems with an electronic keystick**.

To select a function number, press the Increment (↑) or Decrement (↓) buttons on the control panel. To activate the function, press Enter on the control panel while the desired function number is displayed.

Note: The function that is displayed is not activated until you press Enter on the control panel.

Control panel function descriptions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)

Customer control panel functions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)

Function 01–Display Selected IPL Type and Speed (on Systems with a Keystick): This function allows you to **display** the selected IPL type and IPL speed. Pressing the Enter button in function 01 toggles between the two displays:

1. Display IPL type (A, B, C, or D).
2. Display IPL speed (F, S, SE, V=F, or V=S).

When first selected, function 01 displays the current IPL type. Once function 01 is selected, use the Enter button to toggle between the IPL type and IPL speed, as shown in Table 17, (each _) represents 1 character).

Table 17. Function 01 on systems with an electronic keystick

Function/data	Action or description
01 _ _ _ _ _ _	Use the Increment or Decrement buttons to scroll to function 01.
01 _ _ _ A _ _	Press the Enter button to start function 01. Valid IPL types, which appear in the sixth character position of the Function/Data display, are A, B, C, D.
01 _ _ V = F _	Press the Enter button again to display the IPL speed. Valid speed displays are F, S, SE, V=F, or V=S.
01 _ _ _ A _ _	Press Enter to toggle back to the IPL type.
02 _ _ _ _ _ _	Use the Increment or Decrement buttons to scroll through the control panel functions.

Function 01–Display Selected IPL Type, Logical Key Mode, and Speed (on Systems without a Keystick): This function allows you to **display** the selected IPL type, logical key mode, and IPL speed. Pressing the Enter button in function 01 toggles between the two displays:

1. Display IPL type (A, B, C, or D) and the logical key mode (M or N, which appears in the eighth character position of the Function/Data display).
2. Display IPL speed (F, S, SE, or V=F, or V=S).

Table 18. Function 01 on systems without an electronic keystick

Function/data	Action or description
01 _ _ _ _ _ _	Use the Increment or Decrement buttons to scroll to function 01.
01 _ _ _ A _ N	Press Enter to start function 01. Valid IPL types and logical key mode combinations are A_N, B_N, C_N, D_N, A_M, B_M, C_M, D_M.
01 _ _ V = F _	Press the Enter button again to display the IPL speed. Valid speed displays are F, S, SE, V=F, or V=S.
01 _ _ _ A _ N	Press Enter to toggle back to the IPL type and logical key mode.
02 _ _ _ _ _ _	Use the Increment or Decrement buttons to scroll through the control panel functions.

Note: See “Work with Licensed Internal Code” on page 11 and “IPL type, mode, and speed options” on page 213 for more information on IPL options.

Function 02–Select IPL Type and Speed (on Systems with a Keystick): This function allows you to **select** the IPL type, key mode, and speed.

1. Pressing Enter once puts you into the change IPL type (A, B, C, or D). You select the key mode by engaging the keystick and pressing the **Mode** button to scroll through the four operating modes (Manual, Normal, Auto, and Secure). The mode with the light indicates that it is in active mode.
2. When the system power is off, pressing the Enter button twice puts you into the operation for overriding the system IPL speed (F, S, V) for the next IPL.

For powered-on systems with a keystick, function 02 is used to select the IPL type. Table 19 on page 160 shows an example of the sequence for powered-on systems.

Table 19. Function 02 Select IPL **Type** on Powered-on systems with an electronic keystick

Function/data	Action or description
02 _ _ _ _ _	Use the Increment or Decrement buttons to scroll to function 02.
02 _ _ _ A _ _	Press Enter once to start Function 02. Use the Increment or Decrement buttons to scroll through the valid IPL types: A, B, C, and D.
	Press Enter to save the selected IPL type and exit function 02.

For powered-off systems with a keystick, function 02 is used to select the IPL type and IPL speed indicators. Table 20 shows an example of the sequence for powered-off systems.

Table 20. Function 02 Select IPL **Type and IPL Speed** on Powered-off Systems with an Electronic Keystick

Function/data	Action or description
02 _ _ _ _ _	Use the Increment or Decrement buttons to scroll to function 02.
02 _ _ _ A _ _	Press Enter once to start function 02. Use the Increment or Decrement buttons to scroll through the valid IPL types: A, B, C, and D.
	Press Enter to save the selected IPL type and exit function 02.
	Use the Increment or Decrement buttons to scroll to function 02.
02 _ _ _ _ V _	Press Enter twice in a row to select the IPL speeds. Use the Increment or Decrement buttons to scroll through the IPL speeds.
	Press Enter to select the IPL speed and exit function 02.

Function 02–Select IPL Type, Logical Key Mode, and Speed (on Systems without a Keystick): This function allows you to **select** the IPL type, logical key mode and speed.

1. Pressing Enter **once** puts you into the change IPL type (A, B, C, or D) operation and the IPL key mode (M or N). The IPL logical key mode appears in the eighth character position on the Function/Data display, where each (_) represents 1 character.
2. When the system power is off, pressing the Enter button **twice** puts you into the operation for overriding the system IPL speed (F, S, V) for the next IPL.

For powered-on systems without a keystick, function 02 is used to select the IPL type. Table 21 shows an example of the sequence for powered-on systems without a keystick.

Table 21. Function 02 Select IPL **Type and Logical Key Mode** on Systems without an Electronic Keystick

Function/data	Action or description
02 _ _ _ _ _	Use the Increment or Decrement buttons to scroll to Function 02.
02 _ _ _ A _ N	Press Enter once to start function 02. Use the Increment or Decrement buttons to scroll through valid IPL type and logical key mode combinations (A_N, B_N, C_N, D_N, A_M, B_M, C_M, D_M).
	Press Enter to save the selected IPL type and key mode combination and exit Function 02.

For powered-off systems without a keystick, function 02 is used to select the IPL type and IPL speed indicators. Table 22 shows an example of the sequence for powered-off systems without a keystick.

Table 22. Function 02 Select IPL Type and IPL Speed on Systems without an Electronic Keystick

Function/data	Action or description
02 _ _ _ _ _	Use the Increment or Decrement buttons to scroll to Function 02.
02 _ _ _ A _ N	Press Enter once to start function 02. Use the Increment or Decrement buttons to scroll through valid IPL type and logical key mode combinations (A_N, B_N, C_N, D_N, A_M, B_M, C_M, D_M).
	Press Enter to save the selected IPL type and key mode combination and exit Function 02.
	Use the Increment or Decrement buttons to scroll to Function 02.
02 _ _ _ _ V _	Press Enter twice in a row to select the IPL speeds. Use the Increment or Decrement buttons to scroll through the IPL speeds.
	Press Enter to select the IPL speed and exit function 02.

Function 03–Start IPL: Function 03 is enabled only when you select Manual mode and the system power is on.

This function starts an IPL of the selected IPL mode when you press the Enter button. All the Licensed Internal Code is loaded.

Attention: No system shutdown is performed before the IPL. The use of this function can cause loss of data.

Function 04–Lamp Test: This function shows whether any control panel indicators are burned out and whether characters that are displayed on the control panel *Function/Data* display are valid. When you activate this test, the following lights go on:

- On the system control panel:
 - The Processor Active/Activity light
 - The Processor Activity Select lights
 - The System Attention light
 - The Power On light
 - A 5 x 7 dot pattern for each character in the *Function/Data* display
 - The Mode lights (if available)
- On the Expansion Unit control panel (if available):
 - The Power On light
 - The SPCN Attention light
 - A 5 x 7 dot pattern for each character in the *Data* display

The lamp test continues on the system control panel until you perform another control panel function or a power procedure. The Expansion Unit control panel lamp test is only active for 25 seconds.

Use this procedure to verify that the lights on the system control panel are working correctly. If you cannot complete these steps, go to the “Starting Point for All Problems” in the Problem Analysis information for your system to start problem analysis.

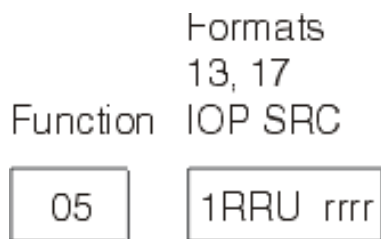
1. Power on the system.
2. Press the Increment (↑) or Decrement (↓) button on the control panel to display Function 04.
Press Enter on the control panel.
3. Do all of the following lights on the system control panel go on?
 - The Processor Active/Activity light
 - The Processor Activity Select lights
 - System Attention light
 - Power On light
 - A 5 x 7 dot pattern for each character in the *Function/Data* display
 - Mode lights (if available)

Yes	No
↓	Exchange the control panel or the replaceable unit that contains the SPCN function (SPNLCRD or ac module). (See “Removal and Installation Procedures” in the Problem Analysis information for your system.)
4. The lights on the system control panel are working correctly.

This ends the procedure.

Function 05–SPCN SRC: Function 05 is available only on systems with SPCN.

Function 05 displays information about power faults and provides informational reference codes during disk unit concurrent maintenance procedures. The format for this function is as follows:



RR = The frame number where the failing unit is installed
 U = The SPCN port to which the failing unit is connected
 rrrr = Unit reference code (URC)

Figure 74. SPCN SRC Formats

Function 06–Disable Continuous Power Main Storage (CPM): Function 06 is available only on systems with SPCN. It is enabled only when you select Manual mode and the system has enabled CPM.

When you power off the system, use this function to disable the continuous powered main storage (CPM) operation.

Table 23. Function 06 Disable CPM

Function / value	Action or description
06 _ _ _ _ _	Use the Increment or Decrement buttons to scroll to function 06. If you cannot scroll to function 06, CPM is not active.

Table 23. Function 06 Disable CPM (continued)

Function / value	Action or description
06 _ _ _ E _ _	Press Enter to enter Disable CPM operation. E (Enable) indicates that the CPM function is active.
06 _ _ _ D _ _	Use the Increment or Decrement buttons to display option D (Disable).
06 _ _ _ _ 0 0	Press Enter to perform the Disable CPM operation. With the 00 displayed the operation was successful (the SPCN interface is operational and the Disable message will be sent). At the next IPL, CPM is automatically available. If FF appears instead of 00, function 06 failed due to an SPCN communications error.

Function 07—Restore System Power and Perform Concurrent Maintenance

Repair: Function 07 is available only on systems with SPCN and only when the system is powered on and in Manual mode. Function 07 allows you to restore power to frames that had a power failure or were powered off. It is also used for concurrent maintenance repair on bulks and fans.

When you first enter function 07, the control panel enters *subfunction mode* by displaying (**). Increment and decrement functions scroll to selectable values. If an SPCN communications error is present when you select a subfunction, the subfunction does not start, and FF (processing failed) displays in the rightmost display positions. Entry of a valid subfunction when no SPCN communications errors are present results in a 00 (processing successful) displayed in the rightmost display positions. Pressing Enter when ** is displayed results in exiting subfunction mode. For example:

Table 24. Function 07 Restore System Power and Perform Concurrent Maintenance Repair

Function / data	Action or description
07 _ _ _ _ _	Use the Increment or Decrement buttons to scroll to function 07.
07 * * _ _ _	Press Enter to enter function 07 subfunction mode.
07 0 4 _ _ _	Use the Increment or Decrement buttons and scroll to desired subfunction (04 in this example). Valid subfunctions are 01, 02, 03, 04, and 05.
07 0 4 _ _ 0 0 briefly, then 07 * * _ _ _	Press Enter to execute subfunction 04. An SPCN communications error was not present, resulting in 00. If an error occurs, FF displays.
07 F 3 _ _ 0 0	Use the Increment or Decrement buttons to select a specific device (in this case F0 - F3).
07 0 4 _ _ 0 0 briefly, then 07 * * _ _ _	Press Enter to exit the subfunction for the specified device and exit to the subfunction level.

See the following list for valid subfunction values and their meanings.

** Cancel Request

The system returns this subfunction when you select ** for subfunction and activate enter. Use this to cancel a pending subfunction 2–5 concurrent maintenance operation. SPCN responds with an EPF 1–5 (enable panel subfunction) to clear any other subfunction range enabled previously.

01 System Power On

If the processing unit is powered on, this command causes the system to transmit a Rack Power On command to the network. After you complete concurrent repairs, use this function to restore power to expansion units that are turned off or faulted off.

02 Fan Power Off

Use this function to select a concurrent fan power off operation. SPCN responds by enabling subfunction range F0–F3 (see “F0-F3 Select Fan”) to select the fan to be powered off.

03 Bulk Power Off

Use this function to select a concurrent bulk power off operation. SPCN responds by enabling subfunction range B0–B5 (see “B0-B5 Select Bulk”) to select the bulk to be powered off.

04 Fan Power On

Use this function to select a concurrent fan power on operation. SPCN responds by enabling subfunction range F0–F3 (see “F0-F3 Select Fan”) to select the fan to be powered on.

You only need this function if the wrong fan is powered off. The system automatically starts a concurrently repaired fan after the fan is inserted.

05 Bulk Power On

Use this function to select a concurrent bulk power on operation. SPCN responds by enabling subfunction range B0–B5 (see “B0-B5 Select Bulk”) to select the bulk to be powered on.

You only need this function if the wrong bulk is powered off. The system automatically starts a concurrently repaired bulk after the bulk is installed.

F0–F3 Select Fan

Use this subfunction to select the fan for the previously selected concurrent repair operation. If accepted, SPCN performs the operation and disables this subfunction range. The system displays a function 5 SRC when the fan is turned off and removes it when the fan is installed.

B0–B5 Select Bulk

Use this subfunction to select the bulk for the previously selected concurrent repair operation. If accepted, SPCN performs the operation and disables this subfunction range. A function 5 SRC is displayed when the bulk is turned off and removed when the bulk is installed.

Function 08–Fast Power Off: Function 08 is enabled only when you select Manual mode.

Use this function when the system is suspended and you cannot perform a power down.

Initially, the system displays an attention SRC, 11-x A1xx 8008. This SRC indicates that you selected Function 08. To perform a fast power off, see “Powering Off and Powering On the System” in the Problem Analysis information for your system.

Note: If the system password was changed at the most recent IPL, performing a fast power off might cause that new password information to be lost.

Functions 09 to 10–Reserved: These functions are reserved for future control panel operations.

Functions 11 to 19–System Reference Code: Functions 11 through 19, if enabled, represent the words of the SRC.

You should record SRC information for error reporting.

For more information on interpreting SRCs, go to Chapter 6, “System Reference Code (SRC) Information,” on page 187.

To use the SRC for problem analysis, go to the “Starting Point for All Problems” in the Problem Analysis information for your system.

Function 20–System Type, Model, and Feature Code: This function displays the machine type, model, and processor feature code in the following format:

tmmm cccc

Values for t indicate the machine type:

1	9401
2	9402
4	9404
6	9406

Values for m indicate the model:

mmm Model number (for example, 510)

Values for c indicate the system processor feature code:

cccc Processor feature code (for example, 2141)

You should record this information with the SRC.

Note: When the machine type and model number are not available, FF is shown.

Extended control panel functions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)

The extended control panel functions consist of two major groups:

- Functions 21 through 49, which are available when you select Manual mode.
- Support service representative Functions 50 through 99, which are available when you select Manual mode, then select and enter the customer service switch 1 (Function 25), followed by service switch 2 (Function 26).

Note: When a function has no data to display, FF is shown.

Customer Extended Panel Functions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)

Function 21–Make DST Available: This function makes DST available on the system console display. The *Use Dedicated Service Tools (DST)* display appears on the primary or alternative console. For more information on the console, see “Determining a primary or alternative console” on page 126.

To exit DST and return to the operating system, select the *Resume operating system display* option on the Use Dedicated Service Tools (DST) display.

For more information, see Chapter 1, “Dedicated Service Tools (DST),” on page 1.

Function 22–Dump Main Storage: This function dumps main storage and processor data to the disk.

Note: Prior to pressing function 22, check to see whether function 34 is available (00 shows in the panel after you select function 34). If it is available, then the system is attempting to run a main storage dump IPL. Using function 34 attempts to retry the IPL such that the original dump is not lost. If function 34 is not enabled (>FF shows in the panel after you select function 34), go back and start function 22.

The first time that you select function 22 and press Enter, the system displays attention SRC 11 A1xx 3022. This indicates that you selected function 22. To dump main storage and system processor data to the disk, you must select function 22 again and press Enter. See “Performing a main storage dump to disk (manual MSD)” on page 267.

Use this function only when a main storage dump is necessary, for example, a suspended (system hang) condition or after an operating system failure.

Attention: No system shutdown is performed before the main storage dump. The use of this function can cause loss of data. See “Function 34–Retry MSD IPL” on page 182.

Functions 25 and 26–Service Switches 1 and 2: In function 25, the service representative switch 1 is set. Function 25 is the first step necessary to set the service function range (50 to 99).

In function 26, the service representative switch 2 is set. Function 26 is the second step necessary to set the service function range (50 to 99).

Function 33–Reorder SPCN Addressing: This function puts the rack addresses in the correct order to show their position in the System Power Control Network (SPCN). Use it when you have added racks to or removed them from the system.

Function 34–Retry MSD or CPM IPL: Function 34 is enabled only for main storage dump IPLs or CPM IPLs. You can use it when the system is hung during the MSD IPL or CPM IPL to retry the IPL without losing the original dump information.

Prior to pressing function 22, check to see whether function 34 is available (00 shows in the panel after you select function 34). If it is available, then the system is attempting to run a main storage dump or power failure recovery (CPM) IPL. Using function 34 attempts to retry the IPL such that the original dump is not lost. If function 34 is not enabled (>FF shows in the panel after you select function 34), go back and start function 22. See “Function 22–Dump Main Storage.”

Service Extended Panel Functions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)

Service functions 50 through 99 are enabled when you select Manual mode and enter function 25 (service switch 1), then function 26 (service switch 2). Subfunctions are used with Functions 51 and 54 through 64.

You can disable the service functions by selecting and entering either function 25 (service switch 1) or function 26 (service switch 2).

Using Subfunctions: After you select and enter the function (51, or 54 through 64), the subfunction field appears with two asterisks (**). You can now select and enter a subfunction value. When you have selected and entered a value, actual data, YY FF (where YY is the function number), is displayed. The 'YY FF' response indicates that no data is present for this subfunction value. The data displays as 8 hexadecimal digits (4 bytes of data).

You can repeat these steps for different subfunction values. To exit subfunctions, select and enter the two asterisks for the subfunction value. Table 25 shows an example of a subfunction data display.

Table 25. Subfunction Data Display Example

Function	Subfunction	Data Display
51	**	Subfunction mode entered
51	00, 01	NIA (8 bytes)
51	02, 03	Current TDE (8 bytes)

Function 50–System Processor Stop: This function stops the system processor.

Attention: This function might cause the system to end abnormally. Use only when directed by your next level of support.

Function 51–System Processor Status: This function displays the following values:

- Next instruction address (NIA)
- Current task dispatching element (TDE) address

The data can be displayed 8 digits at a time. Select and enter a subfunction number to display each word of data from 00 to 0F.

Function 52–System Processor Start: This function starts the system processor (after it has stopped).

Function 53–Path Switch: This function resets communication between the service processor and the control panel.

Attention: Use this function only with proper supervision from your next level of support.

Low-Level Debug (LLD) panel functions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)

You can enable these functions by selecting Manual mode, stopping the system, and selecting Functions 25 and 26. Use these functions to analyze IPL errors. The following is a list of all the low level debug (LLD) panel functions and a description of each.

Function 54–Display I/O Configuration Table (ICT): The I/O configuration table (ICT) contains the state of every I/O bus unit (IOBU) and bus extension unit that

is found on system bus 1. Using this function helps determine the status of the load source IOP at the time of failure. To view data, display one word (4 bytes or 8 digits) at a time by selecting and entering a subfunction number from 00 to 3F.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 55–Display Service Processor Log Buffer (SPLB): The SPLB contains data that is related to the system’s stopping. You can display the data 8 digits at a time. Select and enter a subfunction number to display each word of data from 00 to FF.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 56–Display Service Processor Code Area (SPCA): The service processor code area (SPCA) contains the state of the system processor and service processor at the time of failure. This area contains data such as the failing load identifier (LID), which indicates what LID the service processor wanted from the load-source IOP. The data can be displayed 8 digits at a time. Select and enter a subfunction number to display each word of data from 00 to FF.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 57–Display IPL Message Area (IMSA): The IPL Message Save Area (IMSA) is a first-in-first-out queue of messages that were sent to the service processor before the time of failure. This area is useful in determining the sequence of events on the system I/O bus before the failure. The data can be displayed 8 digits at a time. Select and enter a subfunction number to display each word of data from 00 to 3F.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 58–Display IPL Parameter Area (IPARMS): The IPL parameters area contains the status of the type of IPL that you are performing. The data can be displayed 8 digits at a time. Select and enter a subfunction number to display each word of data from 00 to 08.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 59–Setting First and Second Characters of Address for MFIOP Control Storage Display: See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 60–Setting Third Character of Address for MFIOP Control Storage Display: See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 61–Setting Fourth Character of Address for MFIOP Control Storage Display: See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 62–MFIOP Control Storage Display: See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 63–System Status SRC Trace: The system status SRC trace is a copy of the last 25 status SRCs (those that are usually associated with the IPL sequence or the power-off sequence).

Enter a subfunction between hexadecimal 00 and 18 to look at the status SRCs in sequential order. The most recent SRC (the last status SRC) appears at subfunction hexadecimal 18.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 64–Diagnostic Status SRC Trace: The diagnostic status SRC trace is a copy of the last 25 status SRCs (those that are usually associated with the service processor function of problem analysis and main store dump).

Enter a subfunction between hexadecimal 00 and 18 to look at the status SRCs in sequence. You can see the most recent SRC (the last status SRC) at subfunction hexadecimal 18 and the extended SRC words for this SRC at subfunctions 19 through 1A.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 65–Deactivate Remote Service: Function 65 is available only when you have previously selected Manual mode and extended panel functions 25 and 26.

Use this function to deactivate a remote service session or iSeries 400 Operations Console. This function releases the communications port that was in use for a remote service session or iSeries 400 Operations Console.

Function 66–Activate Remote Service: Function 66 is available only when you have previously selected Manual mode and extended panel functions 25 and 26.

Use this function to activate a remote service session or iSeries 400 Operations Console. This function activates the communications port that is used by remote service or iSeries 400 Operations Console.

Function 67–Disk Unit IOP Reset/Reload: Function 67 is not available for all system types.

This function is used to initiate an IOP dump and a disk unit IOP reset/reload. The function is enabled only when specific SRCs are displayed on the control panel and the associated IOP supports a reset/reload function.

Function 68–Power off Disk Unit IOP/IOA Power Domain: Function 68 is enabled only by specific disk unit system reference codes (SRCs) such as disk-unit attention SRCs.

Function 69–Power on Disk Unit IOP/IOA Power Domain: Function 69 is enabled when the power domain is powered off.

Function 70–MFIOP Control Storage Dump: This function dumps the contents of the control storage from the MFIOP to segment identifier (SID) 0000000087 000000 (SID 87) on the load-source disk.

Control panel functions (Models 270, 8xx, SB2, SB3, and 890)

The control panel functions and descriptions are listed in Table 16 on page 156. For more details about the functions, begin at “Control panel function descriptions (Models 270, 8xx, SB2, SB3, and 890)” on page 173.

Notes:

1. Some control panel functions might not be available on all system types.
2. The x can be any number 0 through 9, any letter A through F, or a blank.
3. If the customer was performing the function, find out why the customer selected the function and verify whether it is complete.
4. If you cannot change the *Function/Data* display or complete the selected function, go to “Starting Point for All Problems” in the Problem Analysis information for your system.

Table 26. Control panel (32-character) function codes

Function code	Function selected
01	<ol style="list-style-type: none"> 1. Display the currently selected IPL type (and logical key mode on some system types). 2. Display the currently selected IPL speed override for the next IPL.
02	Used to select the IPL type, logical key mode, and IPL speed.
03	Start an IPL to load the system. The IPL uses the selected IPL options.
04	Lamp test; all displays and indicators will be switched on.
05	System Power Control Network (SPCN) system reference code (SRC); displays an SRC on the control panel.
07	Allows you to perform SPCN service functions.
08	Fast power off; to perform a fast power off, see “Powering Off and Powering On the System” in the Problem Analysis information for your system.
09 through 10	Reserved.
11 through 19	System reference code (SRC); displays an SRC on the control panel.
20	Display the machine type, model, processor feature code, processor class indicator, and IPL path description.
21	Causes the Use Dedicated Service Tool (DST) display to appear on the system console; to exit DST, select the <i>Resume operating system display</i> option.
22	Force system main storage dump. First see “Function 34–Retry MSD IPL” on page 182.. To perform a system main storage dump, see “Performing a main storage dump to disk (manual MSD)” on page 267.
23	Reserved.
24	Reserved.
25	Use Service switches 1 and 2 to enable or disable functions 50 through 99.
26	Use Service switches 1 and 2 to enable or disable functions 50 through 99.
27 through 32	Reserved.
33	Reorder SPCN addressing.
34	Retry MSD IPL.
35 through 49	Reserved.
50	System processing unit stop.

Table 26. Control panel (32-character) function codes (continued)

Function code	Function selected
51	System processing unit status; displays the following values: B0 register contents, Next Instruction Address (NIA), and current Task Dispatching Element (TDE) contents
52	System processing unit start.
53	Activates, deactivates, and queries the Repeat GARD function.
54	Reserved.
55	Main store dump override processing
56	Reserved.
57	Display service processor diagnostic data area addresses.
58	Set the first character of the base address for the function 62 display.
59	Set the second character of the base address for the function 62 display.
60	Set third character of base address for function 62 display.
61	Set fourth character of base address for function 62 display.
62	Display service processor storage.
63	System status SRC trace.
64	Service processor diagnostic status SRC trace.
65	Deactivate remote service.
66	Activate remote service.
67	Disk unit IOP reset/reload; enabled only by specific disk unit SRCs.
68	Concurrent Maintenance power domain Power Off.
69	Concurrent Maintenance power domain Power On.
70	Dump service processor control storage.
71–99	Reserved.
If you cannot find the function code in this chart, the customer support for added features or devices might not have been available when this information was produced. Look for any supplemental unit function code information for the function code you displayed on the control panel. If you do not find any additional function code information, go to "Function 04–Lamp Test" on page 177 and verify that the lamps are working correctly.	

Ways to access the control panel (Models 270, 8xx, SB2, SB3, and 890)

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.

Figure 75 on page 172 and Figure 76 on page 172 show the types of iSeries 400 control panels:

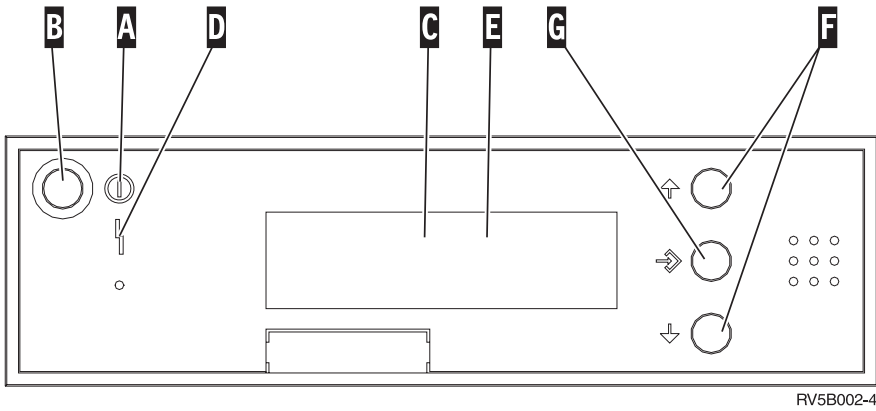


Figure 75. iSeries 400 control panel without a keystick

- A** Power On Light
 - A blinking light indicates power to the unit.
 - A constant light indicates that the unit is up and is working.
- B** Power Push button
- C** Processor Activity
- D** System Attention
- E** Function/Data Display
- F** Increment and Decrement buttons
- G** Enter Push button

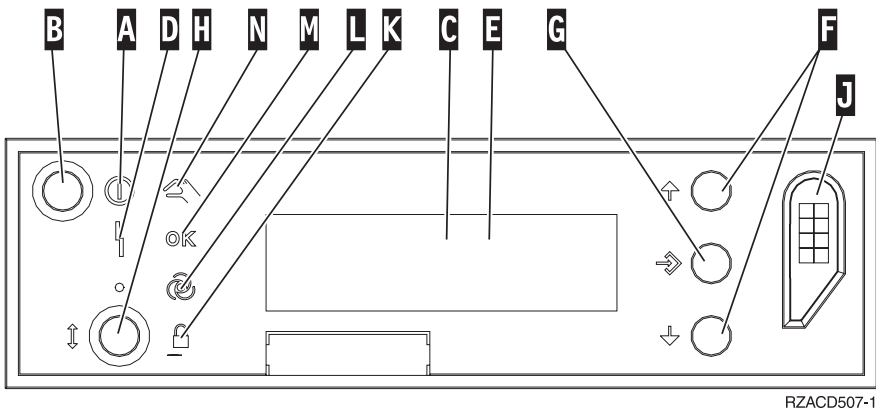


Figure 76. iSeries 400 control panel with a keystick

- A** Power On Light
 - A blinking light indicates power to the unit.
 - A constant light indicates that the unit is up and is working.
- B** Power Push button
- C** Processor Activity
- D** System Attention
- E** Function/Data Display

- F** Increment and Decrement buttons
- G** Enter Push button
- H** Mode Selects
- J** Electronic Keystick Slot
- K** Secure
- L** Auto
- M** Normal
- N** Manual

If your control panel looks like Figure 76 on page 172, before you can use **F** Increment and Decrement buttons and the **G** Enter push button, you need to press **H** Mode Selects to select Manual mode **N**.

To determine how to activate functions 01 and 02 on a control panel, do the following:

1. **Does the control panel have an electronic keylock (a keystick)?**

Yes No

↓ The IPL key mode (M or N only) is displayed. The IPL key modes, Auto and Secure, are not supported. Follow function 01 and 02 procedures for **system types that do not use a keystick**.

2. Insert the keystick.

Press the Mode-selection button to select the IPL mode. Follow function 01 and 02 procedures for **systems with an electronic keystick**.

To select a function number, press the Increment (↑) or Decrement (↓) button on the control panel. To activate the function, press Enter on the control panel while the desired function number is displayed.

Note: The function that is displayed is not activated until you press Enter on the control panel.

Control panel function descriptions (Models 270, 8xx, SB2, SB3, and 890)

Customer control panel functions (Models 270, 8xx, SB2, SB3, and 890)

Function 01–Display Selected IPL Type and IPL Speed (on Systems with a Keystick): This function allows you to **display** the selected type and speed for the next IPL.

1. Display IPL types (A, B, C, or D).
2. Display IPL speed (F, S, SE, V=F, or V=S).

When selected, function 01 displays the currently selected IPL type and IPL speed values (where each () represents 1 character):

Table 27. Function 01 on systems with a keystick

Function/data	Action or description
0 1 _	Use the Increment or Decrement buttons to scroll to function 01.
0 1 _ _ A _ _ _ _ V = F _ _ _ _ _ _ _ _ _ _ _ _ _ _	Valid IPL types are A, B, C, and D. Valid IPL speed displays are F, S, SE, V=F, or V=S.
0 1 _	Use the Increment or Decrement buttons to scroll through the control panel functions.

Function 01–Display Selected IPL Type, Logical Key Mode, and IPL Speed (on Systems without a Keystick): This function allows you to **display** the selected IPL type, logical key mode, and speed for the next IPL.

1. Display IPL types (A, B, C, or D).
2. Display the valid logical key modes (M or N).
3. Display IPL speed (F, S, SE, V=F, or V=S).

Table 28 shows a function 01 example on systems without a keystick.

Table 28. Function 01 on systems without a keystick

Function/data	Action or description
0 1 _	Use the Increment or Decrement buttons to scroll to function 01.
0 1 _ _ A _ _ M _ _ V = F _ _ _ _ _ _ _ _ _ _ _ _ _ _	Valid IPL types are A, B, C, and D. Valid logical key modes are M and N. Valid IPL speed displays are F, S, SE, V=F, or V=S
0 1 _	Use the Increment or Decrement buttons to scroll through the control panel functions.

Function 02–Select IPL Type and IPL Speed Override (on Systems with a Keystick): Before you can use function 02, you must have the system in Manual mode. Selection changes to IPL types can be done with the system powered on or off. Before you can select the IPL speed override, the system must be powered off.

Table 29 shows the sequence of selecting the IPL type on iSeries 400 systems that are powered on.

Table 29. Function 02 select IPL **type** on powered-on systems with a keystick

Function/data	Action or description
0 2 _	Use the Increment or Decrement buttons to scroll to function 02.
0 2 _ _ A < _	Press Enter to start function 02. The current IPL type is displayed with a pointer.
0 2 _ _ B < _	Use the Increment or Decrement buttons to scroll through the IPL types.

Table 29. Function 02 select IPL **type** on powered-on systems with a keystick (continued)

Function/data	Action or description
0 2 _	Press Enter to select the IPL type and exit function 02.
0 1 _	Use the Increment or Decrement buttons to scroll through the control panel functions.

Table 30 shows the sequence of selecting the IPL type and IPL speed on iSeries 400 systems that are powered off.

Table 30. Function 02 select IPL **type** and IPL **speed** on powered-off systems with a keystick

Function/Data	Action or Description
0 2 _	Use Increment or Decrement buttons to scroll to function 02.
0 2 _ _ A < _ _ _ _ _ V _ _ _ _ _ _ _ _ _ _ _ _ _ _	Press Enter to start function 02: <ul style="list-style-type: none"> The current IPL type is displayed with pointer. The current IPL speed is displayed.
0 2 _ _ B < _ _ _ _ _ V _ _ _ _ _ _ _ _ _ _ _ _ _ _	Use the Increment or Decrement buttons to scroll through the IPL types and speeds.
0 2 _ _ B _ _ _ _ _ V _ < _ _ _ _ _ _ _ _ _ _ _ _	Press Enter to select the IPL type. <ul style="list-style-type: none"> The current IPL type is displayed. The current IPL speed is displayed with a pointer.
0 2 _ _ B _ _ _ _ _ S _ < _ _ _ _ _ _ _ _ _ _ _ _	Use the Increment or Decrement buttons to scroll through the IPL speeds.
0 2 _	Press Enter to select the IPL speed and exit function 02.
0 1 _	Use the Increment or Decrement buttons to scroll through the control panel functions.

Function 02–Select IPL Type, IPL Speed Override, and Logical Key Mode (on Systems without a Keystick): You can use function 02 in either Normal mode or Manual mode. When the system is either powered on or off, this function allows you to **select** the IPL type and logical key mode. Before you can select the IPL speed override, the system must be powered off.

For powered-on systems without a keystick, function 02 is used to select the IPL mode and logical key mode. Table 31 shows an example of the function 02 IPL type and logical key mode selection sequence for a powered-on system that does not have a keystick.

Table 31. Function 02 select IPL **type** and **logical key mode** on powered-on systems without a keystick

Function/data	Action or description
0 2 _	Use the Increment or Decrement buttons to scroll to function 02.

Table 31. Function 02 select IPL **type and logical key mode** on powered-on systems without a keystick (continued)

Function/data	Action or description
0 2 _ _ A < _ M _	Press Enter to start function 02. <ul style="list-style-type: none"> The current IPL type is displayed with a pointer. The current logical key mode is displayed.
0 2 _ _ B < _ M _	Use the Increment or Decrement buttons to scroll through the IPL types.
0 2 _ _ B _ _ M < _	Press Enter to select the IPL type.
0 2 _ _ B _ _ N < _	Use the Increment or Decrement buttons to scroll through the logical key modes.
0 2 _	Press Enter to select the logical key mode and exit function 02.
0 1 _	Use the Increment or Decrement buttons to scroll through the control panel functions.

For powered-off systems without a keystick, function 02 is used to select the IPL type, logical key mode, and IPL speed indicators. Table 32 shows an example of the function 02 IPL type, logical key mode, and IPL speed selection sequence for a powered-off system that does not have a keystick.

Table 32. Function 02 select IPL **type, logical key mode, and IPL speed** on powered-off systems without a keystick

Function/data	Action or description
0 2 _	Use the Increment or Decrement buttons to scroll to function 02.
0 2 _ _ A < _ M _ _ _ _ V _	Press Enter to start function 02. <ul style="list-style-type: none"> The current IPL type is displayed with a pointer. The current logical key mode is displayed. The current IPL speed is displayed.
0 2 _ _ B < _ M _ _ _ _ V _	Use the Increment or Decrement buttons to scroll through the IPL types.
0 2 _ _ B _ _ M < _ _ _ _ V _	Press Enter to select the IPL type. <ul style="list-style-type: none"> The current IPL type is displayed. The current logical key mode is displayed with a pointer. The current IPL speed is displayed.
0 2 _ _ B _ _ N < _ _ _ _ V _	Use the Increment or Decrement buttons to scroll through the logical key modes.
0 2 _ _ B _ _ N _ _ _ _ V _ < _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	Press Enter to select the logical key mode. <ul style="list-style-type: none"> The current IPL type is displayed. The current logical key mode is displayed. The current IPL speed is displayed with a pointer.
0 2 _ _ B _ _ N _ _ _ _ S _ < _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	Use the Increment or Decrement buttons to scroll through the IPL speeds.

Table 32. Function 02 select IPL type, logical key mode, and IPL speed on powered-off systems without a keystick (continued)

Function/data	Action or description
0 2 _	Press Enter to select the IPL speed and exit function 02.
0 1 _	Use the Increment or Decrement buttons to scroll through the control panel functions.

Function 03–Start IPL: Function 03 is enabled only when the key mode is in Manual and the system power is on.

This function starts an IPL of the selected IPL type when you press the Enter button. All the Licensed Internal Code is loaded.

Attention: No system shutdown is performed before the IPL. The use of this function can cause loss of data.

Function 04–Lamp Test: This function shows whether any control panel indicators are burned out and whether characters that are displayed on the control panel *Function/Data* display are valid. When you activate this test, all the control panel lights and indicators flash on and off.

The lamp test continues on the system control panel until you perform another control panel function or a power procedure. The expansion unit control panel lamp test is active for 25 seconds and does not flash.

Use this procedure to verify that the lights on the system control panel are working correctly. If you cannot complete these steps, go to the “Starting Point for All Problems” in the Problem Analysis information for your system to start problem analysis.

1. Power on the system.
2. Press the Increment (↑) or Decrement (↓) buttons on the control panel to display Function 04.
Press Enter on the control panel.
3. Do all of the lights and indicators on the system control panel flash on and off?

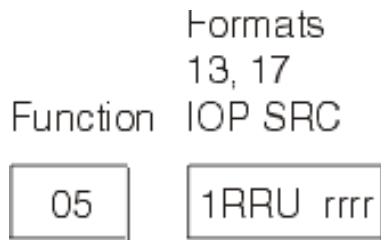
Yes	No
↓	Exchange the control panel or the replaceable unit that contains the control panel function [system unit backplane (MB1) or tower card (CB1)]. See “Removal and Installation Procedures” in the Problem Analysis information for your system.
4. Do the expansion unit control panel lights all come on?

Yes	No
↓	Exchange the control panel on the expansion unit.

The lights on the system control panel are working correctly.

This ends the procedure.

Function 05–SPCN SRC: Function 05 displays information about power faults and provides informational reference codes during disk-unit concurrent maintenance procedures. The format for this function is as follows:



RR = The frame number where the failing unit is installed
 U = The SPCN port to which the failing unit is connected
 rrrr = Unit reference code (URC)

Figure 77. SPCN SRC formats

Function 06: This function is reserved.

Function 07: Use this procedure to perform **Function 07** operations by using the system control panel in Manual mode.

To perform an SPCN operation that is controlled by function 07, do the following:

1. Select Function 07 and press Enter to display 07**.
2. Select the function that you want to perform (refer to Table 33). Use the Increment or Decrement buttons (↑↓) to scroll to the appropriate function. Press Enter to display 07nn 00, where nn is the function that you selected.

Table 33. SPCN functions in function 07

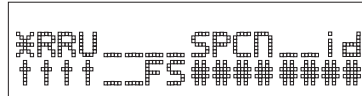
Function	Action or description
A1 (Power On)	Broadcasts a power-on command.
A2 (Turn Fan Off)	Turns off a selected fan in a selected frame (used only on the 840 Processor Tower).
A3 (Turn Power Supply Off)	Turns off a selected power supply in a selected frame (used only on the 840 Processor Tower).
A4 (Turn Fan On)	Turns on a selected fan in a selected frame (used only on the 840 Processor Tower).
A5 (Turn Power Supply On)	Turn on a selected power supply in a selected frame (used only on the 840 Processor Tower).
A6 (Display ID information)	Displays ID information (type, serial number, configuration ID) on the control panel of the selected frame (see Figure 78 on page 179). This function is available only for secondary panels.
A7 (Power ON/OFF)	Power a selected frame On or Off.
A8 (Query the SPCN Configuration ID)	Display the SPCN configuration ID number for a selected frame (see Figure 78 on page 179). This function must be used for a primary panel.

Table 33. SPCN functions in function 07 (continued)

A9 (Set the SPCN Configuration ID)	Set the SPCN configuration ID for a selected frame.
AA	Support-directed procedure only.
AB	Support-directed procedure only.
AC	Support-directed procedure only.

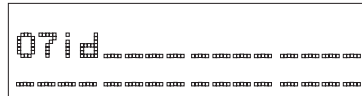
Figure 78 shows the diagram for function A6 or A8 on a Non-System unit panel and function A8 on a System unit panel..

(Non-System unit panel)



(RRU = Rack and Unit, id = Config ID)
(tttt = Box Type, FS##### = Frame Serial #)

(System unit panel)



(id = Config ID)

RZAQ2551-3

Figure 78. Operations diagram for functions A6 and A8

- Use the Increment (↑) or Decrement (↓) buttons to select the frame on which to perform the function that you selected in step 2 on page 178. Press Enter.
- If you selected function A2, A3, A4, or A5 in step 2 on page 178, select the appropriate fan or power supply listed in the following table to perform the operation on.

Fans	Power supplies
00=B01, 01=B02, 02=B03, 03=B04	00=P01, 01=P02, 02=P03, 03=P04, 04=P05, 05=P06

- If you selected function A6 or A8 in step 2 on page 178:
 - If a non-system unit address was selected in step 3, the non-system unit display panel should be blinking and displaying data as shown in Figure 78.
 - If a system unit address was selected in step 3, use the Increment (↑) or Decrement (↓) buttons to scroll to 07xx, where xx is the configuration ID.

The configuration IDs are defined as follows:

- 71 - xSeries Server Tower
- 80 - FC 5065/5066
- 81 - FC 5074/5079/8079
- 82 - FC 9079
- 83 - Model 830/SB2
- 84 - FC 5078/0578
- 89 - FC 5088/0588
- 8A - FC 5094/5294
- 8B - FC 5095
- 90 - FC 5075
- 91 - Model 270 CCIN 22A2, 22A4, 22A5, 2422 without FC 7104
- 92 - Model 270 CCIN 24A0, 24A2 without FC 7104
- 93 - Model 820 iSeries 400
- 95 - Model 270 CCIN 22A2, 22A4, 22A5, 2422 with FC 7104

96 - Model 270 CCIN 24A0, 24A2 with FC 7104
98 - Model 890
99 - FC 9094
A1 - Model 825

6. If you selected function A7 in step 2 on page 178, select either C1 to power ON the frame or C2 to power OFF the frame.
7. If you selected function A9 in step 2 on page 178:
 - If a non-system unit address was selected in step 3 on page 179, the non-system unit panel should be blinking and displaying data as shown in Figure 78 on page 179.
 - a. Use the Increment (↑) or Decrement (↓) buttons on the system unit control panel to select the correct configuration ID from the table in step 5 on page 179 (07nn should be displayed, where nn is the configuration ID).
 - b. Press Enter (07nn 00 should be displayed). After a few seconds, the non-system unit display should stop blinking and return to displaying the frame address.
 - If a system unit address was selected in step 3 on page 179:
 - a. Use the Increment (↑) or Decrement (↓) buttons on the system unit control panel to select the correct configuration ID from the table in step 5 on page 179. (07nn should be displayed, where nn is the configuration ID.)
 - b. Press Enter. On models 270 and 820, the control panel displays a series of bring-up SRCs and then displays function 01. On a model 830 or FC 9079, the control panel displays 07nn00.
8. When you have completed these steps, return to the normal panel display:
 - a. Scroll to 07** using the Increment or the Decrement buttons.
 - b. Press Enter.

This ends the procedure.

Function 08–Fast Power Off: Function 08 is enabled only when the key mode is in Manual and the system power is on.

Use this function when the system is suspended and you cannot perform a power down.

The first time that you select function 08 and press Enter, the system displays an attention SRC, 11 A1xx 8008. This SRC indicates that you selected Function 08. The second time that you select function 08 and press Enter, you confirm the request to power off. To perform a fast power off, see “Powering Off and Powering On the System” in the Problem Analysis information for your system.

Attention: No system shutdown is performed before the IPL. The use of this function can cause loss of data.

Attention: If the system password was changed at the most recent IPL, performing a fast power off might cause that new password information to be lost.

Functions 09 to 10–Reserved: These functions are reserved for future control panel operations.

Functions 11 to 19–System Reference Code: Functions 11 through 19, if enabled, represent the words of the SRC.

You should record SRC information for error reporting.

For more information on interpreting SRCs, go to Chapter 6, “System Reference Code (SRC) Information,” on page 187.

To use the SRC for problem analysis, go to the “Starting Point for All Problems” in the Problem Analysis information for your system.

Function 20–System Type, Model, Feature Code, Hardware Level, and IPL Path

Description: This function displays the machine type, model, processor feature code, hardware level, and IPL path description in the following format:

```
t m m m c c c c _ _ _ _ _ _ _ _  
h h h h _ _ _ _ i i i i i i i i
```

Values for t indicate the machine type:

- 1 9401
- 2 9402
- 4 9404
- 6 9406

Values for m indicate the model:

mmm Model number (for example, 820)

Values for c indicate the system processor feature code:

cccc Processor feature code (for example, 23A4)

Values for hhhh indicate the system processor hardware level:

hhhh Processor hardware level (for example, 1025)

Values for iiiiii indicate the description of the system power on or re-IPL path:

iiiiiii IPL path description (for example, 00000001 indicates that the system was powered on by using the white button on the control panel).

You should record this information with the SRC.

Extended control panel functions (Models 270, 8xx, SB2, SB3, 890)

The extended control panel functions consist of two major groups:

- Functions 21 through 49, which are available when you select Manual mode.
- Support service representative Functions 50 through 99, which are available when you select Manual mode, then select and enter the customer service switch 1 (Function 25), followed by service switch 2 (Function 26).

Note: When a function has no data to display, FF is shown.

Customer Extended Panel Functions (Models 270, 8xx, SB2, SB3, 890)

Function 21–Make DST Available: This function makes DST available on the system console display. The *Use Dedicated Service Tools (DST)* display appears on the primary or alternative console. For more information on the console, see “Determining a primary or alternative console” on page 126.

To exit DST and return to the operating system, select the *Resume operating system display* option on the Use Dedicated Service Tools (DST) display.

For more information, see Chapter 1, “Dedicated Service Tools (DST),” on page 1.

Function 22–Dump Main Storage: This function dumps main storage and processor data to the disk.

Note: Prior to pressing function 22, check to see whether function 34 is available (00 shows in the panel after you select function 34). If it is available, then the system is attempting to run a main storage dump IPL. Using function 34 attempts to retry the IPL such that the original dump is not lost. If function 34 is not enabled (>FF shows in the panel after you select function 34), go back and start function 22.

The first time that you select function 22 and press Enter, the system displays attention SRC 11 A1xx 3022. This indicates that you selected function 22. To dump main storage and system processor data to the disk, you must select function 22 again and press Enter. See “Performing a main storage dump to disk (manual MSD)” on page 267.

Use this function only when a main storage dump is necessary, for example, a suspended (system hang) condition or after an operating system failure.

Attention: No system shutdown is performed before the main storage dump. The use of this function can cause loss of data. See “Function 34–Retry MSD IPL.”

Functions 25 and 26–Service Switches 1 and 2: In function 25, the service representative switch 1 is set. Function 25 is the first step necessary to set the service function range (50 to 99).

In function 26, the service representative switch 2 is set. Function 26 is the second step necessary to set the service function range (50 to 99).

Function 33–Reorder SPCN Addressing: This function puts the rack addresses in the correct order to show their position in the System Power Control Network (SPCN). Use it when you have added racks to or removed them from the system.

Function 34–Retry MSD IPL: Function 34 is enabled only for main storage dump IPLs. You can use it when the system is hung during the MSD IPL to retry the IPL without losing the original dump information.

Service Extended Panel Functions (Models 270, 8xx, SB2, SB3, 890)

Service functions 50 through 99 are enabled when you select Manual mode and enter function 25 (service switch 1), then function 26 (service switch 2). Subfunctions are used with Functions 51 and 57 through 64.

To enable functions 50 through 99:

1. Select function 25 and press Enter. The display reads 25 00.
2. Use the Increment button to select function 26 and press Enter. The display reads 26 00.

Functions 50 through 99 are now available.

You can disable the service functions by selecting and entering either function 25 (service switch 1) or function 26 (service switch 2).

To disable functions 50 through 99, select function 25 and press Enter. Functions 50 through 99 are then no longer available.

Using Subfunctions: To work with subfunctions, do the following:

1. Use the Increment or Decrement buttons to select the appropriate function and press Enter. The function number appears with asterisks (**); for example, 57**. The two asterisks indicate that subfunctions are available.
2. Press the Increment button. The first subfunction number appears; for example, 5700.
3. As the subfunction number is displayed, press Enter. The data associated with the subfunction number is displayed.
4. Press the Increment button. The next subfunction number appears; for example, 5701.
5. As the subfunction number is displayed, press Enter. The data associated with the new subfunction number is displayed.
6. Repeat these steps to gather all the data that is associated with the subfunction.
7. Use the Increment or Decrement buttons to return to the function display with asterisks; for example 57**.
8. Press Enter to exit the subfunctions.

Function 50–System Processor Stop: This function stops the system processor.

Attention: This function might cause the system to end abnormally. Use only when directed by your next level of support.

Function 51–System Processor Status: This function displays the following values:

- Next instruction address (NIA)
- Current task dispatching element (TDE) address

The data can be displayed 8 digits at a time. Select and enter a subfunction number to display each word of data from 00 to 0F.

Table 34 is an example of a subfunction data display that shows NIA and TDE information.

Table 34. Subfunction data display example

Function	Subfunction	Data Display
51	**	Subfunction mode entered
51	00, 01	NIA (8 bytes)
51	02, 03	Current TDE (8 bytes)

Function 52–System Processor Start: This function starts the system processor (after it has stopped).

Function 53–Repeat GARD: The purpose of the Repeat GARD function is to permanently de-configure an intermittently failing processor in case the IPL diagnostics cannot detect the failure and de-configure it. Repeat GARD will

de-configure the failing processor during the IPL following the failure. The failing processor must be replaced or the Repeat GARD function must be cleared before that processor can be used again.

Attention: This function can cause a good processor to be permanently de-configured following a power failure. Use only when directed by your next level of support.

1. Select Function 53 and press Enter to display 53**.
2. Select the function you want to perform (refer to table below). Use the Increment or Decrement button to scroll to the appropriate function. Press Enter to display 53nn, where nn is the function that you selected.

Table 35. Repeat GARD Functions in Function 53

Function	Action or Description
00	Clear memory, processor, L3 Repeat GARD
01	Enable memory, processor, L3 Repeat GARD
02	Disable memory, processor, L3 Repeat GARD
03	View enable/disable status (E – enabled, D – disabled)

Function 55–Override of Main Store Dump: The purpose of the main store dump override function is to allow service representatives to modify the dump policy implemented in the microcode. Once an override is set, it will stay in effect until another override selection has been made.

1. Select Function 55 and press Enter to display 55**.
2. Select the function you want to perform (refer to the table below). Use the Increment or Decrement button to scroll to the appropriate function. Press Enter to display 55nn, where nn is the function that you selected.

Table 36. Override of Main Store Dump Functions in Function 55

Function	Action or Description
00	View current setting
01	No override. Normal operation, where all main store dumps requested will be taken.
02	No main store dump. No portion of the dump will be taken and the system will simply terminate with the failing SRC.
03	Complete hardware dump. Use only when directed by your next level of support.
04	Base abbreviated hardware dump. Use only when directed by your next level of support.
05	Checkstopped hardware dump. Use only when directed by your next level of support.
06	Checkstopped with software registers hardware dump. Use only when directed by your next level of support.

Low-Level Debug (LLD) panel functions (Models 270, 8xx, SB2, SB3, and 890)

You can enable these functions by selecting Manual mode and selecting Functions 25 and 26. The following is a list of all the low-level debug (LLD) panel functions and a description of each.

Function 57–Display Service Processor Diagnostic Data Area Addresses: These addresses can be used to display debug data in function 62.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 58–Setting First Character of the Base Address for the Function 62 Display: See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 59–Setting Second Character of the Base Address for the Function 62 Display: See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 60–Setting Third Character of Address for Function 62 Display: See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 61–Setting Fourth Character of Address for Function 62 Display: See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 62–Display Service Processor Storage: This function displays service processor storage starting at the address that has been set with functions 58 through 61. See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 63–System Status SRC Trace: The system status SRC trace is a copy of the last 25 status SRCs (those that are usually associated with the IPL sequence or the power-off sequence).

Enter a subfunction between hexadecimal 00 and 18 to look at the status SRCs in sequential order. The most recent SRC (the last status SRC) appears at subfunction hexadecimal 18.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 64–Diagnostic Status SRC Trace: The diagnostic status SRC trace is a copy of the last 25 status SRCs (those that are usually associated with the service processor function of problem analysis and main store dump).

Enter a subfunction between hexadecimal 00 and 18 to look at the status SRCs in sequence. You can see the most recent SRC (the last status SRC) at subfunction hexadecimal 18 and the extended SRC words for this SRC at subfunctions 19 through 1A.

See “Low-level debug and data collecting procedures” on page 129 for more information.

Function 65–Deactivate Remote Service: Function 65 is available only when you have previously selected Manual mode and extended panel functions 25 and 26.

Use this function to deactivate a remote service session or iSeries 400 Operations Console. This function releases the communications port that was in use for a remote service session or iSeries 400 Operations Console.

Function 66–Activate Remote Service: Function 66 is available only when you have previously selected Manual mode and extended panel functions 25 and 26.

Use this function to activate a remote service session or iSeries 400 Operations Console. This function activates the communications port that is used by remote service or iSeries 400 Operations Console.

Function 67–Disk Unit IOP Reset/Reload: Function 67 is not available for all system types.

This function is used to initiate an IOP dump and a disk unit IOP reset/reload. The function is enabled only when specific SRCs are displayed on the control panel and the associated IOP supports a reset/reload function.

Function 68–Power off Disk Unit IOP/IOA Power Domain: Function 68 is enabled only by specific disk-unit system reference codes (SRCs) such as disk-unit attention SRCs.

Function 69–Power on Disk Unit IOP/IOA Power Domain: Function 69 is enabled when the power domain is powered off.

Function 70–Dump Service Processor Control Storage: This function saves the contents of the service processor control storage into nonvolatile storage for potential use from an error log.

Chapter 6. System Reference Code (SRC) Information

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Introduction

The system reference code (SRC) is a sequence of data words (codes) that:

- Identifies a system status
- Describes a detected hardware, Licensed Internal Code (LIC), or software failure
- Describes the unit that is reporting the failure and its location

SRCs can display on the control panel, appear in a system console message, appear in the primary partition's console for secondary partitions, or appear in the product activity log (see Chapter 3, "Product Activity Log," on page 97). For details on how SRC information displays on the control panel, see "SRC formats."

The system gathers information about an error as the system detects the error. The Product Activity Log (PAL) records and stores the error information. An SRC encodes information used to evaluate or identify a system-detected hardware or software error, failure, or status. The failure information may include the failing condition or part (or unit) that can be exchanged or replaced and its location. The SRC links to the problem determination procedure when the element detecting the failure cannot isolate the failing condition. The SRC link completes the isolation process.

In summary, the SRC provides the first-failure-data-capture information. The customer or support representative uses SRCs during problem determination, repair actions, and verification. The SRC provides a link to the problem determination procedures (hard or soft copy). Use the SRC and the problem determination procedures to isolate the problem.

SRC formats

Models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, S10, S20, S30, and S40

The control panel automatically displays the Function 11 word when it shows the SRC (see "Word 1 - SRC general information" on page 189). You can select other words (Functions 12 through 19) by using the control panel Increment (↑), Decrement (↓), and Enter pushbuttons. Some portions of the SRC record might not contain data. SRC records vary in length (up to 36 bytes) and display as described in the following sections.

SRC records show with a -3 next to the function number in the Function/Data display on all stage 3 hardware iSeries 400 System Units (for example, 11-3 xxxx xxxx). The -3 indicates that the system uses stage three hardware. For

more information on stage three formats or hardware stages, see Appendix C of *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

The SRC record structure provides information about the machine at the time of the failure.

For models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, S10, S20, S30, and S40, SRCs may consist of up to nine "data words". A word (a word = 4 bytes of sequential data) consists of 8 hexadecimal characters (0-9 or A-F). The function number corresponds to the function on the control panel or Work with Partition Status display that shows the specific word of the SRC. For these systems the word number corresponds to the function number. For example, only word 1 (previously called word 11 to match the function number) of the SRC appears in function 11. See Table 37.

Models 270, 8xx, SB2, and SB3

Models 270, 8xx, SB2, and SB3 have a larger control panel than previous models. They can display up to four words at a time. In addition, the first word of the SRC can consist of ASCII or hexadecimal characters. The other eight words of the SRC still consist of hexadecimal data. Function 11 still displays the first word of the SRC, which can contain 8 to 32 characters (expanded word 1). In the Product Activity Log (PAL) and other software displays, the SRC appears much like it does for earlier releases, except for the possibility of word 1 containing up to 32 characters. Words display as a number from 1 to 9 instead of 11 to 19, thus disassociating the word number from the function number. Refer to Chapter 3, "Product Activity Log," on page 97 for more information on the PAL and SAL. Refer to Table 37 to see the new format.

Example SRC record structure (all models)

Table 37. Example SRC record structure

Models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, S20, S30, and S40		Models 270, 8xx, SB2, and SB3		
Function	Function	Characters	Word	Description
11	11	1-8	1	The leftmost 4 characters displayed describe the reference code identifier (usually the unit reporting error). The rightmost 4 characters are the unit reference code.
	11	9-32	Extended Word 1	
12	12	1-8	2	Displays general system state information.
13	12	9-16	3	Displays additional information about the failure, such as location of the unit, sense data, and serial number.
14	12	17-24	4	
15	12	25-32	5	
16	13	1-8	6	Note: For some systems, Word 14 displays the unit address in eight digits.
17	13	9-16	7	
18	13	17-24	8	
19	13	25-32	9	

Notes:

1. Select Function 20 to display iSeries 400 machine type, model number, and processor feature code.
2. For Functions 14 through 19, data might not display for some SRCs.

Word 1 - SRC general information

Word 1 is the 8-digit SRC. The SRC includes a 2-byte unit reference code (URC) and variable length configuration and supporting data. The URC is located in the second half of Word 1 of the SRC. This SRC (including the URC) is used during problem analysis. You can identify the type of SRC record by the first digit in Word 1 using Table 38.

Identifying SRCs

The type of SRC can be identified by the first digit in the function 11 data display as follows:

Function display	Description
11 0xxx xxxx to 11 9xxx xxxx	Hardware reported error.
11 Axxx xxxx	Attention or action required. The system is waiting for a user action. Example: This type of SRC is displayed on a tape IPL if the tape unit is not ready.
11 Bxxx xxxx	Machine check or internal error detected by Licensed Internal Code. A Licensed Internal Code component detected a system error. The problem could be failing hardware or software. Follow the unit reference code tables.
11 Cxxx xxxx	IPL status. Status SRCs are displayed to indicate the progression of the IPL. These values can be: <ul style="list-style-type: none"> • C1xx xxxx service processor • C2xx xxxx secondary partition • C3xx xxxx system processor • C5xx xxxx LIC system hardware initialization • C6xx xxxx Licensed Internal Code (LIC) • C9xx xxxx OS/400 Operating System • Dxxx xxxx Diagnostic or power down status
11 Dxxx xxxx	General system status. Status SRCs are displayed to indicate the status of system functions when the console is not available. Some of these functions are main storage dump or delayed power off. Note: x = any hexadecimal number

Table 38. General System Reference Codes (SRCs)

Problem	SRC	Description
Machine problems	0xxx xxxx	Problem reported by control panel
	1xxx xxxx	Problem reported by system power control network
	2xxx xxxx through 9xxx xxxx	Hardware machine check, usually IO related
	B006 xxxx	IOP common code
	B1xx xxxx	Service processor machine check
	B143 xxxx	Service Processor PAL entry
	B2xx xxxx	LPAR error conditions
	B3xx xxxx – B4xx xxxx	System processor hardware machine check
	B6xx xxxx	LIC machine check and LPAR configuration machine check
	B8xx xxxx	LIC resource management

Table 38. General System Reference Codes (SRCs) (continued)

Problem	SRC	Description
	B9xx xxxx	Operating system machine check (See <i>iSeries OS/400 Diagnostic Aids</i>)
Operator intervention	A1xx xxxx	Operation interruption by service processor
	A6xx xxxx	Operation intervention by LIC
	A9xx xxxx	Operation interruption by operating system
IPL status	C1xx xxxx	IPL status for the service processor
	C2xx xxxx	General status for normal LPAR power on
	C3xx xxxx	IPL status for the system processor
	C5xx xxxx	IPL status for system hardware initialization
	C6xx xxxx	IPL status for LIC
	C6xx 4400	Automatic main storage dump recovery (IPL) status
	C6xx 441x	Automatic power failure recovery (IPL) status
	C6xx 4500 through 4509	DST IPL status
	C9xx xxxx	IPL status for OS/400 operating system program. See <i>iSeries OS/400 Diagnostic Aids</i>
General status	D1xx xxxx	General status for the service processor
	D2xx xxxx	General status for normal LPAR power off
	D6xx xxxx	General status for Main Storage Dump Manager, LIC run-time status, or LIC power off
	D9xx xxxx	Power down status for OS/400 operating system program. See <i>iSeries OS/400 Diagnostic Aids</i>

Word 2 - System status information

Word 2 provides a fixed location for information common to all SRCs shown on the control panel. It is available for all SRC formats except power and control panel. The service processor provides this information at the time the SRC is displayed to the panel.

Notes[®] for status indicators listed below:

1. For the coding of **M**, Main storage dump indicator, see “Main Storage Dump Indicator (M).”
2. For the coding of **I**, IPL state indicator, see “IPL State Indicator (I)” on page 191..
3. For the coding of **G**, IPL type last initiated indicator, see “IPL Type Last Initiated Indicator (G)” on page 191.

Status indicators

Main Storage Dump Indicator (M): The first hexadecimal digit that is displayed in Word 2 indicates whether the system started a main storage dump and if it was successful. The indicator has the following meanings:

M	Description
0	Dump was not initiated
1	Debug data exists, destructive data only
2	Debug data exists, main storage only
3	Debug data exists, main storage and destructive data only
4	Debug data exists, partial dump (hardware data only)
5	Debug data exists, hardware and destructive data only

- 6 Debug data exists, full dump (main storage and hardware data)
- 7 Debug data exists, extended dump (main storage, hardware data, and destructive data)
- 8 Debug data exists; dump failed after writing segment identifier (SID) 82 to disk
- 9 No debug data exists, destructive data access failed
- A No debug data exists, main storage dump failed
- B No debug data exists, destructive and main storage access failed
- C No debug data exists, partial dump failed
- D No debug data exists, hardware dump failed
- E No debug data exists, full dump failed
- F No debug data exists, extended dump failed

IPL State Indicator (I): The second digit that is displayed in Word 2 indicates how far the IPL went on before the system displayed the SRC. The indicator has the following meanings.

Hex Digit

IPL State Description

- 0 Service processor IPL from start-up code in progress
- 1 IPL from random access memory (RAM) is running
- 2 Service processor task initialized
- 3 LIC initialization completed
- 4 Operational load of LIC is complete
- 5 Bus manager initialized
- 6 Main Storage initialization is complete
- 7 Load Source DASD connection established
- 8 Dedicated Service Tool (DST) or limited paging available
- 9 Storage management directories verified
- A Authority structures verified
- B Indexes verified
- C Database verified
- D LIC hand-off to operating system
- E IPL is complete to sign on display
- F Power down attempted

IPL Type Last Initiated Indicator (G): The third hexadecimal digit that Word 2 displays indicates the IPL type (IPL mode and environment) of the last IPL performed, or the IPL running at the time of the failure. The IPL type for models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, S20, S30, and S40 is coded as shown in Table 39 on page 192. The IPL type for models 270, 8xx, SB2, and SB3, is coded as shown in Table 40 on page 192.

Table 39. IPL type indicator (models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, S20, S30, and S40)

	IPL Type A	IPL Type B	IPL Type C	IPL Type D
Power-on IPL	A	B	C	D
Programmed IPL	1	2	3	4
Function 3 IPL	5	6	7	8
MSD IPL	9	E	F	N/A
Unknown IPL type (Service Processor has been reset)	0	0	0	0

A *Power-on IPL* (first row in the table) includes the IPL that occurs automatically when someone turns on the main power switch or starts power after a power failure. It also includes an IPL started by the timer and a remote IPL started by a communication line.

A *Programmed IPL* is an IPL that results from the PWRDWN SYS command with Restart=Yes*FULL specified.

A *Function 3 IPL* uses the selected IPL options to load the system. It is started by selecting Function 03 on the control panel and pressing the Enter key.

Selecting IPL types A or B (type C is reserved) with Function 02 causes an IPL from different areas on the load source DASD. IPL type D is from the alternative load-source device, such as a tape or optical device.

Table 40. IPL Type Indicator (models 270, 8xx, SB2, and SB3)

	IPL Type A	IPL Type B	IPL Type C	IPL Type D
Unknown IPL type (Service Processor has been reset)	0	0	0	0

System Reference Codes (SRCs)

Notes:

1. For information about general status SRCs, see "General status SRCs" on page 210..
2. For information about IPL status SRCs, see "IPL status SRCs" on page 197.
3. For detailed information about B6xx LIC SRCs, see *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.
4. For detailed information about B9xx OS/400 SRCs, see *iSeries OS/400 Diagnostic Aids*.
5. For information about other SRCs, see the Problem Analysis information for your system model.

General system and Unit Reference Code (URC) information

System Reference Codes (SRCs)

Attention! This book does not list all SRCs. Start problem analysis with the Problem Analysis information for your system model.

Table 38 on page 189 shows how SRCs are grouped. The SRC is a variable length structure.

The SRCs are displayed as a sequence of words that may be displayed by selecting different control panel functions. Function 11 is shown automatically when an SRC is shown. You may select additional functions through function 20 by using the Increment/Decrement (↑ ↓) switches and the Enter button. There is also an option to include reference code details from the Work with Partition Status display. You can also select SRC history option from the Display Partition Info menu.

The System Reference Code (SRC) Format Description: The format of the SRC that you see depends on the system or server.

For more details about SRCs, refer to the following resources:

1. *iSeries Information Center*
2. *iSeries Information Center, System Administration --> Logical Partitions* topic (for using SRCs to troubleshoot logical partitions)
3. Problem Analysis book for your system type (for service representatives)
4. *iSeries Licensed Internal Code Diagnostic Aids - Volume 1, LY44-5900-05* (for service representatives)
5. *iSeries OS/400 Diagnostic Aids, LY44-5907-05* (for service representatives)

Hardware Related System Reference Code Formats: Use Table 41 to determine the SRC format. See "SRC formats" on page 187 for other formats.

Table 41. Hardware-related SRC formats

Word	IOP SRC Format 17 Data	Device SRC Format 27 Data	IOP SRC Format 13 Data
1	TTTT RRRR	tttt rrrr	TTTT RRRR
2	MIGV EP17	MIGV EP27	MIGV EP13
3	BBBB Ccbb	BBBB Ccbb	BBBB Ccbb
4	@@@@ @@@@	@@@@ @@@@	@@@@ @@@@
5	TTTT LMMM	tttt lmmm	TTTT LMMM
6	tttt lmmm	TTTT LMMM	uuuu uuuu
7	ZZZZ rrrr	ZZZZ RRRR	uuuu uuuu
8	ssss ssss	ssss ssss	uuuu uuuu
9	uuuu uuuu	uuuu uuuu	uuuu uuuu
Function 20	Pxxx cccc	Pxxx cccc	Pxxx cccc

The symbols used in Table 41 are defined as follows:

- @@@@** Unit address
- BBBB Ccbb** Bus, bus, card, and board address (direct select address)
- lmmm** Level indicator plus 3+digit model number of failing device
- LMMM** Level indicator plus 3+digit model number (for example, 6100 or 6150)
- M** Main storage dump indicator
- rrrr** Outboard failing unit reference code

RRRR	Unit reference code
ssss	Serial number of failing unit
tttt	Outboard failing unit type number (for example, 9337)
TTTT	Type number or card identification number (hex 2xxx through 9FFF)
uuuu	Unit specific data
V	Additional SRC information exists
ZZZZ	Reserved
Pxxx	Machine type and model, where P is the machine type and xxx is the model: <ul style="list-style-type: none"> • If P=6, the type is 9406 • If P=4, the type is 9404 • If P=2, the type is 9402
MIGV EP	General system status

For a description of the SRC, see Chapter 6, "System Reference Code (SRC) Information," on page 187.

Logical Partition Work with Partition Status System Reference Code

Descriptions and Actions: The following B2pp xxxx (where pp=partition ID) system reference codes only appear on the Work with Partitions Status display. They appear only in the Primary partition, and describe error conditions encountered during the IPL sequence of secondary partitions. Press F10 to monitor SRCs. Press F9 to see additional SRCs. Under the Display Partition Information display, there is an option to display SRC history of up to 200 SRCs and their additional words for one or all partitions.

LIC Detected Problem Reference Code Formats:

Table 42. SRC formats when LIC detects a problem

Word	LIC Format 60 Data	LIC Format 61 Data	LIC Format 62 Data
1	A6xx RRRR	B6xx RRRR	B6xx RRRR
2	MIGV EP60	MIGV EP61	MIGV EP62
3	CCCC 0000	cccc cccc	cccc cccc
4	BBBB Ccbb	pppp pppp	pppp pppp
5	@@@@ @@@@	qqqq qqqq	qqqq qqqq
6	TTTT mmmm	qqqq qqqq	qqqq qqqq
7	ssss ssss	qqqq qqqq	BBBB Ccbb
8	NNNN 0000	qqqq qqqq	TTTT mmmm
9	0000 0000	qqqq qqqq	0000 0000

Table 42 represents the formats for Licensed Internal Code (LIC) SRCs.

- Format 60 is used for LIC Attention SRCs.
- Format 61 is used when LIC detects a LIC programming problem.
- Format 62 is used when LIC detects an IOP Bus or IOP programming problem.

RRRR LIC unit reference code (URC).

- cccc** LIC *Component Reference Code* (CRC). Identifies the LIC component and subcomponent that generated the SRC.
- pppp** LIC *Program Reference Code* (PRC). Identifies the LIC class or component that generated the SRC and the specific error detected.
- qqqq** LIC *Program Reference Code Qualifier*. SRC words found at functions 15-3 through 19-3 or 15-3 and 16-3, depending on the format, provide additional error isolation information that is specific to the Program Reference Code. One or more of these words may be '0000 0000'. *Format 61* has up to 5 words of PRC Qualifier, in words 5-9. The PRC determines the *number* of PRC qualifier words. The *content* of words 5-9 is dependent on the value in word 4. *Format 62* has the PRC qualifier ONLY in words 5-6; there is physical address and type information in words 7-9.

BBBB Ccbb

Bus/Card/Board identifiers of failing component (direct select address)

@@@@ Unit address

ssss Serial number of failing unit

TTTT Type number or card identification number of failing component (hex 2xxx through 9FFF). May be 0000, if system data is not available at the time the SRC is signaled.

ZZZZ Reserved

mmmm

Model number of failing component (hex 2xxx through 9FFF). May be 0000, if system data is not available at the time the SRC is signaled.

CCCC Cause code

NNNN

Number of disk device facilities missing

MIGV EP

General system status (see Chapter 6, "System Reference Code (SRC) Information," on page 187 for more information.)

x Any hexadecimal number

Notes:

1. For information about Function 11 and 12, refer to Chapter 6, "System Reference Code (SRC) Information," on page 187.
2. Format 60 may contain data in a format other than that shown. Format 60 is an old VLIC format, which some new LIC components use. It does not have the component reference code and program reference code that format 61 and 62 have (61 and 62 were specifically defined for the new LIC). Format 60 is mostly component-specific with no key information to indicate format (the developer has to interpret it). Refer to the Problem Analysis information and perform the problem isolation procedure used by the reference code to further define any significant data.

LIC Unit Reference Code Groups

The four-digit unit reference codes follow. These codes are grouped by their first 2 or 4 digits. The groups are:

Group Number	Description
00-01	Machine Check Handler
02	Storage Mgmt

03	Exception Mgmt
04	IPL
05	Process Mgmt
06	Resource Mgmt
07	Modula-2 Support
08	LID Manager
09	Link Loader
0B	Authority
10	Tasking / Queueing
11	Machine Facilities
12	Database
13	Journal
14	Reclaim
15	Translator
16	Source/Sink
17	Common Error Types
18	Power IPL status
19	MUTEX
20-27	Hardware-related errors
30	MSD from Hypervisor
40	IPL status
41	Install IPL status
42	Storage Mgmt IPL status
43	LinkLoader IPL & runtime status
440x	Main store dump IPL status
441x	Continuously Powered Main Storage IPL Status
45	DST IPL status
4A-4F	Database IPL status
50	DST status
5120-5128	LIC Common machine check
52	I/O processor failure
53	Logical partition configuration
55	I/O DASD subsystem status
69	I/O hardware error
70-71	Communications
72	UPS Interface
74	JAVA Virtual Machine

77	I/O HRI
78	Private Address Space Environment
CE	Remote DST
CF	Optical I/O Subcomponent
F1	Hypervisor
FD	LIC Error

Each reference code is divided into these sections:

- Description
- Service recovery action
- Service problem analysis procedure

To determine the meaning and service action for the SRC, use the “Diagnostic Aids” or the “Problem Analysis” document for the system model that has the error.

A main storage dump is taken for most of the LIC URCs unless otherwise indicated in the description of the URC.

SPCN informational concurrent maintenance SRCs

1xxx 01xx	Install hardware unit
1xxx 02xx	Remove hardware unit
1xxx 03xx	Hardware unit is installed
1xxx 04xx	Hardware unit is removed
1xxx 05xx	No action was detected; the bus was released
1xxx 07xx	No action was detected; regulator is turned off
1xxx 08xx	Blower turned off for concurrent maintenance
1xxx 09xx	Bulk turned off for concurrent maintenance

IPL status SRCs

As the system performs an IPL, SRCs appear on the control panel. The SRCs indicate the status of the IPL and are often useful in problem analysis. The following list provides information on the IPL process and shows some of the SRCs (in numeric order) that can appear during an IPL.

IPL SRC

Function Performed

C1xx 1xxx	Service Processor ROS IPL in progress
-----------	---------------------------------------

- C1xx 1006**
Service processor ROS loading RAM from MFIOP directed device
- C1xx 1007**
Service Processor ROS retrying attempt to load RAM from MFIOP directed device
- C1xx 1008**
Service Processor ROS attempting to load RAM from non-MFIOP directed device
- C1xx 1009**
Service Processor ROS retrying attempt to load RAM from non-MFIOP directed device
- C1xx 1016**
Service Processor ROS attempting to load RAM from MFIOP default device
- C1xx 1018**
Service Processor ROS attempting to load RAM from non-MFIOP default device
- C1xx 1019**
Service Processor ROS retrying attempt to load RAM from non-MFIOP default device
- C1xx 100C**
Service processor ROS IPL complete, branch to RAM Loader
- C1xx 1030**
Loading Service Processor system LIC from MFIOP device
- C1xx 1050**
Loading Service Processor system LIC from non-MFIOP device
- C1xx 2001**
Service Processor is setting up to test and load system processor
- C1xx 2002**
Service processor is testing system processor and main storage
- C1xx 2003**
Service processor is loading system processor
- C100 2034**
LIC (system) has been initialized; control has passed to system processor
- C1xx 2050**
Service Processor is waiting for Load Source device
- C1xx 2060**
Service Processor started a read command from Load Source
- C1xx 2090**
Service Processor completed a read command from load source
- C1xx 80xx**
Service Processor/Control Panel communication in progress
- C1xx 805x**
Service Processor is loading Control Panel LIC
- C1xx B1xx**
Basic assurance test completed on MFIOP

C100 D009
LIC (system) running initialization

C200 1xxx
Secondary Partition Early IPL Initialization Phase

C200 1100
Adding partition resources to the secondary configuration

C200 11FF
Partition resources added successfully

C200 2xxx
Secondary Partition SPCN Tower Power ON Phase

C200 1200
Checking if IPL is allowed

C200 12FF
Partition IPL is allowed to proceed

C200 1300
Initializing ISL roadmap

C200 13FF
ISL roadmap initialized successfully

C200 1400
Initializing SP Communication Area #1

C200 1410
Initializing IPL parms

C200 14FF
IPL parms initialized successfully

C200 3xxx
Secondary Partition Bus Unit ISL Phase

C200 3100
Validating ISL command parameters

C200 3111
Waiting for Bus object to become operational

C200 3112
Waiting for bus unit to become disabled

C200 3150
Sending ISL command to bus unit

C200 31FF
Waiting for ISL command completion

C200 32FF
ISL Command complete successfully

C200 4xxx
Secondary Partition Load Source Device Connection Phase

C200 4100
Waiting for load source device to enlist

C200 4200
Load source device has enlisted

C200 4300
Preparing connection to load source device

C200 43FF
Load source device is connected

C200 5xxx
Secondary Partition Main Storage Dump Phase

C200 5100
Preparing to initiate MSD phase

C200 5110
Loading SID 82 from load source device

C200 5115
MSD Phase I

C200 5120
Writing processor registers into SID 82

C200 5125
MSD Phase II

C200 5130
Writing mainstore pages to the load source device

C200 5135
MSD Phase III

C200 5140
Storing (final) SID 82 back to the load source device

C200 5150
Allocating the hardware page table

C200 51FF
MSD processing complete

C200 6xxx
Secondary Partition Load LIC From Load Source Phase

C200 6000
Locating First LID information on the loadsource

C200 6010
Locating Next LID information on the loadsource

C200 6020
Verifying LID information

C200 6030
Priming LP Configuration LID

C200 6040
Preparing to initiate LID load from loadsource

C200 6050
LP Configuration LID primed successfully

C200 6060
Waiting for LID load to complete

C200 6100
LID load completed successfully

C200 7xxx
Secondary Partition Load Source Device Disconnection Phase

C200 7100
Disconnecting from load source device

C200 7110
Preparing to remove the load source IOP from the primary partition

C200 7120
Load source IOP has been successfully removed from the primary partition

C200 71FF
Load source is successfully disconnected

C200 8xxx
Secondary Partition Start Processors Phase

C200 8100
Initializing SP Communication Area #2

C200 8104
Loading data structures into mainstore

C200 8110
Initializing event paths

C200 8120
Starting processors

C200 81FF
Processors started successfully, now waiting to receive the continue acknowledgment from SLIC

C200 8200
Continue acknowledgment received from SLIC

C200 82FF
VSP IPL complete successfully

C3xx xxxx
System Processor or Main Storage Diagnostic in progress

C5xx xxxx
LIC system hardware initialization

C500 C92B
Waiting for console device - error condition only if console not found

C6xx 1800
LIC SPCN setup

C600 3900
SP transfer control of Bus 1 (BCU Switch) to LIC is Complete and LIC Machine Facilities component is initialized

C600 3910
LIC has initiated PCI Bus Reset to all Bus 1 devices except the SP

C600 3911
LIC has initiated self test of all Bus 1 devices except the SP

C600 3912
LIC is initiating IPL of the Load Source IOP

- C600 3913**
LIC is initializing the Load Source IOP messaging functions
- C600 3914**
LIC has detected a Load Source IOP problem and is resetting the IOP, or the IOP has requested a reset after an internal Flash memory LIC update
- C600 3915**
LIC has initiated the Load Source IOP self-load
- C600 3916**
During self-load, the Load Source IOP signalled LIC that it is initiating an internal Flash Memory update or other critical function
- C600 3917**
The Load Source IOP has completed IPL of its operational load, LIC is waiting for the IOP to report its attached IO resources
- C600 4001**
Static paging
- C600 4002**
Start limited paging, call LID manager
- C600 4003**
Initialize IPL/Termination (IT) data area / set up node address communication area (NACA) pointer
- C600 4004**
Check and update MSD SID
- C600 4005**
Initialize event management is running
- C600 4006**
IPL all busses
- C600 4007**
Start error log ID
- C600 4008**
Initialize I/O service
- C600 4009**
Initialize I/O machine
- C600 4010**
Initialize IDE (interactive device exerciser)
- C600 4011**
Initialize remote services
- C600 4012**
Initialize RMAC component data values
- C600 4013**
Initialize context management
- C600 4014**
Initialize RM (component) seize lock
- C600 4015**
Initialize MISR
- C600 4016**
Set time of day

- C600 4017**
Initialize RM (component) process management
- C600 4018**
Initialize error log
- C600 4019**
Restart the service processor
- C600 4020**
Initialize machine services
- C600 4021**
Initialize performance data collector
- C600 4022**
Initialize event management
- C600 4023**
Create MI boundary manager tasks
- C600 4024**
Disable CPM
- C600 4025**
Initializes battery test
- C600 4026**
Hardware card checkout
- C600 4027**
Start integrated device exerciser (Type C IPL only)
- C600 4028**
Start DST
- C600 4029**
Make IPL task not critical
- C600 4030**
Free static storage
- C600 4031**
Destroy IPL task
- C600 4032**
Initialize Integrated File System descriptor management
- C600 4033**
Initialize LPAR Virtual I/O
- C600 4050**
Storage management recovery is running
- C600 4051**
Start LOG is running
- C600 4052**
Trace table initialization is running
- C600 4053**
Context rebuild is running
- C600 4054**
Start product activity log and Advanced Peer-to-Peer Networking® (APPN) is running

- C600 4055
Authority recovery is running
- C600 4056
Journal recovery is running
- C600 4057
Database recovery is running
- C600 4058
Journal synchronization is running
- C600 4059
Commit recovery is running
- C600 4060
Database initialization is running
- C600 4061
Journal IPL clean up is running
- C600 4062
Commit initialization is running
- C600 4064
System Object Model® (SOM) recovery is running
- C600 4065
Start operating system is running
- C600 4070
Integrated File System recovery is running
- C600 4100
Searching for Load Source Candidate (D-mode only)
- C600 4101
Opening media-file to install LIC service displays with proper National Language Version
- C600 4102
Loading and linking from media-file to install LIC service displays with proper National Language Version
- C600 4201
Storage management recovery
- C600 4204
Synchronization of mirrored MSD
- C6xx 4205
Synchronization of mirrored data (where xx is percent complete).
- C600 4240
Reclaim main storage
- C600 4250
Storage management subset directory recovery
- C600 4255
Defragmentation utility
- C600 4260
Storage management directory recovery

- C600 4272**
ASP overflow recovery
- C600 4300**
Static paging is available for the link loader
- C600 4301**
Applying temporary PTFs. If the IPL stops at this point, you might need to install the Licensed Internal Code again.
- C600 4302**
Applying modules. If the IPL stops at this point, you might need to install the Licensed Internal Code again.
- C600 4303**
Temporarily applied PTFs have reached the static paging phase
- C600 432A**
Resolving references to run Mode A; you can safely stop the system while it is doing this work.
- C600 432B**
Resolving references to run Mode B. You may safely stop the system while it is doing this work.
- C600 4330**
Full paging is available; workstation HRI processing
- C600 4331**
Freeing unused nucleus pages
- C600 4332**
Permanently applying PTFs. If the IPL stops at this point, you may need to install the Licensed Internal Code again.

The following SRCs can appear during an MSD IPL.

- C6xx 4400**
Unattended DASD checker started
- C6xx 4401**
Attended DASD checker started
- C600 4402**
Main storage dump manager and storage management recovery started
- C600 4403**
Storage management recovery ended
- C6xx 4404**
LIC log started (where xx is dump copy percent completed).
- C600 4405**
Dump auto copy completed. Shutdown or programmed IPL has started.
- C600 4406**
Shutdown or programmed IPL (MSD related) has started.

End of MSD IPL SRCs.

The following SRCs can appear during a CPM IPL.

- C6xx 4410**
Unattended DASD checker started

- C6xx 4411
Attended DASD checker started
- C600 4412
Storage management recovery started
- C600 4414
LIC log started
- C600 4416
Shutdown or programmed (CPM-related) IPL has started

End of CPM IPL SRCs.

The following are **DST SRCs** for **Attended IPLs**.

- C600 4500
Verifying network attributes
- C600 4501
Looking for the console
- C600 4502
Starting DST display task
- C600 4503
Checking possible machine-readable information (MRI) on media
- C600 4504
Verifying system serial number
- C600 4505
Verifying system type
- C600 4506
Verifying system-unique ID (OS/400 only)
- C600 4507
Starting *'before DST'* DASD checker
- C600 4508
Verifying system password (if DASD check OK; if not OK this is checked when IPLing past DST)
- C600 4509
Starting DASD migration function (only if migrating)
- C600 450A
Starting *'after DST'* DASD checker (can happen twice)

The following are **DST SRCs** for **Unattended IPLs**.

- C600 4500
Verifying network attributes
- C600 4504
Verifying system serial number
- C600 4505
Verifying system type
- C600 4506
Verifying system-unique ID (OS/400 only)

C600 4508
Verifying system password (if DASD check OK)

C600 450A
Starting '*after DST*' DASD checker

C600 450C
DST IPL status

End of DST SRCs for Unattended IPLs.

C600 4A57
Parallel database recovery is at Pass 1

C600 4A60
Parallel database initialization is at Pass 1

C600 4B57
Parallel database recovery is at Pass 2

C600 4B60
Parallel database initialization is at Pass 2

C600 4C57
Parallel database recovery is at Pass 3

C600 4C60
Parallel database initialization is at Pass 3

C600 4F57
The system is recovering all database objects. This step can take several hours. It can occur any time when database recovery is in progress.

C600 4F60
The system is examining all objects during database initialization. It can occur any time when database initialization is in progress.

Note: At this point LIC initialization is complete, and operating system starts. **All hardware is verified.**

IPL SRC Function Performed

If the system uses the OS/400 operating system, the following status SRCs appear:

C900 2810
Reclaim machine context

C900 2820
Resolve system objects

C900 2825
Convert Work Control Block Table

C900 2830
System value object

C900 28C0
Prepare SPCF job

C900 28C5
Initialize system objects

C900 2910
Start system logging

- C900 2920**
Library and object information repository (OIR) cleanup
- C900 2925**
Verify POSIX** root directories
- C900 2930**
Database cross-reference
- C900 2940**
Console configuration
- C900 2950**
Install complex objects
- C900 2960**
Sign on processing
- C900 2965**
Software Management Services (SMS) initialization
- C900 2967**
Applying PTFs
- C900 2968**
IPL options
- C900 2970**
Database recovery part 1, journal recovery part 1
- C900 2973**
This recovery step attempts to perform any needed recovery for Database files that were definitionally being changed, created or deleted when an abnormal system end occurred.
- C900 2976**
This recovery step verifies the object recovery list performs any needed recovery for Journals and Journal Receivers.
- C900 2978**
This IPL Status SRC is displayed when SRCs C900 2A70 - C900 2976 have been completed
- C900 2980**
Storage requirements
- C900 2990**
Performance adjustments
- C900 29A0**
System control block
- C900 29B0**
Spool initialization
- C900 29C0**
Work control block table
- C900 2A80**
Before starting system jobs
- C900 2A85**
Bringing up POSIX SAG
- C900 2A87**
POSIX SAG restart and signals initialization

- C900 2A90**
Starting system jobs
- C900 2A95**
Abnormal Work Control Block Table cleanup
- C900 2AA0**
Damage Notification
- C900 2AA1**
This recovery step either rolls back or completes certain uncompleted Database operations that were run under Commitment Control
- C900 2AA2**
This recovery completes certain Journal operations that were in progress when the system ended processing
- C900 2AA3**
This recovery sends messages to QHST for Database files that may have been damaged by a system end
- C900 2AA3**
This recovery sends messages to QHST for Database files that may have been damaged by a system end
- C900 2AA4**
This IPL Status SRC is displayed when SRCs C900 2AA0 - C900 2AA3 have been completed
- C900 2AA5**
Integrated File System/New File System (NFS) directory recovery
- C900 2AAC**
Integrated File System conversion
- C900 2AB0**
Database Recovery part 2
- C900 2AC0**
Document Library Object (DLO) recovery
- C900 2B10**
Establish event monitors
- C900 2B30**
QLUS job
- C900 2B40**
Device configuration
- C900 2C10**
After system arbiter
- C900 2C20**
SNADS recovery
- C900 2C25**
ZMF component (Mail Enablement (OeDS) Framework) recovery
- C900 2C40**
Work Control Block Table cleanup
- C900 2CF0**
Reclaim storage

C900 2F00
IPL Complete

Operating system initialization is complete when the sign-on screen displays on the console.

General status SRCs

The following list contains general status SRCs listed in numerical order. The xx that is used in the SRCs represents a hexadecimal number further defining the code.

Status Function Performed

D100 8000
Service Processor (SP) is in the process of powering down.

D100 8025
Power down SPCN. This SRC appears during the system shutdown for Continuously Powered Main Storage (CPM). When the system is in CPM, the control panel is off, and the display is dark.

D1xx 3xxx
Service Processor portion of MSD in progress

D1xx 30xx
Preparing or writing to disk

D1xx 31xx
System is preparing segment ID 82 data area

D1xx 3200
Preparing or writing from main storage

D1xx 32xx
The last MSD status SRC. xx+1 is the number (in hexadecimal) of 16MB blocks that are dumped from main storage.

D1xx 8000
Service Processor is in the process of powering down

D1xx 8025
Service Processor is in the process of powering down in CPM mode

D1xx 8030
Service Processor has received a Delayed Power Off request

D1xx 8035
Service Processor Delayed Power Off request has timed out. Main store dump will follow.

D1xx 8065
Remote Service/Operations Console communications line deactivated/failed to activate.

D1xx 8066
Remote Service/Operations Console communications line active.

D1xx D505
MFIOP Initialization in progress

D200 xxxx
Secondary Partition Power OFF Phase

D6xx 0298
System shutdown started

D6xx 0299
System shutdown status

D6xx 0483
Power failed; delay timer is running

D6xx 0484
MI run in progress

D6xx 5500
System shutdown status; attempting to delete information from the disk subsystem cache

D6xx 5501
System shutdown status; indicates that the information from the disk subsystem cache was deleted successfully

D6xx 5502
System shutdown status; indicates that the system failed to delete information from the disk subsystem cache

D6xx 5503
System shutdown status, which indicates the information from the disk subsystem cache was deleted with qualified success

D900 2740
Power down immediate

D900 2750
All subsystems ended

D900 2760
Device configuration shutdown

D900 2770
QLUS job ending

D900 2780
Close database cross-reference files

D900 2790
QSYSARB job ending

D900 27C0
System jobs are ending

Chapter 7. Initial Program Load (IPL) Information

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IPL type, mode, and speed options

Set the IPL options from function 02 on the control panel. To permanently change the IPL speed use the CHGIPLA command.

- Use function 01 to display the current IPL option, including IPL speed. This is the option and speed that the system will use at the next IPL. Refer to “Function 01–Display Selected IPL Type and Speed (on Systems with a Keystick)” on page 158 for more information about function 01.
- Refer to the information in Table 15 on page 155 for speed override definitions.
- Use the HDWDIAG (hardware diagnostics) parameter of the CHGIPLA command to permanently change the IPL speed. The values are: The default shipped value *MIN (minimal) for fast diagnostics and *ALL for all (full) diagnostics.

IPL speed recommendations

- Use CHGIPLA *MIN, or Function 02 F or V=F for most IPLs (to perform a fast IPL that uses minimum diagnostics).
- Use CHGIPLA *ALL, or Function 02 S or V=S, if you change hardware or suspect an intermittent hardware failure (to perform a slow IPL that uses all diagnostics).
- Use CHGIPLA *ALL, or Function 02 S or V=S during the first Install IPL. You can set this at the panel with Function 02; it affects only the one IPL because the next IPL will again pick up the value set with CHGIPLA.

For more information about:

- IPL types, see Table 13 on page 155
- IPL modes, see Table 14 on page 155
- IPL speeds, see Table 15 on page 155
- Control panel functions, see “Control panel function descriptions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)” on page 158 or the system operator information

Methods to perform IPL

Table 43. Methods to perform IPL

Methods	Description
POR	Power on reset IPL. The system was powered off and powered on. During the power on, all hardware runs diagnostic tests.

Table 43. Methods to perform IPL (continued)

Methods	Description
F03	Attention: No system shutdown is performed before the IPL. The use of this function can cause loss of data. Control panel Function 03 starts a Load IPL. This differs from a POR IPL because no power off and power on sequence is done. This means a system shutdown is not performed and not all hardware diagnostics are performed during the IPL. Input-output processors (IOP) are reset using a software POR equivalent.
Programmed IPL without parameters	This IPL is started by the operating system. A PWRDWN SYS command with RESTART (*YES) will initiate this IPL.
Remote power on	An unattended IPL is started from a remote location (using a modem). Normal mode must be selected, the system power must be turned off, and the user must set specific indicators (see the system operation information).
Automatic restart	An unattended IPL is started automatically after a power failure. Normal mode must be selected and the user must set specific indicators (see the system operation information).
Power on by date/time	This IPL is started by an internal clock. Normal mode must be selected and the user must set specific indicators (see the system operation information).

Alternate installation IPL

To enable an alternate installation IPL, select the dedicated service tool (DST) option to *Work with alternate installation device*; see “Work with Dedicated Service Tools environment” on page 23 or “Work with alternate installation device” on page 27. This option is available in DST from control panel function 21 or a type D IPL. For more information about defining and enabling the alternate installation device, see *Install, upgrade, or delete OS/400 and related software*, SC41-5120-07.

IPL sequence

The IPL consists of the following steps:

1. Service processor’s performing power-on tests and loading the system processor
2. Licensed Internal Code (system) initialization
3. Installing or starting the operating system program

For information on IPL status SRCs, see “IPL status SRCs” on page 197.

Service processor initialization

Functions performed

The following list is a high-level description of the functions the service processor performs during an IPL:

1. The service processor starts by running the hardware diagnostic routines to verify the service processor’s own hardware.
2. The service processor obtains the necessary code (software) from the load source (disk or tape) to load itself and control the remainder of the IPL.
3. The service processor runs hardware diagnostic routines on the system processor.
4. The service processor loads the run-time Licensed Internal Code (system).

What is initialized

The following data areas are initialized by the service processor during an IPL:

- Bus 1 I/O configuration table
- IPL parameters
 - IPL mode
 - Switch setting
 - Power control status
 - Power-on cause
- System vital product data (VPD)
- Time of day

Abnormal ending

The service processor ends an IPL when a condition is detected that prevents the base machine from doing work. If an IPL stops, an SRC appears on the control panel, and the System Attention light goes on. The SRC indicates the failing condition.

Licensed Internal Code (LIC) initialization

Functions performed

The following list is a high-level description of the functions that are performed by Licensed Internal Code during an IPL:

1. Licensed Internal Code sets the internal processing unit registers and arrays necessary to run Licensed Internal Code.
2. When initialization is complete, Licensed Internal Code signals the service processor of the event.
3. Licensed Internal Code enters the disabled state (task dispatcher is disabled). Once the service processor starts the processing unit, the earlier constructed queue is made ready. The Licensed Internal Code then does its normal work-time functions.

See “IPL status SRCs” on page 197 for information that is displayed on the control panel during an IPL.

Abnormal ending

Licensed Internal Code ends an IPL when a condition is detected that prevents the machine from doing work. The service processor sends the correct SRC to the control panel.

Conditions that cause Licensed Internal Code initialization to fail are:

- Licensed Internal Code hangs (loops or waits), causing a Licensed Internal Code initialization time-out. The processor gives control to the service processor which, in turn, ends the IPL.
- Licensed Internal Code that is not compatible with the control storage.
Some of the Licensed Internal Code is in main storage in an area that is known as the Licensed Internal Code overlay area. If this code is not compatible with resident code in control storage, the IPL might end during the Licensed Internal Code initialization phase.
- Bad data on file.

If bad data is not detected when read from the file but is detected by the Licensed Internal Code initialization routine, the IPL ends with an SRC. If bad data is on the file, use the *Main storage dump manager* option from the Start a Service Tool display under DST to save the main storage dump to removable

media. You must install the Licensed Internal Code again to correct this problem. If the system does not complete an IPL after initializing the Licensed Internal Code again, the Licensed Internal Code tape is bad.

- Hardware errors.

If hardware errors occur during the Licensed Internal Code initialization step, the IPL ends. If the hardware error is associated with the file, you might need to install the Licensed Internal Code again.

At any point in the Licensed Internal Code initialization phase, errors that end machine processing during an IPL can occur. If this occurs, indicators are set to the data function. The machine check error log buffer, Licensed Internal Code log, or the product activity log contain information about the condition that caused the ending.

Initialization output

The output that is created when the Licensed Internal Code is initialized consists of the following:

- Machine status information saved in the machine initialization status record (MISR).
- Status codes for an initial program load displayed on the control panel for long-running IPL functions. See “IPL status SRCs” on page 197 or *iSeries Licensed Internal Code Diagnostic Aids - Volume 1* for more information.
- Product activity log and Licensed Internal Code log information that service personnel need to service the machine.

Data descriptions

- Preceding stopped data
- Bad page table

Log entries

Logging is a function of Licensed Internal Code and starts during Licensed Internal Code initialization. Licensed Internal Code parts (see “Licensed Internal Code (LIC) introduction” on page 219) send log records to the product activity log. Licensed Internal Code input/output managers do much of the error machine check controlling.

The IOPs also have the ability to send data into the product activity log. Log records from the IOPs are processed by the Reliability Availability Serviceability (RAS) Focal Point Common Class I/O Manager Task in Licensed Internal Code. The following are the types of log entries from the IOP:

Asynchronous Log Report: This is a bus-level record that is used when the I/O processor has detected a critical failure. The asynchronous log report is used when the IOP cannot communicate with Licensed Internal Code or the service processor.

Log Notification Record: This is a log record that is reported to the system from the IOP after the RAS connections have been set up.

Log Information Record: This is an information-only record that is reported to the system after the RAS connections have been set up. The information records (statistics) are logged as product activity log information.

The following list describes the attributes of the product activity log:

- Permanent errors that do not stop the system

- Machine check data when available on the next IPL (if power was not switched off before doing the next IPL)
- Any temporary errors necessary for problem analysis
- Data in multiple formats
- RAS error information and bus level asynchronous log report
- Device driver reported records
- Some dumps and trace data
- Volume information (statistics) data records

A formatted printout of the product activity log records is available by using the *Product activity log* option from the Start a Service Tool display under Dedicated Service Tools (DST).

Status SRCs

Status system reference codes (SRCs) indicate the current state of the system for informational purposes. Status SRCs appear on the control panel during the following processes:

- System IPL
- DST functions (local or remote)
- Dump functions
- System power-down

See “IPL status SRCs” on page 197 and “General status SRCs” on page 210 for more information on specific status SRCs.

Chapter 8. Licensed Internal Code

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Licensed Internal Code (LIC) introduction

The OS/400 operating system is under the control of hardware and software. These controlling parts consist of the following:

- Operating system program
- Licensed Internal Code (system)
- Licensed Internal Code (service processor)
- Licensed Internal Code (I/O processor)
- Hardware

Licensed Internal Code controls the system software and hardware. The Licensed Internal Code and the software licensed programs are packaged together and delivered on the same removable media. The operating system provides one interface to the customer for handling all the code on the system.

Fixes and cumulative PTF packages

Between code releases, problems that are found with the code are fixed with program temporary fixes (PTFs). The term PTF can refer to a Licensed Internal Code, an operating system, or other IBM licensed program fix. Because some PTFs repair problems that might appear to be hardware failures, your actions with PTFs are important for both the customer and for IBM. It is often difficult to tell the difference between a real hardware failure and a code problem that is fixed by a PTF.

The customer is responsible for maintaining fixes to Licensed Internal Code and the operating system.

To display the Licensed Internal Code fixes that are on your system, see “Displaying Licensed Internal Code fixes” on page 220. To display the operating system fixes and cumulative PTF packages that are on your system, see “Displaying OS/400 PTFs” on page 289.

Some PTFs fix problems that might appear to be hardware failures. **Always ensure that the recommended PTFs are applied before you exchange hardware.**

The cumulative PTF packages contain the majority of the PTFs that were available approximately one month before the package date. Additional PTFs (those that have special instructions, or are not requested often) are available through the IBM support center.

If a cumulative PTF package was not applied to the system in the last three months, instruct the customer to load the most recent cumulative PTF package. To display the cumulative PTF packages that are on your system, see “Displaying OS/400 PTFs” on page 289.

Cumulative PTF packages

PTFs are stacked on the cumulative PTF removable media in the following order:

- HIPER Licensed Internal Code fixes
- HIPER OS/400 PTFs
- HIPER licensed program PTFs
- Non-HIPER Licensed Internal Code fixes
- Non-HIPER OS/400 PTFs
- Non-HIPER LPP PTFs

The cumulative PTF package contains the majority of the PTFs that were available approximately one month before the package date. Additional PTFs are available through the IBM software support center.

PSP listings

Obtain information about preventive service planning (PSP) by contacting the customer’s software service provider.

Before generating a LIC APAR, ask your next level of support to screen the APAR and enter the symptoms of the problem into the service support system.

Licensed programs

Licensed programs are represented by names in the form xxxxyyy, where xxxx is the base operating system software and yyy is a unique, 3-character alphanumeric identifier. For more information on code naming conventions, see *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

Displaying Licensed Internal Code fixes

Use the following information to determine the Licensed Internal Code fixes that are on the system. To determine the operating system fixes that are on the system, see “Displaying OS/400 PTFs” on page 289.

Perform the following to display Licensed Internal Code fixes:

1. Access DST (see “Accessing Dedicated Service Tools” on page 4).
2. Select the *Work with Licensed Internal Code* option from the *Use Dedicated Service Tools (DST)* display.
3. Select the *Display Licensed Internal Code* option.
4. Select the *Fix information* option.
5. Select F4 (Prompt) to display a list of Licensed Internal Code fixes. The status information is displayed (pending, or applied permanently or temporarily).
6. To display detailed information about a specific fix, use the *Select* option.
 - On the *Display Fix Information* display, use the function keys to display PTF requirements, supersede information, and dependent fix information.

Code naming conventions

The following table lists the names and descriptions of the Licensed Internal Code (LIC) code groups that can be loaded:

Table 44. Example Licensed Internal Code group names

Group Name	Description
AJDG301	System Licensed Internal Code
AJEDA00	Common multiple function I/O processor LIC
AJENV00	Magnetic storage device LIC
AJGDF01	Common communications I/O adapter LIC
AJGJR01	Common token-ring network adapter LIC
AJGJ601	Communications Licensed Internal Code
AJGW701	Common communications IOP base LIC
AJGLD01	Communications protocol LIC
AJLYD01	Common twinaxial workstation IOP LIC
AJLYE01	Common twinaxial translation tables
AJLYG01	Common twinaxial translation tables
AJSCB01	Common service processor LIC
AJSGM01	Common system processor PAR LIC

For more information on code naming conventions, see *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

Utilities to Install and Restore Licensed Internal Code

Introduction

Before performing problem analysis for Licensed Internal Code, ensure that the latest level of Licensed Internal Code is on your system. To verify that the customer has the latest Licensed Internal Code fixes applied, perform one of the following:

- If the latest cumulative PTF package is applied, you can assume that the latest Licensed Internal Code fixes are on your system. To view a list of the cumulative PTF packages that are installed on your system, see “Displaying OS/400 PTFs” on page 289.
- To view a list of the Licensed Internal Code fixes that are installed on your system, display the information about Licensed Internal Code fixes from DST. For more information, see “Displaying Licensed Internal Code fixes” on page 220.. The first entry that is displayed is the latest.

For more information on fixes, see “Fixes and cumulative PTF packages” on page 219.. For more details on the procedures to install and restore Licensed Internal Code, see “Utility to install Licensed Internal Code” on page 222 or “Utility to restore Licensed Internal Code” on page 223.

Overview of Licensed Internal Code Install and Restore

This section describes:

- How to install the system Licensed Internal Code from removable media when the load-source disk is exchanged.
- How to restore the Licensed Internal Code from removable media for a Licensed Internal Code upgrade.
- How to reload the Licensed Internal Code when the DST is not functional.

Utility to install Licensed Internal Code

Introduction

Installing the Licensed Internal Code erases **all** information on the load-source disk unit, makes the data on the remaining disk units (including customer data) inaccessible, and copies the Licensed Internal Code from removable media to the load-source disk.

The system disk units might not be accessible because data is arranged over multiple drives on the system. After you complete the install procedure, consider the customer data destroyed. The customer can install the operating system and the system data from removable media after you complete the install procedure. **To exchange the Licensed Internal Code without destroying customer data**, see “Utility to restore Licensed Internal Code” on page 223.

Use this utility to install Licensed Internal Code when one of the following occurs:

- The load-source disk has been replaced.
- The system does not contain customer data and Licensed Internal Code.
- The instructions for a new Licensed Internal Code release specify that you cannot use the restore Licensed Internal Code utility.

The system Licensed Internal Code might be on the customer’s system save media, the IBM distribution (ISMD) media, or the Licensed Internal Code save media.

Notes:

1. If there is a set of distribution or save media, start the installation with the first tape or optical device.
2. For instructions on loading the optical device, see the *System Startup and Problem Handling* information.
3. If the console is not powered on, SRC A600 500x is displayed. Power on the display, then select Function 21 on the control panel (see “Control panel function descriptions (Models 150, 170, 250, 4xx, 50x, 51x, 530, 53S, 6xx, 7xx, SB1, and Sxx)” on page 158) to make DST available.
4. The Licensed Internal Code level (with the PTFs applied) is returned to the level supported at the time the media was saved.
5. If you use Volume 1 of the IBM distribution media, you do not apply any PTFs. The operating system reflects that no Licensed Internal Code PTFs have been applied. For more information on PTF levels, see “Displaying Licensed Internal Code fixes” on page 220.
6. For more information on installing the operating system, see *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

While this utility is running, the control panel displays SRCs until DST becomes active (see the *iSeries Licensed Internal Code Diagnostic Aids - Volume 1* for more information). After DST is active, the displays on the console prompt the user and show the install status.

Installing Licensed Internal Code

1. Perform steps 1 through 9 of the alternate IPL to DST procedure (see “Performing an alternate IPL to DST (type D IPL)” on page 8 for instructions).
2. Select the *Install Licensed Internal Code* option on the Install Licensed Internal Code display.

3. **Attention:** The *Install Licensed Internal Code and Initialize System* option destroys all data on the system, including customer data. Select the *Install Licensed Internal Code and Initialize System* option from the Install Licensed Internal Code display.
4. When the Install Licensed Internal Code - Confirmation display appears, press F10 to continue.

Note: A series of displays appears on the console throughout the process to show the install status. User intervention might be required.

5. The system automatically performs a disk IPL and the Install the Operating System display appears.

To install the operating system, select the *Continue installing the operating system* option. See the system operation information for details on how to install the operating system.

Note: When the procedure is complete, remove the media from the removable media unit.

This ends the procedure.

Utility to restore Licensed Internal Code

Introduction

Restoring Licensed Internal Code completely exchanges all Licensed Internal Code with a new level of code. The *Restore Licensed Internal Code* option copies all system Licensed Internal Code from media and puts it on a disk.

Select this utility to do the following:

- Install the new Licensed Internal Code in place of the system's existing Licensed Internal Code **without losing customer data** already on the system.
- Update a system's Licensed Internal Code to a new release.
- Reinstall Licensed Internal Code when DST is not operational.

The system Licensed Internal Code might be on the customer's system save media, the IBM distribution (ISMD) media, or the Licensed Internal Code save media.

Notes:

1. If there is a set of distribution or save media, start the installation with the first tape or optical device.
2. For instructions on loading the optical device, see the *System Startup and Problem Handling* information.
3. The Licensed Internal Code level (with the PTFs applied) is returned to the level supported at the time the media was saved.
4. If you use Volume 1 of the IBM distribution media, you do not apply any PTFs. The operating system reflects that no Licensed Internal Code PTFs have been applied. For more information on PTF levels, see "Displaying Licensed Internal Code fixes" on page 220.

Restoring Licensed Internal Code

1. Perform steps 1 through 8 of the alternate IPL to DST procedure (see "Performing an alternate IPL to DST (type D IPL)" on page 8 for instructions).
2. Select *Install Licensed Internal Code* option from the Install Licensed Internal Code display.

3. **Attention:** The *Install Licensed Internal Code and Initialize System* option destroys all data on the system, including customer data. Be sure to select the *Restore Licensed Internal Code* option from the Install Licensed Internal Code display. Select the *Restore Licensed Internal Code* option from the Install Licensed Internal Code display.

Note: Displays appear on the console throughout the process to show the restore status. User intervention might be required.

4. The system automatically performs a disk IPL and the IPL or Install the System display appears.

To install the operating system, select the *Install the operating system* option. See the system operation information for details on how to install the operating system.

Note: When the procedure is complete, remove the media from the alternate IPL unit.

This ends the procedure.

Authorized Program Analysis Report (APAR)

Report problems in the system program or code to IBM. When you find a problem with the Licensed Internal Code, you can submit a LIC APAR. Program problems are tracked using an authorized program analysis report (APAR). An APAR is a request for the correction of a program defect. Since operating system and Licensed Internal Code fixes might solve program and LIC problems, perform the procedures in "OS/400 or LIC APAR information" on page 289 before submitting the report.

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Primary frame	233	V.35 advanced wrap connector wiring	255
Power sequence complete	233	V.35 communications adapter cable	256
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Unit	234	X.21/High speed communications adapter cable	259
Type	234	X.21 cable wrap connector wiring	259
Model	234	X.21 advanced PCI communications cable	259
Serial number	234	X.21 advanced wrap connector wiring	260
Load ID	234	Token-ring communications adapter cable and card wrap	260
Reference code	234		
Alert status	234		
Extended status	234		
AROS part number	234		
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Last battery capacity test date	235		
Last battery capacity test time	235		
Next battery capacity test date	235		
Next battery capacity test time	235		
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Hardware information

The iSeries system consists of the system unit and the various attached hardware.

For more information on system hardware, see the following:

- Chapter 2, “Hardware Service Manager,” on page 45
- Chapter 3, “Product Activity Log,” on page 97
- “System power overview”
- “Resource names” on page 238
- “Type, Model, and Part Number List” in the Problem Analysis information for your system.
- Locations and addressing sections in the Problem Analysis information for your system.
- “Configuration Rules” in the *AS/400e server 170, 250, 6xx, 7xx, and Sxx System Installation and Upgrade* information.

Note: Configuration rules information is not available for all system types.

System power overview

Power supply

Power for the iSeries systems is supplied using the distributed power concept or by a centralized power supply. The power supply in a distributed power system provides a single voltage to the system bus and device regulators. Power supplied by a centralized power supply provides all the voltages that are needed in the system. For information on the power distribution, see “Locations and Addresses” in the Problem Analysis information for your system.

Battery power unit

The battery power unit is available on most iSeries models that have system power control network (SPCN) installed and some iSeries models without SPCN until release V5R1 (dual line cord power backup is available on most models later than release V5R1). It provides temporary auxiliary power to the system in the event of an ac power loss.

When you install or replace a battery power unit in a non-SPCN model, you should update the system information by selecting the *Battery power unit information* option from the Hardware Service Manager display. This option allows you to display the location of the battery power units on the system and update the manufacture dates.

To update this information on a system that contains SPCN, select *System Power Control Network (SPCN)* from the Hardware Service Manager display.

For more information on the *Battery Power Unit Information* option, see “Battery power unit information” on page 54.

System Power Control Network (SPCN)

The SPCN is a concept of power distribution and control for the iSeries system that makes it easier to add new system hardware units. Problems that are reported to the operating system by the SPCN are logged. You can work with the SPCN information by selecting **System Power Control Network (SPCN)** under the Hardware Service Manager function. For more information on how to work with the SPCN information under Hardware Service Manager, see “SPCN menu flow” on page 228.

SPCN power components

Most power components in new systems and some power components in older systems contain an SPCN node. The SPCN node contains a microprocessor-based controller. The SPCN node functions in the SPCN network and connects the points necessary for controlling power, sending commands, and reporting status.

There is one primary node in a system. All other nodes are secondary nodes.

Primary node

The primary node is the microprocessor-based controller. In stage 2 systems this node is located in the ac module, which is installed in the rear of the system. In stage 3 systems (Models 640, 650, S30, S40, and SB1) the node is on a separate card that is installed in the rear of the system. Models 600 with SPCN, 620, S10, S20, and Model 170 have the combined SPCN and system control panel functions on one card. This card is installed behind the system control panel. For Models 270, 810, 820, or 825 SPCN is part of the backplane. For Models 830, 840, SB2, SB3, and 890 (FC 9094), SPCN is part of the back plane in the PCI cage. The primary node is programmed to issue network commands and poll for status from secondary SPCN nodes in the network.

The primary node monitors the status of the power supplies, regulators, and backup power (BBU and uninterruptible power supply). The primary node is powered on as long as there is ac power to the frame. It communicates with the operating system by exchanging commands and network status through the control panel or service processor.

The primary node collects command responses and error status from the SPCN network and formats them for return to the operating system.

Secondary node

The secondary node is a microprocessor-based controller located in the ac module and bulk power supplies, on a card, or on a backplane. There are no secondary nodes in the 170 model.

Note: On Stage 2 secondary frames, a secondary node is located in the power control compartment (PCC). It receives power-on and power-off commands for the rack mounted units from the primary node. This secondary node controls all the ac outlets on the PCC. For more information about hardware stages, see Appendix C of *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

Each secondary node is programmed to collect unit power status and respond to commands from the primary node. On stage 2 systems, the secondary node also controls the display of the following information on the rack-mounted unit display:

- SPCN address
- Power reference codes

In a *stage 2 'white box' frame*, the secondary nodes can be located in the PCC and the ac module of the rack-mounted units.

In a *stage 2 'black box' frame*, the secondary node is in the ac module.

In a *stage 3 system (Version 4 Release 1 minimum)*, the secondary nodes are located in the bulk power supplies, on a card, or on a backplane of the unit. Secondary nodes are present in the ac modules of attached frames.

In frames with a PCI system bus, the secondary node is located in the PCI cage, the power supply, on a card, or on the backplane.

SPCN addressing

A rack-mounted unit is identified and located by a frame address and a unit address. A frame address is fixed and is assigned by the primary node or by the operating system. A unit address is fixed and determined by the SPCN port to which the unit is connected.

The frame and unit addresses are normally displayed on the control panel of the secondary node (for example, the FC 5042 unit). They appear in the following format:

```
*RRU  RR = The rack address (01 - 62)
      U = The unit address (1 - A)
```

Note: In frames with a PCI system bus, the control panel only displays the rack address: *RR.

SPCN menu flow

Problems that are reported to the operating system by the SPCN are logged. To work with the SPCN information, select the *System Power Control Network (SPCN)* option under the Hardware Service Manager function.

```
Hardware Service Manager

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

System unit . . . . . : 9406-500 10-xxxxx
Release . . . . . : V3R6M0 (1)

Select one of the following:

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

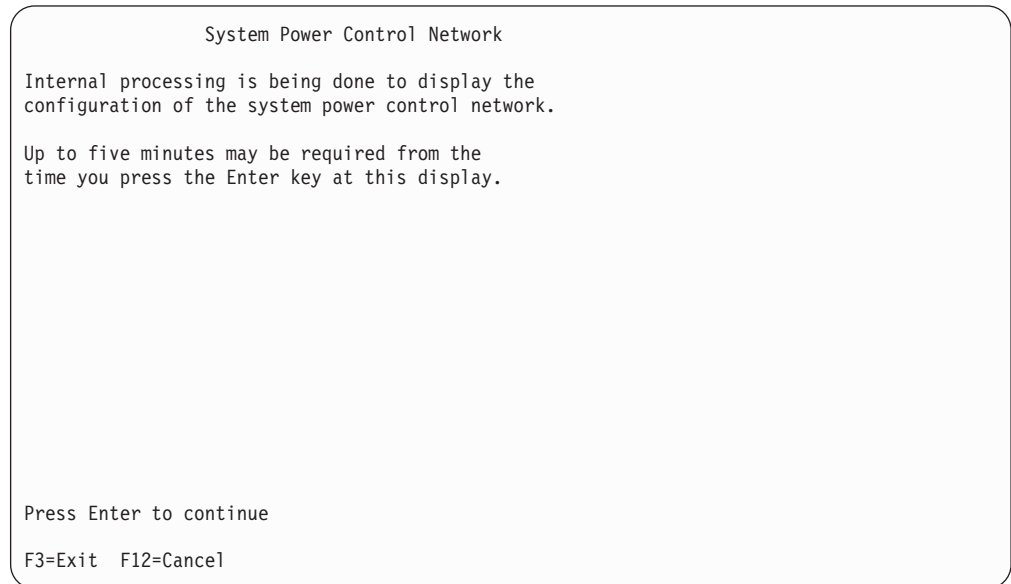
Selection
-

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

Figure 79. Example Hardware Service Manager display for Model 5xx (in the full or limited environment)

Note: For more information on hardware service manager, see Chapter 2, "Hardware Service Manager," on page 45.

When you select the *System power control network (SPCN)* option on the Hardware Service Manager display, the first System Power Control Network display shows advisory information. It informs you that there might be a delay before the *System Power Control Network* main menu display appears. You must press the Enter key to continue.



The second System Power Control Network display allows you to choose the frame or rack-mounted unit with which you want to work.

Pressing F5 (Refresh) causes the system to display updated information for the SPCN. For example, if the operator had written new VPD information, pressing F5 would display the newly written VPD information.

Note: SPCN on the 9337 disk unit does not support this function.

```

System Power Control Network

Battery capacity test . . . . . : Enabled

Type options, press Enter.
3=Write VPD  5=Display detail  6=Display trace log
7=Test battery interface

Opt  Frame  Unit  Type  Serial Number  Fault
-    01    0    ....  00-00000  No
-    01    1    ....  00-00000  No
-    02    0    5070  10-55555  No
-    02    1    5070  10-55555  No
-    03    0    ....  00-00000  No
-    03    1    ....  00-00000  No
-    04    0    ....  00-00000  No
-    04    1    ....  00-00000  No
-    05    0    ....  00-00000  No
                                     More...

F3=Exit  F5=Refresh  F12=Cancel
F6=Disable battery capacity test

```

The fields in this display have the following meanings:

Battery capacity test

This field shows the status of the system-initiated periodic battery capacity test, either enabled or disabled. When used with the F6 key, it allows you to enable or disable the system-initiated periodic battery capacity test. If the field is already enabled, F6 disables the battery capacity test. If the field is already disabled, F6 enables the battery capacity test. When the field is enabled, the test runs every three months on each battery backup unit and any uninterruptible power supply that supports CPM.

Opt

This field allows you to choose to work with the frame or unit components.

The following options are available for the *Opt* field:

- 3 (Write VPD)
For details on this option, see “Write Vital Product Data (VPD) option” on page 231..
- 5 (Display detail)
For details on this option, see “Display Detail option” on page 232.
- 6 (Display trace log)
For details on this option, see “Display trace log” on page 235.
- 7 (Test battery interface)
For details on this option, see “Test battery option” on page 236.

Frame

This field refers to one of the system frames. The value is the SPCN address.

Unit

This field refers to one of the rack-mounted units that are connected to the SPCN. The value is the SPCN port to which the unit is connected. A unit value of zero indicates a system frame node. In V4R1 and later systems, the unit value is a 1, C, or 0.

Type

This field shows the product type of the frame or unit.

Serial number

This field shows the serial number of the frame or unit.

Fault

This field indicates whether a power fault currently exists on that frame or unit. You can find information on the fault in either a message to the system operator or a power reference code on the unit.

Write Vital Product Data (VPD) option

You can select option 3 (Write VPD) on the System Power Control Network (SPCN) display next to the entry for one of the following:

- Frame
- Unit

Select this option when you replace a backplane in a Model 270, 810, 820, or 825, or an ac module, SPCN card, PCC, or PCI cage in other units. This option allows you to write the VPD to the frame or unit on the power system.

Note: This option does not work on 503x migration towers.

When you select option 3 (Write VPD) next to an entry, the following display appears and allows you to enter the VPD values:

```
Write Vital Product Data (VPD)
Frame. . . . . : 01
Unit. . . . . : 0

Change information and press Enter.
Type . . . . . 9301
Model. . . . . 001
Serial Number. . . . 10 - 3892064

F3=Exit F12=Cancel
```

After you change the information on the Write Vital Product Data (VPD) display and press the Enter key, the following display appears. This display indicates the results of the write VPD. Line 24 (bottom of the display) shows a message that describes the results.

Note: VPD for a rack-mounted unit will not be written until the next IPL.

Results of Write Vital Product Data (VPD)

Frame. : 01
Unit. : 0

Change information and press Enter.

Type 9301

Model. 001

Serial Number. . . . 10 - 3892064

F3=Exit F12=Cancel
Vital product data has been successfully written.

Display Detail option

You can select the *Display detail* on the System Power Control Network (SPCN) display to show detailed SPCN information about a frame or unit.

If you select the *Display detail* next to the entry for a frame, the following display appears with detailed information about the frame:

Display Detail for Frame

Frame	: 01	Load Id.	: AB109388
Type.	: 9301	Reference code	: 0000
Model	: 001	Alert status	: 31
Serial number	: 10-2984631	Extended status.	: 543F

AROS part number. : WW193874772G
Responding to polls : Yes
Primary frame : Yes
Power sequence complete : Yes
Fault : No
UEPO switch : On
Cable type for connector J15 : Optical
Cable type for connector J16 : Optical
Cable present for connector J18 : Yes

Press Enter to continue.

F3=Exit F12=Cancel

The fields in this display have the following meanings:

Frame

This field shows the frame address.

Type

This field shows the product type of the frame.

Model

This field shows the model number of the frame.

Serial number

This field shows the serial number of the frame.

Load ID

This field shows the load identifier of the frame Licensed Internal Code.

Reference code

This field shows the error code for the frame. Starting with version 4 release 5, this field will always be 0000.

Alert status

This field shows the status of the frame SPCN node.

Extended status

This field provides additional status information for the frame.

AROS part number

This field shows the alterable read-only storage (AROS) part number.

Responding to polls

This field indicates whether the frame is responding to polling requests from the Primary SPCN node. Field values are Yes or No.

Primary frame

This field indicates whether this is the primary frame. Field values are Yes or No.

Power sequence complete

This field indicates whether the frame power sequencing completed. Field values are Yes or No.

Fault

This field indicates whether a power or functional fault currently exists. Field values are Yes or No.

UEPO switch

This field indicates whether the unit emergency power-off (UEPO) switch is on or off.

Cable type for connector J15

This field indicates the presence or type of cable. Field values are None, Copper, or Optical.

Cable type for connector J16

This field indicates the presence or type of cable. Field values are None, Copper, or Optical.

Cable type for connector J18

This field indicates whether a cable for connector J18 is present. Field values are Yes or No.

If you select option 5 (Display detail) next to the entry for a unit, the following display appears with detailed information about the unit:

Display Detail for Unit

```
Frame . . . . . : 01      Load Id. . . . . : 123FE305
Unit. . . . . : 1      Reference code . . . . . : 0000
Type. . . . . : 9902   Alert status . . . . . : 23
Model . . . . . : 001   Extended status. . . . . : 142E
Serial number . . . . . : 10-2984631
```

```
AROS part number. . . . . : WS12948773JH
Battery present . . . . . : Yes
Last battery capacity test date . . . . . : 05/22/95 MM/DD/YY
Last battery capacity test time . . . . . : 10:53:02 HH:MM:SS
Next battery capacity test date . . . . . : 08/20/95 MM/DD/YY
Next battery capacity test time . . . . . : 10:53:02 HH:MM:SS
Power sequence complete . . . . . : Yes
Fault . . . . . : No
```

Press Enter to continue.

F3=Exit F6=Display status of regulators F12=Cancel

The fields in this display have the following meanings:

Frame

This field shows the frame address.

Unit

This field shows the SPCN port number to which the rack-mounted unit is connected. In models 270, 7xx, 8xx, SB2, and SB3, this field shows a 1, C, or 0.

Type

This field shows the product type of the unit.

Model

This field shows the model number of the unit.

Serial number

This field shows the serial number of the unit.

Load ID

This field shows the load identifier of the unit Licensed Internal Code.

Reference code

This field shows the error code for the unit. Starting with version 4 release 5, this field will always be 0000.

Alert status

This field shows the status of the unit SPCN node.

Extended status

This field provides additional status information for the unit.

AROS part number

This field shows the alterable ROS part number.

Battery present

This field indicates whether a battery is present. Field values are Yes or No. The following four fields on battery information contain data when the field value is Yes:

Last battery capacity test date

This field gives the date of the last battery test in the format MM/DD/YY.

Last battery capacity test time

This field gives the time of the last battery test in the format HH:MM:SS.

Next battery capacity test date

This field gives the date of the next battery test in the format MM/DD/YY.

Next battery capacity test time

This field gives the time of the next battery test in the format HH:MM:SS.

Power sequence complete

This field indicates whether or not the power sequence is complete. Field values are Yes or No.

Fault

This field indicates whether or not a power or functional fault currently exists. Field values are Yes or No.

Note: The Display status of regulators function key (F6) on the Display Detail for Unit display is not recommended for service representative use.

Display trace log

If you select option 6 (Display trace log) on the System Power Control Network (SPCN) display, the following display appears. It shows the trace log data in both hexadecimal and EBCDIC formats. A message appears at the bottom of the display to indicate (as a hexadecimal number of bytes) the amount of data that is returned. You can page up and down to see the entire trace log.

Note: It might take minutes to retrieve all the data; how long depends on the size of the trace log.

The Display Data display shows a section of data from the system. The leftmost

Display Data

```

Data
Offset -----Hexadecimal-----EBCDIC-----
0000 00000000 10FFD007 070010FF 04010000 .....
0010 11020400 00001105 0100D537 00000404 .....N.....
0020 00C00000 0405000F 00000101 0703000C .....
0030 01030000 000C0402 0014000C 04020015 .....
0040 00000000 000C0104 00000022 0604931F .....
0050 00220613 00120032 06060000 003D0603 .....
0060 00000683 06100300 06850504 00010692 .....
0070 06049A20 06920613 000006A2 06060000 .....
0080 00000000 06AD0603 000006AF 061A0600 .....
0090 06AF060A FFFF0B9D 06118521 0B9D060D .....
00A0 04EC0B9D 060E0597 00030204 0000000C .....
00B0 02060000 000C0209 0000000C 020C0000 .....
00C0 00000000 000E0403 0014000E 04030015 .....
00D0 00280100 D5370000 040400C0 00000405 ....N.....
00E0 000F0000 01010703 000C0103 0000000C .....

```

More...

F3=Exit F12=Cancel

00000640 (hex) bytes of data returned. Retrieve trace log buffer successful.

column indicates the offset of this data line from the beginning of the data buffer that is being displayed. The next 4 columns display four, 4-byte hexadecimal numbers that begin at that offset. The last column displays the EBCDIC equivalent of these 16 bytes. Non-displayable characters (characters not part of the National

Language Support (NLS) invariant character set) show up as a period (.). You must use the scroll keys to view additional data.

Test battery option

If you select option 7 (*Test battery*) on the System Power Control Network (SPCN) display, the following display appears confirming that you requested the battery interface test. You have the chance to cancel the test by pressing the F12 (Cancel) key.

```
Confirm Test of Battery

You have requested to run a battery interface test for the
unit shown below.

NOTE: This test may take up to five minutes to complete.

Serial
Opt  Frame  Unit   Type   Number  Fault
7    01     1     9903   10-4920857  No

F12=Cancel
```

Selecting this option causes the system to perform a battery interface test and schedule a battery capacity test in 24 hours. Because the system automatically tests the batteries every 3 months (if enabled), you should use this option only after replacing a battery power unit. This option is valid for only those units that contain a battery power unit and is not valid for a frame.

Note: Excessive testing of the battery will shorten its useful life.

When the test completes, the following display appears. A message that describes the results displays on line 24.

Results of Battery Test

The results of the battery interface test are displayed below. If the test was successful, a battery capacity test will be performed on this unit in 24 hours.

Serial Opt	Frame	Unit	Type	Number	Fault
7	01	1	9903	10-4920857	No

F12=Cancel
Test has completed. No problems were found.

If the interface test is successful, a capacity test automatically runs in 24 hours. The capacity test is delayed to allow the battery to become fully charged. Results of the capacity test are logged in the product activity log.

Note: Excessive testing of the battery shortens its useful life.

System Interconnect

In V5R1, the term *High Speed Link (HSL)* replaces the term *System Interconnect (SI)*. Use the information in this document about High Speed Links when working with System Interconnect resources.

High Speed Link

High Speed Link (HSL) resources provide the connection between system I/O busses and the system processor. HSL resources are normally configured in loops with the system unit having an HSL controller resource that handles routing of the data between the system processor and the system I/O busses. System I/O busses connect to the loop with HSL I/O adapter resources. When you view the logical resources of a High Speed Link loop using Hardware Service Manager, you will see:

- *HSL controller resource(s)* (called Local High Speed Link Network Interface Controllers (Local HSL NICs) in V5R1).
- *HSL loop resource(s)* (called SI rings in V4R5) under the controller listed above the loop.
- *HSL I/O adapter resource(s)* (called SI I/O adapters in V4R5) under the loop listed above the adapters.
- The *System Bus Adapter Resource(s)* under the *HSL I/O adapter resource(s)* option. From this level and below, I/O resources appear the same way as they do in the *System bus resources* option from *Display Logical Resources* in the *Hardware Service Manager* menu.

HSL links consist of these items:

- A port from either the controller or an adapter on the loop.

- An HSL connection which is either an internal connection or an external HSL cable.
- A port from either an adapter on the loop or the controller.

Loops start and end on the same port pair of an HSL controller, for example, the A0 and A1 ports.

When you view an HSL controller or adapter resource in HSM, you can select *Display detail* option to view the status and information about the links on that resource.

There are two ports on each HSL resource. The *Leading link* usually refers to the connection between the resource's 0 port to the next HSL resource on the loop. The *Trailing link* usually refers to the connection between the resource's 1 port to the next HSL resource on the loop.

In some cases a link is an internal connection in a system unit or expansion tower. In that case the link will be labeled as "internal" and there will not be port label information.

When port pairs are on a system unit they are labeled on the frame as A0 and A1; B0 and B1; and so on. When port pairs are on an expansion tower they are labeled on the frame as 00 and 01.

Multi-adapter bridge

A multi-adapter bridge is a resource which provides the connection between PCI I/O processors and a system PCI bus under an HSL I/O adapter (SI I/O adapter in V4R5). The bridge controls a set of card positions that are labeled "PCI Bridge Set" on the frames of system units and expansion towers. There can be more than one multi-adapter bridge resource connected to a system bus. Each bridge resource operates independently from any other bridge on the system bus and the bridge controls only the card positions in its own PCI bridge set.

Resource names

Communications lines, I/O processors, and devices are system resources. All system resources are identified by a resource name. To list the system resources, or display and change resource names:

- See Chapter 2, "Hardware Service Manager," on page 45.
- Enter the resources command:
 - WRKHDWRSC

During an IPL all powered-on resources that do not have a name are assigned a name. The Licensed Internal Code assigns the name according to the order in which the resource reports to the system. The resource name is used for identification (by the Licensed Internal Code) during the next IPL, on displays, in printouts, and during system configuration.

Note: Many system resources are identified by both logical and packaging resource names. The logical and packaging hardware resources have different resource names.

Use the following tables to identify the logical and packaging system resources. For more information on system resources, see Chapter 2, "Hardware Service

Manager,” on page 45 and Chapter 3, “Product Activity Log,” on page 97.

Table 45. Logical resource naming formats

Name	Description	Example
A	Disk (device)	A1
BC	Bus controller	BC01
BCC	Bus controller (expansion adapter)	BCC01
BD	Bus extender driver	BD01
BR	Bus extender receiver	BR01
BUS	Bus	BUS01
CC	Communications IOP	CC01
CEC	System (logical)***	CEC01
CMB	Multiple Function IOP	CMB01
CTL	Workstation I/O adapter	CTL01
DC	Storage controller (disk, tape, diskette, optical)	DC01
ERR	Inoperative resource**	ERR01
I	Diskette	I1
LIN	Communications IOA	LIN01
LINE	Communications port	CMN01
MP	Main (system) processor	MP01
MS	Main storage card	MS01
OPT	Optical drive	OPT01
PN	Control panel	PN01
SI	Storage IOP	SI01
SP	Service processor	SP01
T	Tape device (external)	T1
TC	Tape device (internal)	TC
UNK	Unknown resource*	UNK0001
WS	Workstation I/O processor	WS01
See Note	Printer (device)	P1
See Note	Workstation (device)	W1
<p>Note: Names for displays and printers are defined by the user as any two characters.</p> <p>* An unknown resource (UNK) is one that is assigned to an I/O processor that is not operational, or to a device that the operating system does not recognize.</p> <p>** An inoperative resource (ERR) is one that is not operational. Full vital product data might not be provided.</p> <p>*** A system resource (CEC) is a collection of all logical resources that are attached to the processor. It also indicates the type, model, and serial number of the system.</p>		

Table 46. Packaging resource naming formats

Name	Description	Example
C	Card	C01
CE	Card enclosure (rack-mounted)	CE01

Table 46. Packaging resource naming formats (continued)

Name	Description	Example
DE	Device enclosure (rack-mounted)	DE01
EE	Card enclosure (enclosure-mounted)	EE01
EMD	Device (enclosure-mounted)	EMD01
EMP	Control panel (enclosure-mounted)	EMP01
FR	Frame	FR01
SD	Stand-alone device	SD001
SYS	System (packaging)*	SYS01

* A system resource (SYS) is a collection of all packaging resources that are contained within, or attached to the system unit.

Hardware configuration restrictions

The following restrictions apply for the hardware that is associated with resources. For more information, see Chapter 2, “Hardware Service Manager,” on page 45 and “Hardware information” on page 226.

- If you move a workstation I/O processor (IOP), you must move the attachment cable that is connected to the IOP to the card position along with the IOP.

Note: The cable must be moved because the configuration for the IOP is tied to the resource name of the IOP, which follows the serial number of the card.

- If you move a communications I/O adapter (IOA), you must move the cables that are connected to the IOA along with the IOA.

Note: The cable must be moved because the configuration for the lines is tied to the resource name of the IOA, which is based on the serial number of the IOA card.

Communications card, cable, and wrap connector reference

Single-port communications adapter card and TPAC wrap connector

Note: TPAC = Two-Port Adapter Cable.

Table 47. Single-port communications adapter card wrap connector. This adapter wrap connector is also used for the 25-pin D shells on the two port adapter cable.

Communications adapter card wrap connector	Connector pin	V.24-RS232 adapter card	X.21 adapter card	V.35 adapter card
1 cable ID 3	1	CID 3	CID 3	CID 3
2 to 3	2	XD	XD-A	XD-A
3 to 2	3	RD	RD-A	RD-A
4 to 5	4	RTS	XD-B	XD-B
5 to 4	5	CTS	RD-B	RD-B
6 to 20	6	DSR	IND-A	Not Used
7	7	SGND	SGND	SGND
8 to 16,18	8	CD	SET-B	RX-A

Table 47. Single-port communications adapter card wrap connector (continued). This adapter wrap connector is also used for the 25-pin D shells on the two port adapter cable.

Communications adapter card wrap connector	Connector pin	V.24-RS232 adapter card	X.21 adapter card	V.35 adapter card
9 to 11,17	9	DCERS	Not Used	CD
10 cable ID 2	10	CID 2	CID 2	CID 2
11 to 9,17	11	STBY	DCLK-A	CTS
12 cable ID 1	12	CID 1	CID 1	CID 1
13 cable ID 0	13	CID 0	CID 0	CID 0
14 to 21,22	14	Not Used	Not Used	DX-B
15 to 23	15	TCLK	IND-B	DSR
16 to 8,18	16	Not Used	Not Used	TX-A
17 to 9,11	17	RCLK	SET-A	RTS
18 to 8,16	18	WRAP	DCLK-B	DX-A
19 to 24,25	19	Not Used	Not Used	Not Used
20 to 6	20	DTR	CTL-A	Not Used
21 to 14,22	21	RLB	Not Used	RX-B
22 to 14,21	22	RI	Not Used	TX-B
23 to 15	23	RATE	CTL-B	DTR
24 to 19,25	24	DTE	Not Used	Not Used
25 to 19,24	25	TI	Not Used	Not Used

High speed communications card and wrap connector wiring

Table 48. High speed communications

Wrap connector pin to pin	Connector pin	Signal destination
4 to 5, 8	4	RTS A to CTS A, CD A
5 to 4	5	CTS A to RTS A
7 to 9, 43, 49, 50	7	SGND to CID 0, CID 1, CID2, CID 3
8 to 4	8	CD A to RTS A
9 to 7	9	CID 0 to SGND
10 to 12, 40	10	DTE clock A to RCLK A, TCLKA
11 to 14	11	RI to Remote loop back
12 to 10	12	RCLK A to DTE clock A
14 to 11	14	Remote loop back to RI
15 to 45	15	Local loop back to test indicator
18 to 37	18	TD A to RD A
20 to 34	20	RD B to TD B
21 to 22, 25	21	RTS B to CTS B
22 to 21	22	CTS B to RTS B
25 to 21	25	CD B to RTS B
27 to 29, 41	27	DTE clock B to RCLK B, TCLK B
28 to 47	28	RSGND to TSGND

Table 48. High speed communications (continued)

Wrap connector pin to pin	Connector pin	Signal destination
29 to 27	29	RCLK B to DTE clock B
34 to 20	34	TD B to RD B
35 to 39	35	DTR B to DSR B
36 to 38	36	DTR A to DSR A
37 to 18	37	RD A to TD A
38 to 36	38	DSR A to DTR A
39 to 35	39	DSR B to DTR B
40 to 10	40	TCLK A to DTE clock A
41 to 27	41	TCLK B to DTE clock B
43 to 7	43	CID 1 to SGND
47 to 28	47	TSGND to RSGND
49 to 7	49	CID 2 to SGND
50 to 7	50	CI 3 to SGND

Advanced PCI communications console cable

Table 49. Advanced PCI communications console cable

Signal designation	Adapter connector pin number	DCE connector pin number
Ready for sending (CTS) to RTS	2	8
Data set ready (DSR) to DTR	4	6
Transmit data to Received data	6	3
Signal Ground (SGND)	9	5
Signal Ground (SGND)	10	5
Received data to Transmit data	13	2
DTR/CD to DSR	15	1,4
Signal Ground (SGND)	27	5
Request to send (RTS) to CTS	33	7

Cryptographic processor card and wrap connector wiring

Table 50. Cryptographic processor card and wrap connector wiring

Signal designation	Wrap connector pin to pin
CD to RTS,CTS	1 to 7,8
RD to TD	2 to 3
DTR to DSR	4 to 6

Two-port communications adapter card and wrap connector wiring

Table 51. Two-port 232/ac dc

Wrap connector pin to pin	Connector pin	EIA 232 or V.24	EIA 366 or V.25	X.21
1 Cable ID (CID) 3	1	CID 3 P1	CID 3 P1	CID 3 P1
2 to 3	2	XD P1	Not Used	XD-A P1
3 to 2	3	RD P1	PWI P1	RD-A P1
4 to 38	4	DSR P1	Not Used	IND-A P1
5 to 6, 18	5	DCERS P1	DG RV P1	Not Used
6 to 5, 18	6	STBY P1	NB2 P1	DCLK-A P1
7 to 8, 36	7	RLB P1	NB4 P1	Not Used
8 to 7, 36	8	Not Used	Not Used	Not Used
9 to 10	9	XD P2	Not Used	XD-A P2
10 to 9	10	RD P2	PWI P2	RD-A P2
11 to 15	11	DSR P2	Not Used	IND-A P2
12 to 13, 33	12	DCERS P2	DG RV P2	Not Used
13 to 12, 33	13	STBY P2	NB2 P2	DCLK-A P2
14 to 44, 46	14	Not Used	Not Used	Not Used
15 to 11	15	DTR P2	Not Used	CTL-A P2
16 to 29, 30	16	CD P2	DSC P2	SET-B P2
17	17	SGND P2	SGND P2	SGND P2
18 to 5, 6	18	RCLK P1	RCV1 P1	SET-A P1
19 to 20	19	RTS P1	DPR P1	XD-B P1
20 to 19	20	CTS P1	PND P1	RD-B P1
21 to 39	21	TCLK P1	RCV2 P1	IND-B P1
22 to 23, 35	22	Not Used	Not Used	Not Used
23 to 22, 35	23	WRAP P1	NB8 P1	DCLK-B P1
24 to 25, 37	24	TI P1	DLO P1	Not Used
25 to 24, 37	25	DTE P1	CRQ P1	Not Used
26 to 27	26	RTS P2	DPR P2	XD-B P2
27 to 26	27	CTS P2	PND P2	RD-B P2
28 to 32	28	TCLK P2	RCV2 P2	IND-B P2
29 to 16, 30	29	Not Used	Not Used	Not Used
30 to 16, 29	30	WRAP P2	NB8 P2	DCLK-B P2
31 to 43, 45	31	RI P2	ACR P2	Not Used
32 to 28	32	RATE P2	NB1 P2	CTL-B P2
33 to 12, 13	33	RCLK P2	RCV1 P2	SET-A P2
34	34	SGND P1	SGND P1	SGND P1
35, 22, 23	35	CD P1	DSC P1	SET-B P1
36 to 7, 8	36	RI P1	ACR P1	Not Used
37 to 24, 25	37	Not Used	Not Used	Not Used

Table 51. Two-port 232/ac dc (continued)

Wrap connector pin to pin	Connector pin	EIA 232 or V.24	EIA 366 or V.25	X.21
38 to 4	38	DTR P1	Not Used	CTL-A P1
39 to 21	39	RATE P1	NB1 P1	CTL-B P1
40	40	CID 2 P1	CID 2 P1	CID 2 P1
41	41	CID 1 P1	CID 1 P1	CID 1 P1
42	42	CID 0 P1	CID 0 P1	CID 0 P1
43 to 31, 45	43	Not Used	Not Used	Not Used
44 to 14, 46	44	DTE P2	CRQ P2	Not Used
45 to 31, 43	45	RLB P2	NB4 P2	Not Used
46 to 14, 44	46	TI P2	DLO P2	Not Used
47	47	CID 3 P2	CID 3 P2	CID 3 P2
48	48	CID 2 P2	CID 2 P2	CID 2 P2
49	49	CID 1 P2	CID 1 P2	CID 1 P2
50	50	CID 0 P2	CID 0 P2	CID 0 P2

ISDN wrap connector and connector pin

Table 52. ISDN

Wrap connector pin to pin	Connector pin	ISDN
1 Cable ID (CID) 3	1	CID 3
2 to 3	2	FLASHER TRIG
3 to 2	3	Jumper to FLASHER DISCH
4 to 38	4	OPTO OUT/DEGLITCH IN
5 to 6, 18	5	FLASHER OUT
6 to 5, 18	6	OPTO OUT/DEGLITCH IN
7 to 8, 36	7	VCC OPTO
8 to 7, 36	8	Not Used
9 to 10	9	+XMIT TE DRIVER (+DATA IN)
10 to 9	10	+RCV TE DSHL (+DATA OUT)
11 to 15	11	RES
12 to 13, 33	12	Not Used
13 to 12, 33	13	Not Used
14 to 44, 46	14	Not Used
15 to 11	15	Not Used
16 to 29, 30	16	Not Used
17	17	SGND
18 to 5, 6	18	DEGLITCH DISCH
19 to 20	19	Not Used
20 to 19	20	Not Used
21 to 39	21	DEGLITCH BASE

Table 52. ISDN (continued)

Wrap connector pin to pin	Connector pin	ISDN
22 to 23, 35	22	Not Used
23 to 22, 35	23	Not Used
24 to 25, 37	24	Not Used
25 to 24, 37	25	Not Used
26 to 27	26	-XMIT TE DSHL (-DATA IN)
27 to 26	27	-RCV TE DRIVER (-DATA OUT)
28 to 32	28	Not Used
29 to 16, 30	29	RES
30 to 16, 29	30	Not Used
31 to 43, 45	31	RES
32 to 28	32	Not Used
33 to 12, 13	33	Not Used
34	34	SGND
35 to 22, 23	35	Not Used
36 to 7, 8	36	Not Used
37 to 24, 25	37	Not Used
38 to 4	38	JUMPER TO DEGLITCH IN
39 to 21	39	DEGLITCH RST
40	40	CID 2
41	41	CID 1
42	42	CID 0
43 to 31, 45	43	Not Used
44 to 14, 46	44	Not Used
45 to 31, 43	45	Not Used
46 to 14, 44	46	Not Used
47	47	CID 3
48	48	CID 2
49	49	CID 1
50	50	CID 0

Two-port communications adapter cable

Table 53. Two-port communications adapter cable wiring

50-pin connector	Port 1 DTE connector number	Port 2 DTE connector number
1	1	Not Used
2	2	Not Used
3	3	Not Used
4	6	Not Used
5	Not Used	Not Used
6	11	Not Used

Table 53. Two-port communications adapter cable wiring (continued)

50-pin connector	Port 1 DTE connector number	Port 2 DTE connector number
7	21	Not Used
8	Not Used	Not Used
9	Not Used	2
10	Not Used	3
11	Not Used	6
12	Not Used	Not Used
13	Not Used	11
14	Not Used	19
15	Not Used	20
16	Not Used	8
17	Not Used	7
18	17	Not Used
19	4	Not Used
20	5	Not Used
21	15	Not Used
22	Not Used	Not Used
23	18	Not Used
24	25	Not Used
25	24	Not Used
26	Not Used	4
27	Not Used	5
28	Not Used	15
29	Not Used	Not Used
30	Not Used	18
31	Not Used	22
32	Not Used	23
33	Not Used	17
34	7	Not Used
35	8	Not Used
36	22	Not Used
37	19	Not Used
38	20	Not Used
39	23	Not Used
40	10	Not Used
41	12	Not Used
42	13	Not Used
43	Not Used	Not Used
44	Not Used	24
45	Not Used	21
46	Not Used	25

Table 53. Two-port communications adapter cable wiring (continued)

50-pin connector	Port 1 DTE connector number	Port 2 DTE connector number
47	Not Used	1
48	Not Used	10
49	Not Used	12
50	Not Used	13

RJ-45 cable wrap connector

Table 54. RJ-45 cable wrap connector

Description	Wrap connector pin to pin
+RCV_TE DRIVER (+DATA_OUT TO +XMIT_TE DSHL (+DATA_IN)	3 to 4
-XMIT_TE DSHL(-DATA_IN) TO -RCV_TE DRIVER (-DATA_OUT)	5 to 6
(Positions 1,2,7,8 not used)	

V.24 communications adapter remote power-on cable

Table 55. V.24 communications adapter remote power-on cable

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Transmitted data	103	2	2
Received data	104	3	3
Request to send (RTS)	105	4	4
Ready for sending (CTS)	106	5	5
Data set ready (DSR)	107	6	6
Data terminal ready/connect data set to line	108/2 108/1	24	20
Received line signal (carrier) detector	109	8	8
Data signal rate selector (DTE source)	111	43	23
Transmitter signal element timing (DTE)	113	11	24
Transmitter signal element timing (DCE)	114	19	15
Receiver signal element timing (DCE)	115	21	17
Select standby ³	116	29	11
Calling indicator ⁴	125	27, E1	22
Remote loopback	140	25	21
Local loopback	141	22	18
Test indicator	142	12	25
Cable ID 1, common return	102	7,16,17,33	7

Table 55. V.24 communications adapter remote power-on cable (continued)

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Notes:			
¹	Cable ID 1, 2, 4 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.		
²	The V.24 cable wrap connector is used with this cable. See V.24 cable information for wiring diagram.		
³	The Select Standby signal (circuit 116) is not used on all V.24 Communication Adapter Remote Power-On cables.		
⁴	Adapter Connector Number E1 is needed only with Stage 1 hardware.		

V.24/X.21bis communications adapter cable

Table 56. V.24/X.21bis communications adapter cable

Signal Designation	Interchange Circuit Number	Adapter Connector Pin Number	DCE Connector Pin Number
Transmitted data	103	2	2
Received data	104	3	3
Request to send (RTS)	105	4	4
Ready for sending (CTS)	106	5	5
Data set ready (DSR)	107	6	6
Data terminal ready/connect data set to line	108/2	20	20
Received line signal (carrier) detector	109	8	8
Data signal rate selector	111	23	23
Transmitter signal element timing (DTE)	113	24	24
Transmitter signal element timing (DCE)	114	15	15
Receiver signal element timing (DCE)	115	17	17
Select standby ²	116	11	11
Calling indicator	125	22	22
Remote loopback	140	21	21
Local loopback	141	18	18
Test indicator	142	25	25
Cable ID 0, common return	102	(7, 13)	7
Notes:			
¹	Cable ID 0 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.		
²	The Select Standby signal (circuit 116) is not used on all V.24 Communication Adapter cable assemblies.		

Stage 1 V.24/X.21bis cable wrap connector wiring

Table 57. V.24/X.21bis cable wrap connector wiring

Signal designation	Wrap connector pin to pin
Transmit data to receive data A	2 to 3
RTS to CTS	4 to 5
DTR to DSR	20 to 6
Data signal rate selector to carrier detector	23 to 8
DTE clock to RSET DCE, (TSET) ¹	24 to 17 (15)
Select standby to TSET ¹	11 to 15
Remote loopback to calling indicator	21 to 22
Local loopback to test indicator	18 to 25
Note:	
¹ Some cables do not contain the Select Standby to TSET wrap. In these cables, DTE Clock wraps to RSET DCE and TSET.	

V.24/X.21bis cable wrap connector wiring

Table 58. V.24/X.21bis cable wrap connector wiring

Signal designation	Wrap connector pin to pin
Transmit data to receive data A	2 to 3
RTS to CTS	4 to 5
DTR to DSR	20 to 6
Data signal rate selector to carrier detector	23 to 15 (17)
DTE clock to RSET DCE, (TSET)	24 to 25
Select standby to TSET ¹	11 to 17
Remote loopback to calling indicator	21 to 22
Local loopback to test indicator	18 to 8
Note:	
¹ Some cables do not contain the Select Standby to TSET wrap. In these cables, DTE Clock wraps to RSET DCE and TSET.	

EIA 232 advanced PCI communications cable

Table 59. EIA 232 advanced PCI communications cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitted data (TD)	13	2
Received data (RD)	6	3
Request to send (RTS)	2	4
Ready for sending (CTS)	33	5
Data set ready (DSR)	15	6
Signal Ground (SGND)	7,10,27	7
Received line signal (carrier) detector (CD)	20	8

Table 59. EIA 232 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitter Clock (TCLK)	29	15
Receiver Clock (RCLK)	26	17
Data terminal ready (DTR)	4	20
Ring Indicate (RI)	31	22

EIA 232 advanced wrap connector wiring

Table 60. EIA 232 advanced wrap connector wiring

Signal destination	Wrap connector pin to pin
TD to RD, RI	2 to 3,22
RD to TD	3 to 2
RTS to CTS, TCLK	4 to 5,15
CTS to RTS	5 to 4
DSR to DTR	6 to 20
CD to DTR	8 to 20
TCLK to RTS	15 to 4
RCLK to DTR	17 to 20
DTR to CD, DSR, RCLK	20 to 17,8,6
RI to TD	22 to 2

Stage 1 EIA-232/X.21bis communications adapter cable

Table 61. EIA-232/X.21bis communications adapter cable

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Transmitted data	103	2	2
Received data	104	3	3
Request to send (RTS)	105	4	4
Ready for sending (CTS)	106	5	5
Data set ready (DSR)	107	6	6
Data terminal ready/connect data set to line	108/2 108/1	24	20
Received line signal (carrier) detector	109	8	8
Data signal rate selector	111	43	23
Transmitter signal element timing (DTE)	113	11	24
Transmitter signal element timing (DCE)	114	19	15
Receiver signal element timing (DCE)	115	21	17
Select standby ²	116	29	11

Table 61. EIA-232/X.21bis communications adapter cable (continued)

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Calling indicator	125	27	22
Cable ID 1, 4 common return	102	(17, 33, 7)	7
Notes:			
¹	Cable ID 1, 4 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.		
²	The Select Standby signal (circuit 116) is not used on all EIA-232/X.21bis Communication Adapter cables.		

EIA-232/X.21bis communications adapter cable

Table 62. EIA-232/X.21bis communications adapter cable

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Transmitted data	103	2	2
Received data	104	3	3
Request to send (RTS)	105	4	4
Ready for sending (CTS)	106	5	5
Data set ready (DSR)	107	6	6
Data terminal ready/connect data set to line	108/2	20	20
Received line signal (carrier) detector	109	8	8
Data signal rate selector	111	23	23
Transmitter signal element timing (DTE)	113	24	24
Transmitter signal element timing (DCE)	114	15	15
Receiver signal element timing (DCE)	115	17	17
Select standby ²	116	11	11
Calling indicator	125	22	22
Cable ID 0, 3 common return	102	(1, 7, 13)	7
Notes:			
¹	Cable ID 0, 3 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.		
²	The Select Standby signal (circuit 116) is not used on all V-24 Communication Adapter cable assemblies.		

EIA-232/X.21bis cable wrap connector wiring

Table 63. EIA-232/X.21bis cable wrap connector wiring

Signal designation	Wrap connector pin to pin
Transmit data to receive data	2 to 3
RTS to CTS	4 to 5
DTR to DSR, calling indicator	20 to 6, 22

Table 63. EIA-232/X.21bis cable wrap connector wiring (continued)

Signal designation	Wrap connector pin to pin
Data signal rate selector to carrier detector	23 to 8
DTE clock to RSET DCE, (TSET) ¹	24 to 17, (15)
Select standby to TSET ¹	11 to 15
Note:	
¹ Some cables do not contain the Select Standby to TSET wrap. In these cables, DTE Clock wraps to RSET DCE and TSET.	

V.36/EIA 449 high speed communications adapter cable

Table 64. V.36/EIA 449 high speed communications adapter cable

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Transmitted data A, B	103	18,34	4,22
Received data A, B	104	37,20	6,24
Request to send (RTS) A, B	105	4,21	7,25
Ready for sending (CTS) A, B	106	5,22	9,27
Data set ready (DSR) A, B	107	38,39	11,29
Data terminal ready (DTR) A, B	108	36,35	12,30
Received line signal (carrier) detector (RLSD) A, B	109	8,25	13,31
Transmitter signal element timing (DTE) A, B	113	10,27	17,35
Transmitter signal element timing (DCE) A, B	114	40,41	5,23
Receiver signal element timing A, B	115	12,29	8,26
Calling indicator (CI)	125	11	15
Local loop back (LLB)	141	15	10
Remote loop back (RLB)	140	14	14
Test indicate (TI)	142	45	18
Receive circuit ground		28	20
Send circuit ground		47	37
Note: Cable ID 0, 2, 3 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.			

V.36/EIA 449 high speed communications adapter cable wrap connector wiring

Table 65. V.36/EIA 449 high speed communications adapter cable wrap connector wiring

Signal designation	Wrap connector pin to pin
Transmit data A to receive data A	4 to 6
Transmit data B to receive data B	22 to 24
DTR A to DSR A	12 to 11

Table 65. V.36/EIA 449 high speed communications adapter cable wrap connector wiring (continued)

Signal designation	Wrap connector pin to pin
DTR B to DSR B	30 to 29
RTS A to CTS A and RLSD A	7 to 9,13
RTS B to CTS B and RLSD B	25 to 27,31
TSET A (DTE) to TSET A (DCE) RSET A	17 to 5,8
TSET B (DTE) to TSET B (DCE) RSET B	35 to 23,26
Remote loopback to ring indicate	14 to 15
Local loopback to test indicate	10 to 18
Send circuit ground to receive circuit ground	37 to 20

Stage 1 V.35 communications adapter cable

Table 66. V.35 communications adapter cable

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Transmitted data A, B	103	42, 26	P, S
Received data A, B	104	44, 31	R, T
Request to send (RTS)	105	4	C
Ready for sending (CTS)	106	5	D
Data set ready (DSR)	107	6	E
Received line signal (carrier) detector	109	8	F
Transmitter signal element timing (DCE) A, B	114	48, 30	Y, A (A)
Receiver signal element timing (DCE) A, B	115	13, 46	V, X
Cable ID 2, 1, common return	102	(17, 16, 7)	B
Data terminal ready	108	24	H

Note: Cable ID 2, 1 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.

Stage 1 V.35 cable wrap connector wiring

Table 67. V.35 cable wrap connector wiring

Signal designation	Wrap connector pin to pin
Transmit data A to receive data A, TSET A, RSET A	P to (R, Y, V)
Transmit data B to receive data B, TSET B, RSET B	S to (T, A, X)
RTS to CTS, DSR, carrier detector	C to (D, E, F)

V.24 advanced PCI communications cable

Table 68. V.24 advanced PCI communications cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitted data (TD)	13	2

Table 68. V.24 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
Received data (RD)	6	3
Request to send (RTS)	2	4
Ready for sending (CTS)	33	5
Data set ready (DSR)	15	6
Signal Ground (SGND)	7,27	7
Received line signal (carrier) detector (CD)	20	8
Transmitter Clock (TCLK)	29	15
Receiver Clock (RCLK)	26	17
Local Loop Back (LLB)	21	18
Data terminal ready (DTR)	4	20
Ring Indicate (RI)	31	22
Remote Loop Back (RLB)	23	21
Test Indicate (TI)	18	25

V.24 advanced wrap connector wiring

Table 69. V.24 advanced wrap connector wiring

Signal destination	Wrap connector pin to pin
TD to RD	2 to 3
RD to TD	3 to 2
RTS to CTS, TCLK	4 to 5,15
CTS to RTS	5 to 4
DSR to DTR	6 to 20
CD to RLB	8 to 21
TCLK to RTS	15 to 4
RCLK to DTR	17 to 20
LLB to TI	18 to 25
DTR to DSR, RCLK	20 to 6,17
RLB to CD, RI	21 to 8,22
RI to RLB	22 to 21
TI to LLB	25 to 18

V.35 advanced PCI communications cable

Table 70. V.35 advanced PCI communications cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitter Clock B (TCLK-B)	28	AA
Signal Ground (SGND)	7,8,27	B
Request to send (RTS)	2	C
Ready for sending (CTS)	33	D

Table 70. V.35 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
Data set ready (DSR)	15	E
Carrier detector (CD)	20	F
Data terminal ready (DTR)	4	H
Ring Indicate (RI)	31	J
Local Loop Back (LLB)	21	L
Remote Loop Back (RLB)	23	N
Test Indicate (TI)	18	NN
Transmitted Data A (TD-A)	13	P
Received data A (RD-A)	6	R
Transmitted Data B (TD-B)	12	S
Received Data B (RD-B)	5	T
DTECK A	36	U
Receiver Clock A (RCLK-A)	26	V
DTECK B	35	W
Receiver Clock B (RCLK-B)	25	X
Transmitter Clock A (TCLK-A)	29	Y

V.35 advanced wrap connector wiring

Table 71. V.35 advanced wrap connector wiring

Signal destination	Wrap connector pin to pin
TCLK-B to DTECK-B	AA to W
RTS to CTS	C to D
CTS to RTS	D to C
DSR to DTR	E to H
CD to DTR	F to H
DTR to DSR, CD	H to E,F
RI to RLB	J to N
LLB to TI	L to NN
RLB to RI	N to J
TI to LLB	NN to L
TD-A to RD-A	P to R
RD-A to TD-A	R to P
TD-B to RD-B	S to T
RD-B to TD-B	T to S
DTECK-A to RCLK-A, TCLK-A	U to V,Y
RCLK-A to DTECK-A	V to U
DTECK-B to TCLK-B, RCLK-B	W to AA,X
RCLK-B to DTECK-B	X to W
TCLK-A to DTECK-A	Y to U

V.35 communications adapter cable

Table 72. V.35 communications adapter cable

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Transmitted data A, B	103	2, 4	P, S
Received data A, B	104	3, 5	R, T
Request to send (RTS)	105	17	C
Ready for sending (CTS)	106	11	D
Data set ready (DSR)	107	15	E
Received line signal (carrier) detector	109	9	F
Transmitter signal element timing (DCE) A, B	114	16, 22	Y, AA
Receiver signal element timing (DCE) A, B	115	8, 21	V, X
Cable ID 1, 0, common return	102	7, 12, 13	B
Data terminal ready	108	23	H

Note: Cable ID 1, 0 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.

V.35 cable wrap connector wiring

Table 73. V.35 cable wrap connector wiring

Signal designation	Wrap connector pin to pin
Transmit data A to receive data A, RSET A, TSET B	P to R, V, AA
Transmit data B to receive data B, RSET B, TSET A	S to T, X, Y
RTS to CTS, carrier detector	C to D, F
DSR to data terminal ready	E to H

V.35/High speed communications adapter cable

Table 74. V.35/High speed communications adapter cable

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Transmitted data A, B	103	18, 34	P, S
Received data A, B	104	37, 20	R, T
Request to send (RTS)	105	4, 21	C
Ready for sending (CTS)	106	05, 22	D
Data set ready (DSR)	107	38, 39	E
Received line signal (carrier) detector	109	8, 25	F
Transmitter signal element timing (DCE) A, B	114	40, 41	Y, AA
Receiver signal element timing (DCE) A, B	115	12, 29	V, X
Cable ID 1, 0, common return	102	43, 09, 7	B

Table 74. V.35/High speed communications adapter cable (continued)

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
Data terminal ready	108	36, 35	H
Transmitter signal element timing (DTE) A, B	113	10, 27	U, W
Ring Indicate (RI) A, B	125	11, 28	J

Note: Cable ID 1, 0 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.

V.35/High speed communications adapter cable wrap connector wiring

Table 75. V.35/High speed communications adapter cable wrap connector wiring

Signal designation	Wrap connector pin to pin
Transmit data A to receive data A	P to R
Transmit data B to receive data B	S to T
RTS to CTS, RI	C to (D,J)
DTR to DSR, RLSD	H to (E,F)
TSET A(DTR) to TSET A(DCE), RSET A	U to (V,Y)
TSET B(DTE) to TSET B(DCE), RSET B	W to (X,AA)

V.36/RS-449 advanced PCI communications cable

Table 76. V.36/RS-449 advanced PCI communications cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitted data A (TD-A)	13	4
Transmitter clock A (TCLK-A)	29	5
Received data A (RD-A)	6	6
Request to send A (RTS-A)	2	7
Receiver clock A (RCLK-A)	26	8
Ready for sending A (CTS)	33	9
Local Loop Back (LLB)	21	10
Data set ready A (DSR-A)	15	11
Data terminal ready A (DTR-A)	4	12
Carrier detector A (DC-A)	20	13
23	14	
Ring Indicate (RI)	16	15
DTECK A	36	17
Test Indicate (TI)	17	18
Signal Ground (SGND)	7,9,10,27	19
RC Ground (SC-GND)	34	20
Transmitted data B (TD-B)	12	22

Table 76. V.36/RS-449 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitter clock B (TCLK-B)	28	23
Received data B (RD-B)	5	24
Request to send B (RTS-B)	1	25
Receiver clock B (RCLK-B)	25	26
Ready for sending B (CTS-B)	32	27
Data set ready B (DSR-B)	14	29
Data terminal ready B (DTR-B)	3	30
Carrier detector B (CD-B)	19	31
DTECK B	35	35
SC Ground (SC-GND)	22	37

V.36/RS-449 advanced cable wrap connector wiring

Table 77. V.36/RS-449 advanced cable wrap connector wiring

Signal destination	Wrap connector pin to pin
TD-A to RD-A	4 to 6
TC-A to RTS-A	5 to 7
RD-A to TD-A	6 to 4
RTS-A to TC-A, CTS	7 to 5,9
RC-A to DTECK-A	8 to 17
CTS to RTS-A	9 to 7
LLB to TI	10 to 18
DSR-A to DTR-A	11 to 12
DTR-A DSR-A, CD-A	12 to 11,13
CD-A to DTR-A	13 to 12
RLB to RI	14 to 15
RI to RLB	15 to 14
DTECK-A to RC-A	17 to 8
TI to LLB	18 to 10
RC-GND to SC-GND	20 to 37
TD-B to RD-B	22 to 24
TC-B to RTS-B	23 to 25
RD-B to TD-B	24 to 22
RTS-B to TC-B, CTS-B	25 to 23,27
RC-B to DTECK-B	26 to 35
CTS-B to RTS-B	27 to 25
DSR-B to DTR-B	29 to 30
DTR-B to DSR-B, CD-B	30 to 29,31
CD-B to DTR-B	31 to 30
DTECK-B to RC-B	35 to 26

Table 77. V.36/RS-449 advanced cable wrap connector wiring (continued)

Signal destination	Wrap connector pin to pin
SC-GND to RC-GND	37 to 20

X.21 communications adapter cable

Table 78. X.21 Communications Adapter Cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitted data A, B	2, 4	2, 9
Received data A, B	3, 5	4, 11
Control A, B	20, 23	3, 10
Indication A, B	6, 15	5, 12
Signal element timing A, B	17, 8	6, 13
Cable ID bit 2, common return	7, 10	8

Note: Cable ID 2 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.

X.21/High speed communications adapter cable

Table 79. X.21/High speed communications adapter cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitted data A, B	18, 34	2, 9
Received data A, B	37, 20	4, 11
Control A, B	36, 35	3, 10
Indication A, B	38, 39	5, 12
Signal element timing A, B	12, 29	6, 13
Cable ID bit 2, common return	49, 7	8

Note: Cable ID 2 is connected to common return pin 7 only at the DTE connector end and is not connected at the DCE end.

X.21 cable wrap connector wiring

Table 80. X.21 cable wrap connector wiring

Signal designation	Wrap connector pin to pin
Transmit data A to receive data A, signal timing A	2 to 4, 6
Transmit data B to receive data B, signal timing B	9 to 11, 13
Control A to indicate A	3 to 5
Control B to indicate B	10 to 12

X.21 advanced PCI communications cable

Table 81. X.21 advanced PCI communications cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitted data A (TD-A)	13	2

Table 81. X.21 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
CNTL-A	4	3
Received data A (RD-A)	6	4
IND-A	15	5
SET-A	29	6
Signal Ground (SGND)	27,9	8
Transmitted data B (TD-B)	12	9
CNTL-B	3	10
Received data B (RD-B)	5	11
SET-B	28	13

X.21 advanced wrap connector wiring

Table 82. X.21 advanced wrap connector wiring

Signal destination	Wrap connector pin to pin
TD-A to RD-A, SET-A	2 to 4,6
CTL-A to IND-A	3 to 5
RD-A to TD-A	4 to 2
IND-A to CTL-A	5 to 3
SET-A to TD-A	6 to 2
TD-B to RD-B, SET-B	9 to 11,13
CTL-B to IND-B	10 to 12
RD-B to TD-B	11 to 9
IND-B to CTL-B	12 to 10
SET-B to TD-B	13 to 9

Token-ring communications adapter cable and card wrap

Table 83. Token-ring Communications Adapter Cable

Interface line name	Adapter connector pin number	ICS data connector	Wrap connector pin to pin
Transmit positive (TX+)	9	Orange dot	9 to 1
Transmit negative (TX-)	5	Black dot	5 to 6
Receive positive (RX+)	1	Red dot	1 to 9
Receive negative (RX-)	6	Green dot	6 to 5

Ethernet/IEEE 802.3 transceiver adapter cable and card wrap

Table 84. Ethernet/IEEE 802.3 transceiver adapter cable and card wrap

Interface line name	Adapter connector pin number	Wrap connector pin to pin (normal wrap)	Wrap connector pin to pin (collision wrap)
Data out - circuit A (DO-A)	3	3 to 5	3 to 2
Data out - circuit B (DO-B)	10	10 to 12	10 to 9

Table 84. Ethernet/IEEE 802.3 transceiver adapter cable and card wrap (continued)

Interface line name	Adapter connector pin number	Wrap connector pin to pin (normal wrap)	Wrap connector pin to pin (collision wrap)
Data out - circuit shield (DO-S)	11		
Data in - circuit A (DI-A)	5	5 to 3	
Data in - circuit B (DI-B)	12	12 to 10	
Data in - circuit shield (DI-S)	4		
Control in - circuit A (CI-A)	2		2 to 3
Control in - circuit B (CI-B)	9		9 to 10
Control in - circuit shield (CI-S)	1		
Voltage common (VC)	6		6 to 13
Voltage plus (VP)	13		13 to 6
Voltage shield (VS)	14		
Protective ground (PG) (Conductive shell)	Shell		

Facsimile adapter cable wrap connector wiring

Table 85. Facsimile adapter cable wrap connector wiring

Signal designation	Wrap connector port A pin to port B pin
OH/DP to RI	11 to 13
AN1 to AN2	9 to 9
AN2 to AN2	10 to 10
RI to OH/DP	13 to 11
+5V to wrap cable logic	19
DL to country or region code	23 to 14
CLK to CLK Wrap	16 to 18
Country or region code to DL	14 to 23
CLK wrap to CLK	18 to 16
Logic ground to wrap cable logic	7

DDI transceiver adapter cable and card wrap

Table 86. DDI transceiver adapter cable and card wrap

Interface line name	Adapter connector pin number	ICS data connector	Wrap connector pin to pin
Transmit positive (TX+)	5	Red dot	5 to 1
Transmit negative (TX-)	9	Green dot	9 to 6
Receive positive (RX+)	1	Black dot	1 to 5
Receive negative (RX-)	6	Orange dot	6 to 9

PCI communications card wrap connector wiring

Table 87. PCI communications card wrap connector wiring

Signal destination	Wrap connector pin to pin
RTS-B to CTS-B	1 to 32
RTS-A to CTS-A	2 to 33
DTR-B to DSR-B, CD-B	3 to 14,19
DTR-A to DSR-A, CD-A	4 to 15,20
RD-B to TD-B	5 to 12
RD-A to TD-A	6 to 13
SGND to SGND	7 to 27
CID(1) to SGND	8 to 27
SGND to SGND	9 to 27
SGND to SGND	10 to 27
unused	11 to 30
TD-B to RD-B	12 to 5
TD-A to RD-A	13 to 6
DSR-B to DTR-B	14 to 3
DSR-A to DTR-A	15 to 4
RI to RLB	16 to 23
TI to DIAG_OUT-A	17 to 24
TI to LLB	18 to 21
CD-B to DTR-B	19 to 3
CD-A to DTR-A	20 to 4
LLB to TI	21 to 18
RLB to RL, RI	23 to 31,16
DIAG_OUT-A to TI	24 to 17
RCLK-B to DTECK-B	25 to 35
RCLK-A to DTECK-A	26 to 35
LGND to RGND, CID(3), CID(2), CID(1), CID(0)	27 to 34,10,9,8,7
TCLK-B to DTECK-B	28 to 35
TCLK-A to DTECK-A	29 to 36
UNUSED	30 to 11
RI to RLB	31 to 23
CTS-B to RTS-B	32 to 1
CTS-A to RTS-A	33 to 2
SGND to SGND	34 to 27
DTECK-B to RCLK-B, TCLK-B	35 to 28,25
DTECK-A to RCLK-A, TCLK-A	36 to 29,26

Communications signal voltage levels

Table 88. Communications signal voltage levels

Interface type	OFF voltage level	ON voltage level
V.24 EIA-232 X.21bis	Less than -3 volts	More than +3 volts
V.35	When terminated by a 100-ohm resistive load, the differential voltage (A-B) is 0.55 volts +/- 20%.	When terminated by a 100-ohm resistive load, the differential voltage (B-A) is 0.55 volts +/- 20%.
Note: See the V.35 cable to find out which pin numbers are A and B.		
X.21	The differential voltage (A-B) is less than -0.3 volts. When terminated by a 100 ohm resistive load, the differential voltage (B-A) is the larger of 2.0 volts or 50% of the open circuit voltage. The open circuit voltage is between 2.0 and 6.0 volts.	The differential voltage (A-B) is more than + 0.3 volts. When terminated by a 100 ohm resistive load, the differential voltage (A-B) is the larger of 2.0 volts or 50% of the open circuit voltage. The open circuit voltage is between 2.0 and 6.0 volts.
Note: See X.21 cable diagram to find out which pin numbers are A and B.		
ISDN	Logic 0 The differential voltage (A-B) is less than +.75 volts and more than -.75 volts (nominal).	Logic 1 The differential voltage (A-B) is 0.0 volts (nominal).

Chapter 10. Working with Storage Dumps

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Main storage dump introduction

A main storage dump (MSD) is a process of collecting data from the system's main storage. A main storage dump can be performed in the following ways:

- Automatically - by the service processor as the result of a system failure.
- Manually - by use of Function 22 on the control panel when the system waits, loops, or appears to have an operating system failure.

For more information on automatic and manual MSDs, see "Automatic main storage dump" on page 266 and "Performing a main storage dump to disk (manual MSD)" on page 267.

A complete MSD consists of the following:

- Main storage data
- Licensed Internal Code (LIC) module information (link map)
- MSD control data (SID 82)

Main storage dump data can be stored in three places:

- On the load-source disk
All MSD data is stored on the load-source disk during the dump process. While it is on the load-source disk, it is called the **current MSD**. You can display or copy the current MSD until either the next main storage dump occurs (writes over it), or the next IPL is performed. To ensure that the current MSD is available to assist in problem analysis, you must copy the dump to removable media or the MSD library. Once an IPL occurs, some main storage data for the current MSD may be lost. Also the link map for the current MSD may be inaccurate. What remains of the current MSD is called residue.
- On removable media
This is a copy of the data that was first stored on the load-source disk, plus a current link map and any MSD data still in main storage. The MSD that is copied to removable media (for example, tape) can assist in problem analysis.
- In the MSD library
This is a copy of the data that was first stored on the load-source disk, plus a current link map and any MSD data still in main storage. The MSD library

allows you to work with copies of MSDs. The contents of the MSD library is stored in auxiliary storage. You can access dumps in the MSD library to assist in problem analysis.

For more information on how to display a main storage dump, see “Main storage dump manager” on page 30 and the *iSeries Licensed Internal Code Diagnostic Aids - Volume 1*.

For more information on how to copy a main storage dump, see “Copying a main storage dump” on page 268.

Automatic main storage dump

When the system stops due to a hardware or software failure, the service processor begins the main storage dump process. (To check whether the system performed an MSD or to verify that a current MSD is on the system, see “Error recovery for dumps” on page 272.)

When the service processor begins the main storage dump process, the control panel displays D1xx 3xxx reference codes. When the initial stages of the MSD are complete, the service processor performs one of the following:

- Displays a reference code on the control panel (if it cannot continue).
- Begins an MSD IPL and displays C6xx 44xx SRCs along with the IPL SRCs on the control panel.

Note: For more information on C6xx 44xx and D1xx 3xxx SRCs, see “General status SRCs” on page 210.

When the system completes the dump, data for the current MSD is either placed on the load-source disk or held in main storage. The Main Storage Dump Manager (MSDM) function then starts.

When a failure causes the system to perform a main storage dump, the Main Storage Dump Manager SRC display (Figure 80 on page 267) will appear as soon as the last disk unit reports in.

Note: If not all disk units report in (after about 40 minutes), the *Disk Configuration Error Report* screen will appear when the user specifies an action that requires access to auxiliary storage. Note the error that appears on the display. This can help during problem analysis. Press the F3 (Exit) key to continue to view the current MSD or copy it to removable media.


```

Main Storage Dump Occurred
S/N 10 xxxx

The system has failed. Report the following information to
your IBM service representative.

SRC word 1 . . . . . : B6005121
SRC word 2 . . . . . : 08B0005D
SRC word 3 . . . . . : 00000000
SRC word 4 . . . . . : 00000000
SRC word 5 . . . . . : 00000000
SRC word 6 . . . . . : 00000000
SRC word 7 . . . . . : 00000000
SRC word 8 . . . . . : 00000000
SRC word 9 . . . . . : 00000000
Type/Model/Feature . . : 9406 0820 23BB

Warning: The Main Storage Dump (MSD) must be copied for service.
Failure to copy the Main Storage Dump will limit
the ability to diagnose the failure.

Press Enter to copy the MSD for service or view the MSD.

F3=Exit    F12=Cancel

```

Figure 80. Example MSDM SRC display that appears on the console when an MSD occurs.

Attention! Unless the current MSD is copied to removable media or the MSD library, the dump data in main storage will be lost when the system performs an IPL at the end of the dump process. To copy the MSD, press the Enter key. When the Main Storage Dump Manager display appears, go to “Copying a main storage dump” on page 268.

If you select F3/F12 to exit Main Storage Dump Manager without copying the MSD, the following message appears:

```

Main storage dump has not been copied for service.

```

Selecting F3/F12 a second time ends the main storage dump manager function, and the system performs an IPL again.

Performing a main storage dump to disk (manual MSD)

To start a main storage dump, perform the following procedure:

1. **Attention:** Ask the customer to verify that no interactive jobs are running.
 - a. Make sure the console is powered on.
 - b. Note the current IPL mode. This will need to be restored when done with the dump process.
 - c. Select Manual IPL mode.
 - d. Use the Increment (↑) or Decrement (↓) button to display Function 22 (main storage dump).

If you are running on a secondary partition, you need to request a dump from the logical partitions service tool.

Note: Prior to pressing function 22, check to see whether function 34 is available in the panel (see “Function 34–Retry MSD or CPM IPL” on page 166). If it is available, then the system is attempting to run a main storage dump or power failure recovery (CPM) IPL. Pressing function 34 attempts to retry the IPL such that the original dump is not lost.

- e. Press Enter on the control panel.
2. Are zeroes displayed on the control panel for more than 30 seconds?

No	Yes
↓	The multiple function IOP or service processor is not responding to a request from the control panel.
	Ask your next level of support for assistance and write a Licensed Internal Code Trouble Report (LICTR) if suitable.
	This ends the procedure.
3. The system displays an attention SRC, A1xx 3022, which indicates that Function 22 has been selected. Re-select Function 22, press Enter on the control panel, and wait for the dump to complete.
4. Follow the status of the main storage dump:
 - If the system displays status SRCs as Function 11 during the dump, see “Main storage dump status” on page 271.
 - If an A6005004 SRC appears on the control panel, power on the console
5. Did the main storage dump complete successfully?

Note: The appearance of an A600 440x SRC on the control panel and a Main Storage Dump display on the console indicates a successful MSD.

No	Yes
↓	For SRCs other than A6004405, go to “Copying a main storage dump” for the correct procedure. (For A6004405 SRC, the dump has already been copied.) Then select original IPL mode (e.g.: Normal) and exit out of the MSD Manager. Return to PIP that sent you here.
	This ends the procedure.
6. Go to “Error recovery for dumps” on page 272.

This ends the procedure.

Copying a main storage dump

You can copy main storage dump data in the following ways:

- From the current main storage dump to removable media
- From the current main storage dump to the MSD library
- From the MSD library to removable media
- From removable media to the MSD library

Notes:

1. Dumps must be copied to removable media or the MSD library as soon as possible. If a machine check occurs after the system has performed an IPL, another MSD might automatically be taken. If this is the case, the first (original) MSD does not get saved; it gets overwritten by the new dump.
2. For descriptions of the current MSD and the MSD library storage, see “Main storage dump introduction” on page 265.

To copy a main storage dump, you must access the Main Storage Dump Manager function. Access this function in one of the following ways:

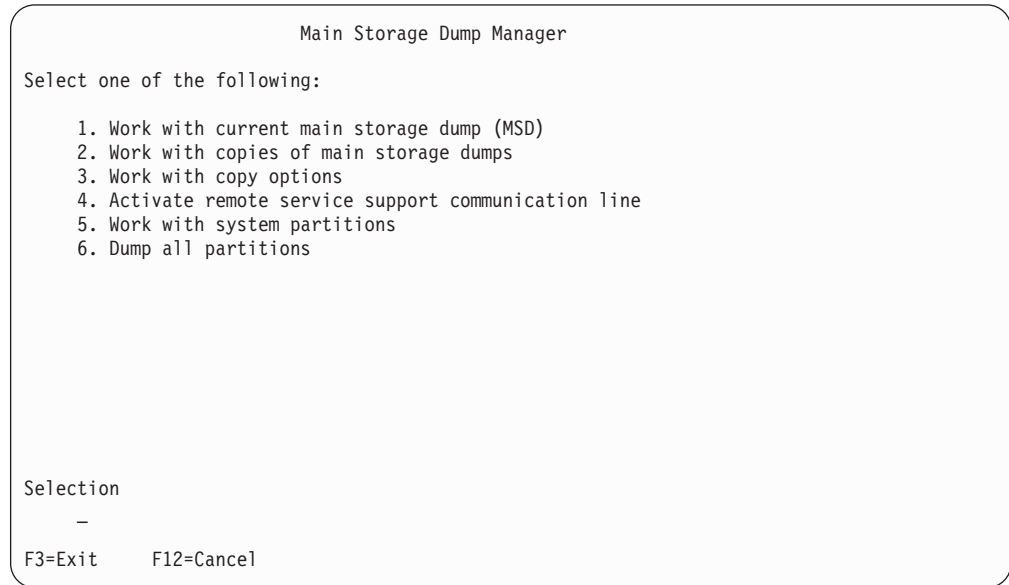
- When you perform an MSD, access the Main Storage Dump Manager function during the dump process. The Main Storage Dump Occurred display appears

when the dump data is placed on the load-source disk. If you press the Enter key from this display, the Main Storage Dump Manager display appears.

- At any other time, access the Main Storage Dump Manager function from the Start a Service Tool display.

The Main Storage Dump Manager display allows you to work with the current dump or copies of past dumps.

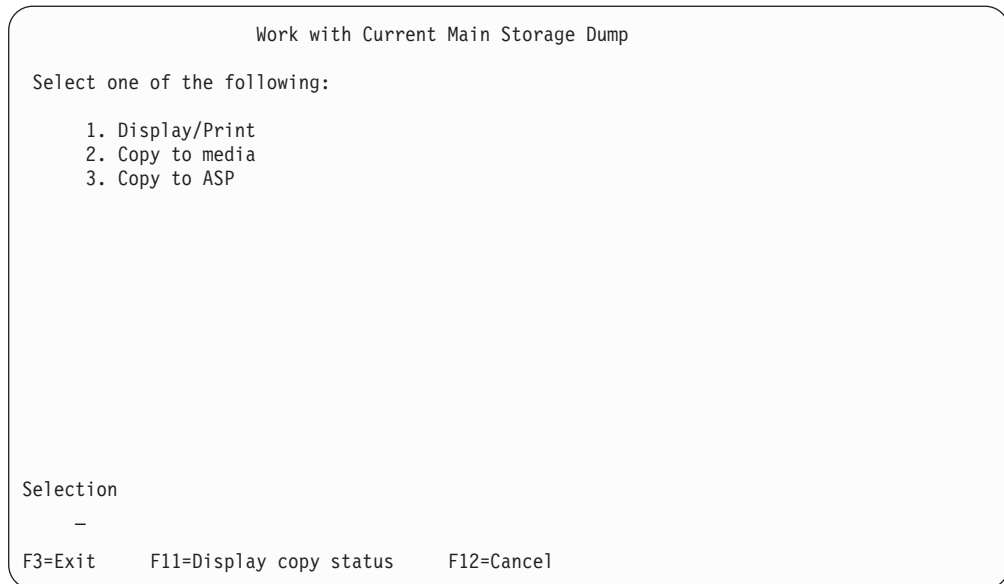
Note: Options 4, 5, and 6 may not appear.



Work with current main storage dump

If you select the *Work with current main storage dump (MSD)* option from the Main Storage Dump Manager display, you can work with the newest MSD taken by the system. The current MSD is stored on the load-source disk. It gets replaced by the next main storage dump or is lost during the next IPL.

The Work with Current Main Storage Dump display allows you to select the following options:



Display main storage dump

Use this option to display the current MSD. For more information on displaying the current MSD, see “Main storage dump manager” on page 30.

Copy main storage dump to media

If you select the *Copy to media* option, you must load the removable media. A series of displays appears indicating the progress. When the copy function completes, a success or a failure message appears. When you exit the Main Storage Dump Manager, the system IPLs again and can be returned to the customer.

Copy main storage dump to MSD copy

If you select the *Copy to ASP* option, you must provide a description of the dump. When you press the Enter key, a series of displays appears indicating the progress. When the copy function completes, a success or a failure message appears. When you exit the Main Storage Dump Manager, the system IPLs again and can be returned to the customer.

The following message indicates that the system encountered problems while trying to copy the dump to MSD library:

Cannot IPL to Storage Management Recovery. Copy dump to media.

If this message appears, you must copy the MSD to removable media.

For more information on the MSD library, see “Main storage dump introduction” on page 265.

Work with copies of main storage dumps

If you select the *Work with copies of main storage dumps* option from the Main Storage Dump Manager display, you can work with a copy of an MSD that is on removable media or in the MSD library. For descriptions of removable media and the MSD library storage, see “Main storage dump introduction” on page 265.

This option allows you to perform the following functions:

MSD status	Function performed
11 A1xx 300x	Main storage dump successful completion. See "Copying a main storage dump" on page 268..
11 A6xx4404	
11 B1xx 4998 or 11 B1xx4698 or 11 B2xx5117	A valid main storage dump exists. Perform a complete IPL and try the MSD procedure again.

Note: x can be any hexadecimal character (0 through 9, A through F).

Error recovery for dumps

Determining whether main storage dump data was written to disk

Perform the following steps to determine whether a main storage dump data was written to disk:

1. If the Main Storage Dump Occurred display appears on the system console, then the first part of the main storage dump data has been written to disk. Go to "Copying a main storage dump" on page 268 to save the main storage dump.
2. If the main storage dump terminated with an SRC displayed on the control panel, and the Main Storage Dump Occurred display does not appear on the system console do the following:
 - a. Check to see if function 34 is available at the control panel.
 - b. If function 34 is available, select function 34 at the control panel and press Enter at the control panel to attempt a retry of the dump IPL.
If the Main Storage Dump Occurred display appears on the system console, function 34 was successful and the main storage dump data is not lost. Go to "Copying a main storage dump" on page 268 to save the main storage dump.
 - c. If function 34 is not available or if the terminating SRC continues to be displayed at the control panel, then the main storage dump data has been lost. The only remaining data that might be available is the main storage dump residue, a service processor storage dump, and all of the System Reference Code data words. Go to "Reporting the error" to collect as much data as possible.

Reporting the error

The main storage dump failure needs to be reported with all of the data that can be collected. Collect and record or save the following data:

1. Save the SRC data words:
 - a. Set the control panel key mode to Manual.
 - b. Record all of the SRC data words available from function 11 through function 20.
2. Save the service processor control storage data dump.
 - a. Select control panel function 70 and press Enter. See "Performing an IOP storage dump to disk (Models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, S20, S30, and S40)" on page 273 or "Performing a service processor storage dump (Models 270, 8xx, SB2, and SB3)" on page 273.

3. Save the main storage dump residue.
 - a. Use SST to enter the Main Storage Dump Manager.
 - b. Use the Main Storage Dump Manager to save the current main storage dump. See “Copying a main storage dump” on page 268.

Additional help

For details on main storage dump information, see the *iSeries Licensed Internal Code Diagnostic Aids - Volume 1* information.

To save the dump data to removable media, see “Copying a main storage dump” on page 268.

Performing an IOP storage dump to disk (Models 150, 170, 250, 4xx, 5xx, 6xx, 7xx, SB1, S20, S30, and S40)

Perform the following to obtain a storage dump of the MFIOP card:

1. Select Manual mode.
2. Select control panel Function 25 (service switch 1 function).
3. Press Enter on the control panel.
4. Select control panel Function 26 (service switch 2 function).
5. Press Enter on the control panel.
6. Select control panel Function 70 (MFIOP storage dump).
7. Press Enter on the control panel.
8. Wait for **one** of the following completion SRCs:
 - a. 11xx A1XX8ABF
 - b. 11xx B1XX8ABF
 - c. 11xx D1XX8ABF
9. The data is now written to disk.
10. Save the MFIOP data for the storage dump to tape or diskette (See “Copying the IOP storage dump to removable media (All Models)” on page 274).

This ends the procedure.

Performing a service processor storage dump (Models 270, 8xx, SB2, and SB3)

Perform the following to obtain a storage dump of the service processor card:

1. Select Manual key mode.
2. Select control panel Function 25 (service switch 1 function).
3. Press Enter on the control panel.
4. Select control panel Function 26 (service switch 2 function).
5. Press Enter on the control panel.
6. Select control panel Function 70 (service processor control storage dump).
7. Press Enter on the control panel.
8. Wait for the status SRCs to complete (D1xx 380x followed by 00 status displayed).
9. The data is now saved to a non-volatile storage area.

10. Save the service processor control storage data (See “Copying the service processor storage dump to removable media (Models 270, 8xx, SB2, and SB3)”).

Copying the IOP storage dump to removable media (All Models)

1. Load the removable media that is initialized with a SID87 volume ID.

Note: If you are using a volume with a different volume name, use that name in place of SID87.

Press the Enter key.

2. From the Start a Service Tool display, select the *Display/Alter/Dump* option.
3. Select the correct dump option (for the type of media that you are copying to) from the Display/Alter/Dump Output Device display.
4. Select the *Starting address* option.
5. Enter a starting address of 0000000087 000000 and length of 400000.
6. Type DUMP in the *File* field. Type SID87 in the *Volume ID* field. If you are using a volume with a different volume name, use that name in place of SID87. Press the Enter key.
7. The dump image is being copied from the disk to the media. Wait for the operation to complete.

Note: You might not receive a completion message.

8. Press F3 (exit) from the Specify Dump Title display. Type DUMP2 in the *File* field.
9. Press F3 to exit.
10. Remove the media.
11. Ask your next level of support for procedures to send in the IOP storage dump image (now on media) for LIC APAR creation.

This ends the procedure.

Copying the service processor storage dump to removable media (Models 270, 8xx, SB2, and SB3)

The service processor storage dump is moved to the product activity log data at the next successful IPL after the service processor storage dump is performed. To copy this dump to a removable media perform the following steps:

1. IPL the system and sign on
2. From the Start a Service Tool display, select the *Product Activity Log* option.
3. Search the Product Activity Log for an entry of class = dump.

The entry you select should have the date and time associated with the IPL. For more information on the Product Activity Log, see Chapter 3, “Product Activity Log,” on page 97.

4. When you are certain you have found the entry that contains the service processor storage dump, use the *Print report* option to print this dump to a spool file.
5. At the command line, use the WRKSPLF command to save this dump image to removable media.

Performing an IOP dump using hardware service manager (All Models)

You can perform I/O processor storage dumps by using the *I/O debug* option on the Logical Hardware Resources display (under Hardware Service Manager). Use this utility under the direction of your next level of support. For more information on the Hardware Service Manager function, see Chapter 2, “Hardware Service Manager,” on page 45.

The Logical Hardware Resources display (under Hardware Service Manager) lists the logical resources that are attached to the system bus. Select the *I/O debug* option to access the IOP dump function. The IOP dump function allows you to collect, display, print, and save data from the I/O processor. The dump is written to a temporary disk storage area. When you exit the Hardware Service Manager function, the dump is lost.

IOP dump information in the Product Activity Log (All Models)

IOP storage dumps occur at the time the system detects the problem. If the IOP failure does not cause a system failure, the dump information is placed in the product activity log.

1. Search the product activity log for a class of entries that are labeled *IOP dump*. For more information on the product activity log, see Chapter 3, “Product Activity Log,” on page 97.
2. Display the detailed entry.

Note: Multiple entries (with the same log ID) are associated with this dump. Press the Enter key to display each entry. Verify the *Class* field for the IOP dump.

3. To view the entire dump, select the function to print the IOP dump.

Appendix A. OS/400 Operating System

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DST in OS/400 full paging environment

DST operates in stand-alone (non-paging), limited, and full paging environments. The DST tools and functions vary depending on the paging environment (see “System paging environments” on page 2) and the iSeries 400 operating system that is used.

The full paging environment is used during normal system operation. The following options appear on the Use Dedicated Service Tools (DST) display for the OS/400 operating system:

- Perform an IPL
- Install the operating system
- Work with Licensed Internal Code
- Work with disk units
- Work with DST environment
- Select DST console mode
- Start a service tool

- Perform automatic installation of the operating system
- Work with remote service support
- Work with system partitions
- Work with system capacity
- Work with system security

For details on each DST option, see “DST options” on page 10. For general information on DST, see Chapter 1, “Dedicated Service Tools (DST),” on page 1.

DST in OS/400 limited paging environment

DST operates in stand-alone (non-paging), limited, and full paging environments. The DST tools and functions vary depending on the paging environment (see “System paging environments” on page 2) and the iSeries 400 operating system used.

The limited paging environment is available when you perform an IPL to DST. The following options appear on the *Use Dedicated Service Tools (DST)* display for the OS/400 operating system:

- Install the operating system
- Perform an IPL
- Perform automatic installation of the operating system
- Select DST console mode
- Start a service tool
- Work with disk units
- Work with DST environment
- Work with Licensed Internal Code
- Work with remote service support
- Work with system partitions
- Work with save storage and restore storage
- Work with system capacity
- Work with system security

For details on each DST option, see “DST options” on page 10. For general information on DST, see Chapter 1, “Dedicated Service Tools (DST),” on page 1.

System Service Tools (SST)

The system service tools (SST) run one or more Licensed Internal Code (LIC) or hardware service functions under the control of the operating system. To determine whether the OS/400 operating system is running on your system, see “Determining the dominant operating system” on page 124. SST allows you to perform service functions concurrently with the customer’s application programs. The printer that is used for output must be an SCS-type data stream printer that is attached to the same workstation input-output processor (IOP) or storage media unit.

Accessing system service tools

You can access SST only when the system is in the full-paging environment (see “System paging environments” on page 2). The full paging environment is used during normal system operation. All disk units, the Licensed Internal Code, and the operating system are available.

You can access system service tools (SST) in two ways:

Selecting SST from the problem handling option

1. At the iSeries 400 Main Menu, select the *Problem handling* option.
2. The *Problem Handling* display appears.
Select the *System service tools* option.
3. The *Start Service Tools (SST) Sign On* display appears.
Type in your user ID and password.
4. Press the Enter key.
5. The *System Service Tools* display appears.
For more information on SST options, see “SST options.”
This ends the procedure.

Entering the Start System Service Tools (STRSST) command

1. Type STRSST on the command entry line at the iSeries 400 Main Menu.
2. Press the Enter key.
3. The *Start Service Tools (SST) Sign On* display appears.
Type in your user ID and password.
4. Press the Enter key.
5. The *System Service Tools (SST)* display appears.
For more information on SST options, see “SST options.”
This ends the procedure.

SST options

When you access SST (see “Accessing system service tools”), the following options are available:

- Start a service tool
- Work with active service tools
- Work with disk units
- Work with diskette data recovery
- Work with system partitions
- Work with system capacity
- Work with system security
- Work with service tool user IDs

Start a service tool

Select this option from the *System Service Tools* display. It displays all of the service tools that are available under SST. This option is a subset of the functions available under Dedicated Service Tools (DST). For information on the *Start a Service Tool* option under DST, see Chapter 1, “Dedicated Service Tools (DST),” on page 1. The following options are available under SST:

- Product activity log - For details, see Chapter 3, “Product Activity Log,” on page 97..
- Trace Licensed Internal Code - For details, see “Licensed Internal Code (LIC) trace” on page 30.
- Work with communications trace - For details, see “Work with communications trace” on page 32.
- Display/Alter/Dump - For details, see “Display/Alter/Dump” on page 28.
- Licensed Internal Code log - For details, see “Licensed Internal Code (LIC) log” on page 29.
- Main storage dump manager - For details, see “Main storage dump manager” on page 30.
- Hardware service manager - For details, see Chapter 2, “Hardware Service Manager,” on page 45.

Work with active service tools

Select this option from the *System Service Tools* display. It lists active service tools and their status. You can start service tools and leave them active while you start another service tool. Use this function to work with a service tool you left active or to end an active service tool. The status of a service tool shows whether the service tool is active or ending. For more information, see “Work with active service tools” on page 24.

Work with disk units

Select this option from the *System Service Tools* display. It displays tools that can be run for disk units. You can do the following:

- Display disk configuration
- Display checksum configuration
- Calculate checksum configuration
- Work with auxiliary storage pools (ASP) threshold
- Add units to ASPs
- Work with device parity protection
- Work with disk unit recovery
- Work with disk unit information
- Calculate mirroring capacity

This option is a subset of the functions available from dedicated service tools (DST). The complete function is not available from SST in full paging environment. For more information, see “Work with disk units” on page 13.

Work with diskette data recovery

Select this option from the *System Service Tools* display. It allows you to read data from a diskette that contains cyclic redundancy check (CRC) errors. CRC errors occur when the system finds data on a diskette that is not readable during a read operation. Normally, when the system finds a CRC error, you cannot read the diskette past the point of the failing sector. By using this option, you can read diskettes that contain sectors with CRC errors.

The iSeries 400 system can use diskettes for saving and restoring system objects. One or more objects can be stored on a diskette. Whenever the system finds a diskette that contains a bad sector during a read operation, the operation ends. A bad diskette sector, which causes a CRC error, can result from failure in the diskette or from wrong handling. The *Work with diskette data recovery* option allows

you to read data from a diskette, correct any failing sectors present on the diskette, then write the new data to a new diskette.

Options:

- Alter diskette data

This option allows you to change the data in any sector on a diskette. For more information, see “Alter diskette data” on page 282.

- Read data from diskette

This option reads the contents of a diskette while ignoring diskette sectors with read data CRC errors. For more information, see “Read data from diskette” on page 282.

- Write data to diskette

This option writes the volume table of contents (VTOC) and data sectors to a new diskette. For more information, see “Write data to diskette” on page 282.

- Display diskette data

This option allows you to display the data in any sector on a diskette. For more information, see “Display diskette data” on page 282.

- Print reports

This option allows you to print the following reports from the diskette:

- Volume label
- Data set label
- Load or dump object descriptor
- Failing sector
- Sector range

For more information, see “Print reports” on page 283.

Processing restrictions: The *Work with diskette data recovery* option:

- Cannot duplicate diskettes containing data sets that have data set directories in the data area.

Deleted sectors are accepted by the read option and are identified by the print operation. The write operation compresses the data set in which the deleted sectors are found. Compression must occur before the write operation occurs; there is no machine interface (MI) to write a deleted sector. The automatic compression saves all data sets by starting with extent sector addresses. When suitable, the option adjusts end-of-extent and end-of-data addresses.

Diskettes containing data sets that have data set directories in the data area cannot be duplicated because the automatic compression could destroy the sector addressability of the data set directory. Any change made to the VTOC area should not change the sector size as determined by the read operation; compression logic assumes the same sector size.

- Might not read VTOC or data set identification sectors into a space object.

This option accepts I/O media errors that are associated with the sectors read during a read VTOC command. Because the IOP does not always return sectors read in error, the VTOC or data set identification sectors might not be read into the system space object. You can assemble valid sectors in place of those sectors that are not read back into the space object because of sector errors. The write operation checks identification sectors for the volume and first data set to verify if they are present or absent.

Alter diskette data: The display in Figure 81 appears when you select the *Alter diskette data* option on the Work with Diskette Data Recovery display.

```

                                Alter Diskette Data
Starting sector address . . ____ CCHRR
Type changes, press Enter.

0000      00000000 00000000 00000000 00000000      * ..... *
0010      00000000 00000000 00000000 00000000      * ..... *
0020      00000000 00000000 00000000 00000000      * ..... *
0030      00000000 00000000 00000000 00000000      * ..... *
0040      00000000 00000000 00000000 00000000      * ..... *
0050      00000000 00000000 00000000 00000000      * ..... *
0060      00000000 00000000 00000000 00000000      * ..... *
0070      00000000 00000000 00000000 00000000      * ..... *
0080      00000000 00000000 00000000 00000000      * ..... *
0090      00000000 00000000 00000000 00000000      * ..... *
00A0      00000000 00000000 00000000 00000000      * ..... *
00B0      00000000 00000000 00000000 00000000      * ..... *
00C0      00000000 00000000 00000000 00000000      * ..... *
00D0      00000000 00000000 00000000 00000000      * ..... *

More...
F3=Exit  F5=Refresh  F12=Cancel  F14=Previous sector
F15=Next sector

```

Figure 81. Example of Alter Diskette Data display

You can advance one sector at a time by pressing F15, or you can return to the previous sector by pressing F14. Also, you can type over the *Starting sector address* field. This field gives you direct access to any sector on the diskette.

Read data from diskette: Select this option first. This option reads cylinder 0, sector by sector, and cylinders 1 through 74 with one request. When the read operation finds a CRC or a deleted or sequentially relocated sector, it builds an error summary record and continues reading until it reaches an end-of-volume.

Write data to diskette: This option writes the VTOC and the data sectors from the image that is contained in the system space object. The diskette is written in either ASCII or EBCDIC, as determined by the read option. If the operation receives a bad feedback response code from the REQIO instruction, the write data to diskette operation ends with an error message. If the write operation is successful, the output diskette is given the same volume serial number and content as the original diskette.

Display diskette data: The display in Figure 82 on page 283 appears when you select the *Display diskette data* option on the *Work with Diskette Data Recovery* display.


```

                                Display Diskette Data
Starting sector address . . ____ CCHRR
Type changes, press Enter.

0000      00000000 00000000 00000000 00000000      * ..... *
0010      00000000 00000000 00000000 00000000      * ..... *
0020      00000000 00000000 00000000 00000000      * ..... *
0030      00000000 00000000 00000000 00000000      * ..... *
0040      00000000 00000000 00000000 00000000      * ..... *
0050      00000000 00000000 00000000 00000000      * ..... *
0060      00000000 00000000 00000000 00000000      * ..... *
0070      00000000 00000000 00000000 00000000      * ..... *
0080      00000000 00000000 00000000 00000000      * ..... *
0090      00000000 00000000 00000000 00000000      * ..... *
00A0      00000000 00000000 00000000 00000000      * ..... *
00B0      00000000 00000000 00000000 00000000      * ..... *
00C0      00000000 00000000 00000000 00000000      * ..... *
00D0      00000000 00000000 00000000 00000000      * ..... *
More...
Press Enter to continue.

F3=Exit   F5=Refresh   F12=Cancel   F14=Previous sector

```

Figure 82. Example of Display Diskette Data display

The contents of sector 1 on cylinder 0, track 0 are displayed first. You can advance one sector at a time by pressing the Enter key, or you can return to the previous sector by pressing F14. Also, you can type over the *Starting sector address* field. This field gives you direct access to any sector on the diskette.

Print reports: The *Print Reports* display appears when you select the *Print reports* option on the *Work with Diskette Data Recovery* display. You can print the following reports or select options from the *Print Reports* display:

- Volume label report

The system space object supplies this report by virtual address in a standard hexadecimal and character format. This option formats the volume label fields. The volume label field contains a field description, the hexadecimal field offset into the sector, and the field contents.
- Data set label report

For each data set that is on the diskette, the system space object supplies a report by virtual address in a standard hexadecimal and character format. This option formats the data set label fields. The data set label field contains a field description, the hexadecimal field offset into the sector, and the field contents.
- Load and dump object descriptor report

The system save and restore options specify a list of system objects that contains the database in the request descriptor (RD) part of the source/sink request (SSR) data used by the REQIO instruction. For each object that the REQIO instruction specifies, the load/dump I/O manager writes to the diskette a *load/dump object dump descriptor* that contains a summary of the system environment from which that object was dumped.

For each *load/dump object dump descriptor* contained on the diskette, the system space object dumps the descriptor sector by virtual address in a standard hexadecimal and EBCDIC format. This option formats the *load and dump object dump descriptor* fields. The descriptor field contains a field description, the hexadecimal field offset into the sector, and the field contents.
- Failing sector report

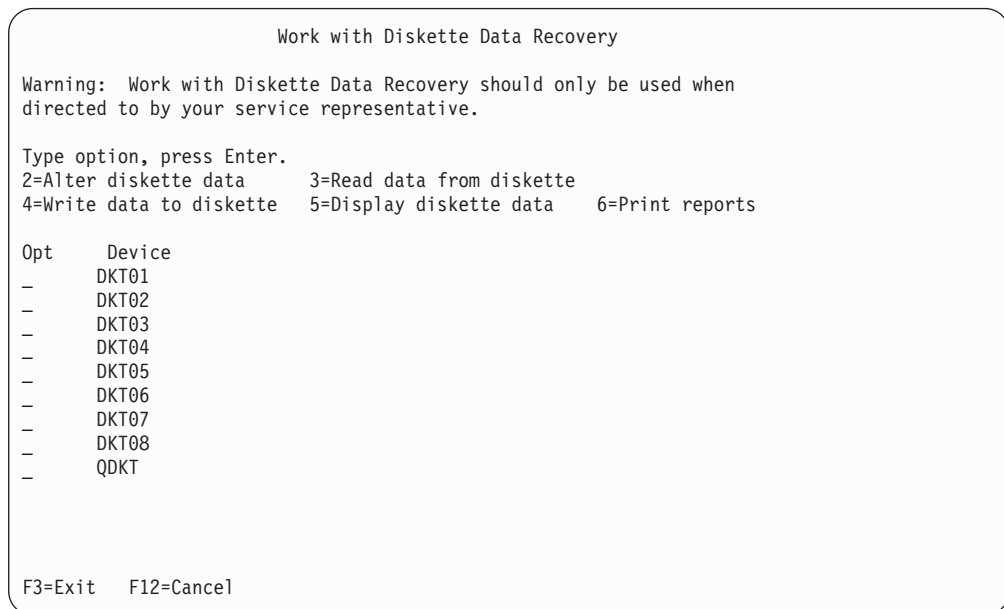
The sectors that found read (or CRC feedback response code) errors supply this report after you select the *Read data from diskette* option. The sectors are formatted to provide the sector address (CCHRR—cylinder, head, record), the data set identifier, the hexadecimal data offset into the sector, and the sector contents. Because the data CRC can be anywhere in the failing sector, the failing sector report shows where to place the failing sector in its correct context.

- Sector range report

This report comes from the sectors in the sector range you specify. Each sector is formatted to contain the sector address (CCHRR), data set identification, load and dump object type, subtype, and object name (if suitable). The space object dumps the sector by virtual address in a standard hexadecimal and EBCDIC format. You must enter a starting and ending sector address to print a sector range report.

How to use the Work with Diskette Data Recovery option:

1. Select the *Work with diskette data recovery* option on the *System Service Tools (SST)* display. The *Work with Diskette Data Recovery* display appears. This display shows the diskette units with which you can work.



2. Insert a diskette with read errors into the diskette unit with which you want to work.
3. Type a 3 in the *Opt* field next to the diskette unit in which you inserted the diskette and press the Enter key. Selecting the read option moves the contents of the diskette to a system space object where you can display or change them.
4. After the diskette is read into the system space object, select the *Print reports* option on the *Work with Diskette Data Recovery* display to print the contents of the diskette. This helps you find the failing sectors and the address of the system space object where you can change the contents of the diskette.
5. Select a diskette summary report. Print the summary reports in any combination by typing a 6 in front of the summary report you want and pressing the Enter key.

Note: The type of diskette you are working with determines the type of summary report you want to print. All diskettes have volume headers

and data set headers; therefore, you might want summary reports for these areas. If you find read errors, you should look at the failing sector summary. For diskettes that are used in save and restore operations, use the *load and dump object dump descriptor* summary.

6. If you want to print the sector range report, specify the start and end sector address for the sector range. If you do not specify a sector address, no sectors will print in the print range sector area of the report.
7. To display the contents of the diskette, select the *Display diskette data* option on the *Work with Diskette Data Recovery* display.
To change the failing sectors, select the *Alter diskette data* option on the *Work with Diskette Data Recovery* display.
8. Exchange the diskette that contains CRC errors with one of the same type and format.
9. Select the *Write data to diskette* option on the *Work with Diskette Data Recovery* display to write the changed data to the new diskette.

This ends the procedure.

Work with system partitions

For information on the *Work with system partitions* options, see “Work with system partitions” on page 42.

Note: Some functions are restricted to DST use only and cannot be performed from SST.

Work with system capacity

For more information on the *Work with system capacity* option, see “Work with system capacity” on page 43.

Note: Some functions are restricted to DST use only and cannot be performed from SST.

Work with system security

For more information on the *Work with system security* option, see “Work with system security” on page 43.

Note: Some functions are restricted to DST use only and cannot be performed from SST.

Work with service tools user IDs

For more information on the *Work with service tools user IDs* option, see “Work with service tools user IDs” on page 25.

Note: Some functions are restricted to DST use only and cannot be performed from SST.

Function keys (SST)

Keys F3, F5, F10, F12, and F16 usually have the following functions:

- F3 key ends the SST function.
- F5 key causes the system to ignore input to the display. Use this key to see the same display with the input erased or a waiting display.
- F10 key causes the command entry display to be shown. You can then enter CL commands.

- F12 key causes a return to the previous display. You can use this key to return through the prompts to the first service tool display that has an option that can cancel the service tool.
- F16 key always returns control to the *System Service Tools (SST)* display; it does not cancel the active service tool.

Online problem analysis and resolution

Introduction

Online Problem Analysis and Resolution (PAR) consists of the following:

- Displays and prompts to instruct the customer and service representative through problem analysis.
- Problem analysis for the hardware and software parts of the devices to perform problem analysis.
- The problem log, which contains system problem descriptions and the status of each problem.
- The Service Support Facility, which controls reporting the problems to the service support system.

Online PAR manages system errors and gives the customer maximum system availability, effective problem analysis, and a set of software tools for analyzing, repairing, and reporting problems. It runs concurrently with other customer programs; therefore any part of the system that is not usable by the customer is also unavailable for a problem analysis task. The customer should be aware of this when deciding to run Online PAR.

Another part of PAR is the iSeries 400 system problem management functions. This provides automated problem analysis, automated problem logging and tracking, automated problem reporting, and problem correction. It quickly and accurately manages problems occurring on the system. For more information on the automated problem management functions, see “Service attributes (DSPSRVA or CHGSRVA) commands” on page 295.

Online help is available by pressing the Help key. Some displays might have more than one Help screen. Additional Help screens are indicated by a (+) or **More...** in the lower right hand corner. To display these screens, press the Roll or Page keys.

System failures fall into two groups:

- System-detected
- Customer-detected

System-detected problems

System-detected problem management starts with the detection of a software or hardware error by a device that is attached to the system. When software logically detects a problem, the system collects the data and notes the error. When a device physically detects a problem, the device uses the common I/O interface to report an error message (note) to the system. The system uses these error notes to create a problem log entry and sends a message to the QSYSOPR message queue. The problem log entry has a description of the failing device. This description allows a problem analysis procedure to be called without initial customer input.

Problem log

The problem log contains descriptions for all messages with problem analysis routines. The system operator and other authorized persons use the problem log to manage the problem records that are made by Online PAR. Functions that the problem log provides include the following:

- Display problem records or print problem records
- Define a new problem
- Analyze an existing problem
- Report a problem
- Add notes to a problem record
- Recover from a problem
- Verify that a problem has been corrected
- Mark a problem as corrected
- Delete one or more problem records
- Query problem analysis status from a remote site

The customer has access to problem log functions in one of the following ways:

- Type the WRKPRB (Work with Problems) command and press the Enter key.
- On the Main Menu, select the *Problem handling* option. Then, on the Problem Handling display, select the *Work with problems* option.

The WRKPRB command has search parameters available to control the range of problems that is displayed. Pressing F4 displays the search parameters. One of these parameters is SRVID, which is the problem management report (PMR) number the remote support system returned when it reported the problem. Some other examples of search parameters are time range, type of failing hardware, and resource name of failing hardware.

Each entry in the problem list that WRKPRB displays contains a unique, ten-digit problem identification (ID). This ID appears on all displays for a specific problem and in the PMR for the problem in the remote support system. The problem list has a field that you can use to specify the problem ID that you want to go to directly.

Messages relating to hardware failures

When the system makes an entry in the problem log for each system-detected problem, it also sends a message to the QSYSOPR message queue. Messages that are associated with system-detected problems are marked with an asterisk (*) or are highlighted.

Start problem analysis by placing the cursor anywhere on the message line that contains the asterisk and press F14. For more options, press the Help key to view the *Additional Message Information* display, then press F14 (Work with Problem) to view the *Work with Problems* display. For details, see the Problem Analysis information for your system. To see available online help, press the Help key.

Note: It is possible to have highlighted or marked with an asterisk multiple system messages that are related to the same failure. For example, a 9335 A01 control unit failure would generate its own message and two more system messages (one per actuator) for each B01 unit on the A01 device function processor.

If you have additional messages that are marked with an asterisk from the original failure, you can remove them by doing the following:

1. Close the problem under "Work with problem" (WRKPRB).
2. Display system messages [(DSPMSG QSYSOPR ASTLVL(*INTERMED))]. Run problem analysis by moving the cursor to the message that is marked with an asterisk (*) or highlighted and pressing F14 to remove the * or highlighting. Then press F11 or select option 4 to remove the message.

You can use F14 multiple times on one message.

Online help is available by pressing the Help key.

You can display the QSYSOPR message queue by entering.

```
DSPMSG QSYSOPR
```

To display the message queue every time a message is logged, put the queue in *BREAK mode.

To put the queue in Break mode, enter

```
CHGMSGQ QSYSOPR *BREAK
```

Putting the QSYSOPR message queue in Break mode lets the customer know immediately when the system detects a problem. The customer can then choose to analyze the problem or delay analysis until a later time. System-detected problems can be analyzed later by displaying QSYSOPR or using the WRKPRB command.

Other messages that describe system problems can be logged in QSYSOPR although they are not associated with a specific system-detected problem.

The first three letters in the message are the message identifier and indicate the message category. The following list shows some typical message identifiers that relate to hardware:

CPA Messages that need system operator action

CPD Diagnostic messages

CPI Informational messages

MCH Machine interface

The remaining four digits indicate the sequence number of the message. If an error condition occurs, you receive an error message that identifies the error.

1. Place the cursor anywhere on the same line as the error message.
2. Press the Help key. The resulting Additional Message Information display contains the message identifier, the name of the program that is sending the message, and additional message information.
3. Read the additional message information about the error or the description of which corrective action to take; take the corrective action.

Customer-detected problems

Customer-detected problem management is activated when the customer detects a problem that was not detected by the system. Online PAR guides the customer through a series of panels to solve customer problems, analyze problems to a failing part, or generate a symptom string for reporting to IBM.

During the definition of a customer-detected problem, to prevent errors in the procedure, the system guides the customer. System units supply a problem analysis (PDP) as the entry point from Online PAR. Once the problem is analyzed to a part, Online PAR determines which general entry PDP is requested, if any. Online PAR generates a symptom string for a software error. The IBM service support system uses the symptom string to determine whether a software problem already has an available fix.

Customer-detected problem analysis can be started in one of the following ways:

- Enter the ANZPRB (Analyze Problem) command. Use the ANZPRB command to analyze a user-detected problem when no problem analysis message was generated, or when a problem is intermittent.
- Enter the WRKPRB (Work with Problem) command. Select the *Work with problem* option for any listed problem that has *Opened* in the Status field. Select the *Analyze problem* option.

Service support facility

The service support facility can be used for system-detected problems and user-detected problems.

When problem analysis is complete, online PAR gives the customer the option of reporting the problem. For many problems, analysis results are shown as a field-replaceable unit. Other analysis procedures make a symptom string to be reported with the problem.

Displaying OS/400 PTFs

Between code releases, problems that are found with the code are fixed with program temporary fixes (PTFs). The term PTF can refer to a Licensed Internal Code or an operating system fix. For more information on fixes and cumulative PTFs, see "Fixes and cumulative PTF packages" on page 219.

To display the operating system PTFs that are installed on your system, perform one of the following:

- Enter Display Program Temporary Fix (DSPPTF) 5769SS1 and look for the following:
 - TCYYDDD - The entire cumulative PTF package was applied.
 - TAYYDDD - All HIPER PTFs were applied.
- Enter DSPPTF 5769999 and look for the following:
 - TLYYDDD - All LIC HIPER Fixes were applied.

YYDDD: YY = last 2 digits of the Year, DDD = Julian date.

CYDDDVVRM is the format of the cumulative PTF package (VRM = version, release, modification).

OS/400 or LIC APAR information

Use the system operation or the service library information to assist in performing the tasks that are listed in Table 89 on page 290. Doing this should help assure that the system is current for all known problems before you create an authorized program analysis report (APAR). For more details about obtaining information necessary to help resolve software problems by components, see "Gathering

Information for Solving Problems by Component" in *iSeries Licensed Internal Code Diagnostic Aids - Volume 1* or *iSeries OS/400 Diagnostic Aids*.

Table 89. Tasks to perform before requesting a new OS/400 or LIC APAR

Task to be performed	What to do	Location of instructions
Determine whether customer-reported symptom is a problem fixed by a program temporary fix (PTF).	Use support data: Support publications, TIPS, Exception lists, or Support Center recommendations	
Review the PTF level to see whether a cumulative PTF package needs to be installed.	DSPPTF 5769SS1 and DSPPTF 5769999. Look for PTF marker. See PTF levels on back.	System operation information, iSeries Information Center
Order a cumulative PTF package	Send Program Temporary Fix Order (SNDPTFORD) SF99VRM	System operation information
Obtain a list of generally available iSeries 400 PTFs.	SNDPTFORD SF97VRM (VRM = version, release, modification example 410).	System operation information
Determine if a PTF has been superseded	SNDPTFORD SF97VRM Find the PTF number in the PTF summary listing. The latest PTF is listed in the "replaced by" column.	System operation information
Determine whether the system has all the LIC HIPER fixes.	Check for HIPER marker TLYYDDD using DSPPTF 5769999 and compare with the latest PSP.	See "Displaying OS/400 PTFs" on page 289.
Obtain a list of HIPER PTFs not in the latest cumulative PTF package.	SNDPTFORD SF98VRM	System operation information
Obtain a list of all LIC HIPER repairs (hardware PSP listing)	SNDPTFORD MF98VRM	System operation information
Install all HIPER PTFs from the cumulative PTF package.	Get latest cumulative PTF package and use GO PTF.	Follow the instructions in the cumulative PTF package.
Install just the HIPER LIC fixes from the cumulative PTF package.	Get the latest cumulative PTF package and use GO PTF.	Follow the instructions in the cumulative PTF package.
Order a PTF	SNDPTFORD PTF # (where # is the PTF number).	System operation information
Load a PTF	Load Program Temporary Fix (LODPTF)	System operation information
Apply a PTF	Apply Program Temporary Fix (APYPTF)	System operation information
Remove a PTF	Remove Program Temporary Fix (RMVPTF)	System operation information
Display a PTF	DSPPTF	System operation information
Display the release level	Enter "GO LICPGM" and select menu option 10.	System operation information
Install all Licensed Internal Code after a load source disk fails.	Use customers latest save tapes.	94xx service library
Restore all Licensed Internal Code if the IPL code is damaged.	Use customers latest save tapes.	94xx service library

How to reset an I/O processor card while the system is up and running

Resetting an IOP restarts and reloads that IOP. Use this procedure to recover from an intermittent error condition.

Note: You can also perform an IOP reset under the hardware service manager function (see “Debug the resource” on page 64).

1. **Note:** You cannot reset the workstation IOP for the workstation at which you are working or a workstation that is the only one on the system.

Do you want to reset the local workstation IOP?

No **Yes**

- ↓ Vary off the local workstation IOP (see “Varying configuration descriptions on and off”).

Then, go to step 5 of this procedure.

1. Do you want to reset the communications IOP?

No **Yes**

- ↓ Vary off all the lines on a communications IOP (see “Varying configuration descriptions on and off”).

Then, go to step 5 of this procedure.

2. Do you want to reset the cryptographic IOP?

No **Yes**

- ↓ You must end cryptographic services. Enter ENDCS (End Cryptographic Services) command.

To reset the cryptographic IOP, enter STRCS Press F4 to prompt parameters. Then, enter RESET *YES. **This ends the procedure.**

3. Do you want to reset a tape, optical, or disk IOP without an attached disk unit?

Yes **No**

- ↓ **This ends the procedure.**

4. Vary off all the IOPs and device descriptions on the IOP (see “Varying configuration descriptions on and off”).

5. Enter the VRYCFG (Vary Configuration) command. Then, press F4 for prompting.

6. Enter STATUS *ON RESET *YES Then, press the Enter key.

This ends the procedure.

Varying configuration descriptions on and off

The *Go Hardware* display allows you to access all lines, devices, and IOPs and to see and change (vary on or off) the configuration status for these resources. The status of all configuration descriptions can also be displayed or changed (varied on or off) using the WRKCFGSTS (*NWI | *CTL | *LIN | *NWS | *DEV) command. This command is also used for varying off a line and all the IOPs and devices under it.

Notes:

1. All active jobs must be ended before you can vary off. You might be able to enter the WRKACTJOB (Work with Active Jobs) command on the command line on the WRKCFGSTS display or use the Work with Job option to end active jobs.

Note: To end active jobs running on the facsimile IOP, use the ENDFAXSPT command.

2. If a line, IOP, device, network interface (NWI), or nonprogrammable workstation is hung up, varying its configuration description off, then on (in that sequence) provides recovery for some intermittent problems.
3. You cannot display or change cryptographic resources by using the WRKCFGSTS command. To view these resources, use the Work with Hardware Resources (WRKHDWRSC) command.

Commonly used OS/400 service commands

The following list provides a quick reference to some of the commands that are commonly used in servicing the iSeries 400 system. For more information on some of these service commands, see the iSeries 400 Information Center.

OS/400 Command	Function:
APYPTF	Apply a Program Temporary Fix (PTF)
ANZPRB	Analyze a new problem
CHGMSGQ QSYSOPR *BREAK	Change message to break
CHGSRVA	Change service attributes
CHGNETA	Change network attributes
CHGSYSVAL	Change system values (see 1 on page 299)
CHGXMTLVL	Change transmit level of the facsimile I/O processor (see "Change Transmit Level (CHGXMTLVL) command" on page 297)
CRTCTLBSC	Create a controller description for a BSC controller
CRTCTLLWS	Create local workstation I/O processors
CRTDEV DSP	Create a local display device
CRTDEVPRT	Create a local printer device
CRTDEVSPR	Create a device description for a remote display
CRTDEVTAP	Create a local tape device
CRTLINASC	Create a line descriptor for an asynchronous line
DLTPRB	Delete all entries in problem log over 30 days old
DSPJOB	Display a job
DSPJOBLOG	Display the job log
DSPLCLHDW	Display local hardware
DSPLOG QHST	Display the history log
DSPMSG QSYSOPR	Display messages in the system operator's message queue
DSPPFM	Display physical file member
DSPPTF	Display Program Temporary Fixes (PTFs)
DSPSFWRSC	Display software resources
DSPSYSVAL	Display system values (for example, QTIME) (see 1 on page 299)

OS/400 Command	Function:
ENDRMTSPT	End remote support
ENDSBS	End subsystem
GO *ALL	Lists all menus for system commands
GO CMDDSK	Go to the disk commands menu
GO CMDHDW	Go to the hardware commands menu
GO CMDHDWRSC	Go to the hardware resource commands menu
GO CMDINF	Go to the information commands menu
GO CMDPTF	Go to the PTF commands menu
GO CMDPWR	Go to the power commands menu
GO CMDSPT	Go to the support commands menu
GO CMDSRV	Go to the service commands menu
GO CMDSYS	Go to the system commands menu
GO CMDSYSVAL	Go to the system value commands menu (see 1 on page 299)
GO CMDVFY	Go to the verify commands menu
GO INFO	Go to the information assistant options menu
GO LICPGM	Display Release/ Version/Modification level of the OS/400 program; Display national language
GO MAIN	Go to the main menu
GO ORDER	Display the IBM market support commands
GO SUPPORT	Go to the support and education menu
GO UPGRADE	Displays upgrade information
INSPTF	Install PTF
INZDKT	Initialize diskette
INZTAP	Initialize tape
PRTDEVADR	Print device address
PRTERLOG	Print information from the error log
PRTINTDTA	Print the Vertical Licensed Internal Code exception information
PWRDWN SYS *IMMED	Power down the system
RQSORDAST	Request (marketing) order assistance
SAVAPARDTA	Save APAR data
SAVSYS	Save system
SIGNOFF	Sign you off the system
SNDPTFORD	Send PTF order
SNDSRVRQS *TEST	Test the IBM support link
STRPRTWTR	Start printer writer
STRRMTSPT	Start remote support to give service access to the system from a remote location

OS/400 Command	Function:
STRSST	Start the system service tools (see “System Service Tools (SST)” on page 278)
SNDSRVRQS	Test the support link
VFYCMN	Show the Communications Verification display (see “Verify communications” on page 304)
VFYOPT	Verify optical storage unit or library
VFYPRT	Verify printer prints a pattern on the printer
VFYTAP	Verify tape unit
VRFCFG	Vary configuration (vary device, I/O processor, or communications line on or off)
WRKALR	Show the alert log
WRKCFGSTS	Display the status of all I/O processors
WRKDEVD	Work with device display
WRKORDINF	Work with order information to build topology files for upgrades
WRKOUTQ	Work with output queue
WRKPRB	Show the problem log display (see “Online problem analysis and resolution” on page 286)
WRKHDWPRD	Show the Work with Hardware Products display (see “Work with Hardware Products (WRKHDWPRD) Command” on page 298)
WRKHDWRSC	Displays the resource names
WRKSYSSTS	Work with system status

To sign off the workstation, return to the main menu by selecting the *end* option, or by pressing the System Request key. Then, enter 90 to sign off.

Work with System Value (WRKSYSVAL) Command

The system is shipped with system values that control different aspects of its operation. The Work with System Value (WRKSYSVAL) command shows a list of all system values. For more information, see the iSeries 400 Information Center.

If you know the name of the system value you want to display or change, you can use the Display System Value (DSPSYSVAL) or Change System Value (CHGSYSVAL) command.

To work with system values:

1. Enter WRKSYSVAL
2. From the Work with System Values display, you can request a list of all the system values or a subset of that list.
 - To list all system values, type *ALL in the *Subset by type* field.
 - To list a subset of system values, enter a type in the *Subset by type* field. (Press F4 for a list of types).
3. To change the system value, select the *Change* option.

Commonly used system values

QDATE: QDATE is the system date. It is composed of the following system values: QYEAR, QMONTH, and QDAY. Available date formats are YMD, MDY, DMY (Y = year, M = month, D = day), or JUL (Julian format). Its value is set from the IPL Options display, and is updated when the system value QTIME reaches midnight (000000). A change that is made to this value might also change QYEAR, QMONTH, and QDAY.

QTIME: QTIME is the system value for the time of day. It is composed of the following system values: QHOUR, QMINUTE, and QSECOND. You can set its value from the IPL Options display. QTIME format is hhmmss.

hh=24 hour time clock
mm=minutes
ss=seconds

Changes to this value take effect immediately, and they might affect the system values QHOUR, QMINUTE, and QSECOND.

QAUTOCFG: The automatic configuration indicator (QAUTOCFG) controls whether the system creates device descriptions automatically for locally attached devices. The system default, 1, is to perform automatic configuration. If you do not want the system to create device descriptions, change the system value to zero (0). You can use the WRKSYSVAL command, or enter the following command:

```
CHGSYSVAL SYSVAL(QAUTOCFG) VALUE('0')
```

QRMTSRVATR: The remote service attribute (QRMTSRVATR) system value controls incoming access to remote service support through the iSeries 400 electronic customer support line.

Note: You can also set or reset this system value by using the change service attributes command (see "Service attributes (DSPSRVA or CHGSRVA) commands").

Service attributes (DSPSRVA or CHGSRVA) commands

The system is shipped with service attributes that assist in system operation. You can display the service attributes by entering the Display Service Attributes (DSPSRVA) command or change the service attributes by entering the Change Service Attributes (CHGSRVA) command.

Commonly used service attributes

ANZPRBAUTO: The automated problem analysis function enables problem analysis routines to run automatically. Problem analysis routines are programs that attempt to isolate a problem. At the time of the failure, they run in a background batch job. This function also monitors for selected critical conditions. When it encounters one, it sends a *BREAK message to users (who are specified by the service attribute, CRITMSGUSR) to ensure that they recognize the condition.

To change the value of the automated analysis function, type:

```
CHGSRVA ANZPRBAUTO(*YES)
```

The system default (*Yes) is to run the automated problem analysis function.

If you do not want the system to perform the automated problem analysis function, change the value to *NO.

CRITMSGUSR: When problem analysis routines run automatically at the time of a failure (see “ANZPRBAUTO” on page 295), this function specifies who is sent a *BREAK message. Use the critical message user function to create an ordered list of user identifiers and user classes. When the system detects a critical condition, it notifies the first entry in the list by a *BREAK message. If the user or the user class is not signed on, the system sequentially notifies the entries in the list until a user is notified.

To work with the critical message user function, type:

```
CHGSRVA CRITMSGUSR(*QSYSOPR)
```

The system default (*QSYSOPR) sends a *BREAK message to the system operator.

You can change the value and create an ordered list of user identifiers and user classes.

RPTPRBAUTO: This service attribute allows automatic reporting of software problems. When problem analysis routines run automatically at the time of a failure (see “ANZPRBAUTO” on page 295), the RPTPRBAUTO function specifies whether the software service provider is notified. For more information on the service provider function, see “RPTSRVPVD.” To change the value of automated reporting function, type:

```
CHGSRVA RPTPRBAUTO(*YES)
```

The system default is to run the automated problem notification (*YES). It runs in a background batch job at the time of the failure.

When problem notification is not automatic (*NO), you can report problems to the service provider from the QSYSOPR message queue, or by using the Work with Problems (WRKPRB) command.

RPTSRVPVD: When problems are automatically reported (see “RPTPRBAUTO”), this function specifies the name of the service provider for your system.

To work with the service providers function, type:

```
WRKSRVPVD
```

The system default (*IBMSRV) is to automatically report problems to IBM.

You can change the service provider. Use the Help key for more information on the specific options.

SNDDTAPKT: When problems are automatically reported (see “RPTPRBAUTO”), this function sends data that was collected at the time of the failure to the specified service provider.

To change the value of the send data packet function, type:

```
CHGSRVA SNDDTAPKT(*YES)
```

The system default (*YES) is to send up to 2000 bytes of data to the service provider.

If you do not want the system to send data, change the system value to *NO.

PTFINSTYP: This function specifies when to apply PTFs. To apply a PTF, use the install PTF command (INSPTF) or the GO PTF command (select the *Install a*

program temporary fix option from the Program Temporary Fix (PTF) display). These commands use the PTFINSTYP service attribute automatically when you do not specify the *Type* field.

To change the value of the PTF install function, type:

```
CHGSRVA PTFINSTYP (*DLYIPL)
```

The system default (*DLYIPL) is to designate all of the PTFs for a delayed type of application, and then perform an IPL on the system.

Use the Help key for more information on the specific options.

Change Transmit Level (CHGXMTLVL) command

The CHGXMTLVL command is used to change the transmit level of the facsimile I/O processor. The command exists in library QFAX and is accessible only to users with *SERVICE authority.

Note: Do not change the transmit level unless you have direction from your next level of support.

The command is supported in the Facsimile Support/400 Licensed Program.

The following parameters are used with the CHGXMTLVL command:

- CARD specifies the facsimile description name with which you want to work. For more information on facsimile description names, see *Application System/400[®] Facsimile Support/400 Users Guide and Reference*, SC41-8245. The name must be a member of file QAFFCFG in library QUSRSYS.
- TELPORT specifies the port with which you want to work. The only choices are FAX1 or FAX2.
- XMTLVL specifies the new transmit level setting (XMTLVL) of the port. Country-defined transmit level ranges, and default values are contained in the internal table of the Facsimile I/O processor (for example, type 2664). The code for the Facsimile I/O processor determines the proper transmit level by detecting which country coupler is attached to the I/O processor and automatically sets the transmit level range and default. The values represent the negative dB level of the port.

Valid XMTLVL ranges, 0 through 30 (in whole number increments), and default values vary by country. For example, the US and Canada range is 0 to -15 dB, and the default is set to -9 dB. *DFT assigns the country-specific coupler default value.

Do not change the transmit level unless you have direction from your next level of support. If you enter an XMTLVL value that is not within the valid range for your country, the I/O processor selects the closest valid transmit level. For example, if your country's valid range is -6 dB to -15dB and you set the XMTLVL to 4, the IOP selects -6 dB.

Notes:

1. At each ADDFAXCRD command request, the I/O processor tables are initialized.
2. There is no online help information available for the CHGXMTLVL command.

Work with Hardware Products (WRKHDWPRD) Command

Introduction

The Work with Hardware Products (WRKHDWPRD) command allows you to work with description labels. The system uses description labels to identify hardware.

When you run the WRKHDWPRD command, the Work with Hardware Products display appears with the following options:

```
Work With Hardware Products
System: xxx
Select one of the following:

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

Selection

—

F3=Exit F12=Cancel

1. Display description label locations

This option allows you to display or print the current configuration label location information. It is the customer's responsibility to configure and assign labels in the system for cables and devices. Before a system upgrade procedure, the service representative uses this option to identify cables and devices that might need a (physical) label attached.

For more information on how to use this option before an upgrade, see "Using the configuration description label information to prepare for a system upgrade."

2. Change description label locations

This option allows you to display, change, or print a worksheet of the current configuration label location information. Use this option after a system upgrade to compare the system configuration description label information with the (physical) label that is attached to the cable or device. If the labels do not match, use the *Change Description Label Locations* display to change the system label.

For more details on how to use this option after an upgrade, see "Using the configuration description label information after a system upgrade" on page 300..

Using the configuration description label information to prepare for a system upgrade

Before powering the system down for an upgrade, you must record specific system value information, verify the system configuration, and create (physical) labels to attach to the system cables and devices.

Perform the following steps before you begin the upgrade:

1. Display and note the IPL type (QIPLTYPE) system value by performing the following:
 - a. On the command line of the iSeries 400 Main Menu, type `wrksysval qipltype` and press the Enter key.
 - b. Type 5 in the `qipltype` field to display the value. Press the Enter key.
 - c. Note the information for later use.
2. Display and note the automatic configuration indicator (QAUTOCFG) system value by performing the following:
 - a. On the command line of the iSeries 400 Main Menu, type `wrksysval qautocfg` and press the Enter key.
 - b. Type a 5 in the `qautocfg` field to display its value.
 - c. Note the information for later use.
3. On the command line of the iSeries 400 Main Menu, type the following and press the Enter key: `wrkhdwprd`
4. The *Work with Hardware Products* display appears.
Select the *Display description label locations* option and press the Enter key.
5. The *Display Description Label Locations* display appears.
Press the F17 key to create a printout.

Note: You must press the F17 key even if a printer is not available. Pressing the F17 key places a copy of the label locations in the system print spool if a printer is not available. This allows the label locations to print at another time or at another printer location. You can continue by copying the information from the displays onto a piece of paper.

6. Use the *Display Description Label Locations* printout to verify that all of the system cables and devices are labelled correctly.

```

Display Description Label Locations
System: xxx
System type-model/serial . . . . . : 940x-xxx / xx-xxxxx

-----Location-----
Frame   EIA   Device   Card
ID      Location Position Position Port  Label
T1          2          2          2          CTL01
T1          3          3          3          CTL03
T1          4          4          4          BLDG6, CTL02
T1          4          4          4          TAP01
T1          5          5          5          DKT01
T2          2          2          2          TCTCONNECT, TRNLINE
T2          3          3          3          TRNBACKUP
T2          4A         4A         4A         QESLINE, QTILINE,
QTIPASLIN
T2          4B         4B         4B         *NONE
T2          5A         5A         5A         SANFRAN
T2          5B         5B         5B         DALLAS
T2          6A         6A         6A         ENDICOTT, LIN003
More ...
F3=Exit   F11=Display types/serial numbers   F12=Cancel
F17=Print

```

- Cable information is in the *Label* column for each card position.
- Device information is in the *Label* column for each device position.

7. Compare the label that is attached to the cable or device with the name that appears in the Label column on the printout.
 - If the label that is attached to the cable or device matches the information in the Label column, do not create a label.
 - If one of the following occurs, you must create and attach a label to the cable:
 - a. There is information in the *Label* column, but no label is attached to the cable.
 - b. The label that is attached to the cable does not match the information in the Label column.
 - c. A label is attached to the cable, and *NONE appears in the Label column.
8. Find the blank labels that came with the upgrade shipment.
9. Create a label for each cable or device that you identified:
 - a. On the blank labels that were provided, write the information that appears in the Label column.
10. Use the *Card Position*, *Device Position*, *Type-Model*, and *Serial Number* columns on the printout to assist in locating the devices.

Note: If no label is attached to the cable, *NONE indicates that it is not necessary to attach a label to the cable.

Note: If an asterisk (*) appears in the *Location* and *Serial Number* columns, the label is no longer associated with hardware in the system. You do not need to create a label.

Attach the labels to the cables and devices that you identified.

11. Keep the *Display Description Label Locations* printout you might want to use it during the Test Procedure portion of the upgrade.
12. Press F3 (Exit) until you reach the Main Menu.

Attention: If you replace the labeled cable or device during the hardware install of the upgrade, ensure that you transfer the label from that cable or device to the replacement cable or device. If you cannot remove the label without damaging it, copy the information onto a new label and attach it to the replacement cable or device.
13. Ask the customer to sign on as QSECOFR. Have the customer save the system configuration to a file by performing the following:
 - a. Create a file to store the system configuration data.


```
CRTSAVF QGPL/CFGSAVE
```
 - b. Save the system configuration data to the file you created.


```
SAVCFG DEV(*SAVF) SAVF(QGPL/CFGSAVE)
```
14. Go to the instructions to perform the upgrade.

After completing the upgrade, go to “Using the configuration description label information after a system upgrade” to verify that labels that are attached to the cables or devices match label information in the system.

Using the configuration description label information after a system upgrade

After performing a system upgrade, you must update the configuration description label information in the system to match the information that appears on the (physical) label that is attached to the cable or device.

To update the configuration description label information in the system, perform the following procedure:

1. Perform an attended IPL:
 - a. Select Manual mode on the control panel.
 - b. Power on the system.
 - c. When the IPL display or the Install display appears, select the *Perform an IPL* option.
2. The *Sign On* display appears. Ask the customer to sign on as QSECOFR.

Note: It is important that you perform the following step to correctly update the device resource names.

3. At the *IPL Options* display:
 - a. Set the *Start this device only* option to **Y** (Yes).
 - b. Set the *Define or change system at IPL* option to **Y** (Yes).
 - c. Select *System value commands* option.
 - d. Select *Change system values* option.
 - e. Ensure that the system value QAUTOCFG is '0'
 - f. Ensure that the system value QIPLTYPE is '2'Press F3 twice to continue the IPL.

Note: As the IPL continues, SRC A900 2000 appears. No action is necessary at this time.

4. Have the customer sign off after the IPL is complete.
5. Sign on to the system at the console:
 - On the *User* line of the Sign On display, type QSRV
 - On the *Password* line, type the default password QSRV or ask the customer for the password and press the Enter key.
6. Use the following commands to verify that all devices are varied off.

```
WRKCFGSTS CFGTYPE(*CTL) CFGD(*LWS)
WRKCFGSTS CFGTYPE(*CTL) CFGD(*TAP)
WRKCFGSTS CFGTYPE(*DEV) CFGD(*TAP)
WRKCFGSTS CFGTYPE(*DEV) CFGD(*DKT)
WRKCFGSTS CFGTYPE(*LIN)
WRKCFGSTS CFGTYPE(*NWI)
WRKCFGSTS CFGTYPE(*NWS)
```
7. On the command line of the iSeries 400 Main Menu, type the following and press the Enter key: wrkhdwprd
8. The *Work with Hardware Products* display appears.
Select the *Change description label locations* option and press the Enter key.
9. The *Change Description Label Locations* display appears.

```

Change Description Label Locations
System: xxx
System type-model/serial . . . . . : 940x-xxx / xx-xxxxxxx
Select locations where the label on the actual machine or Label Location
worksheet does not match the label listed below, press Enter.
2=Change

```

```

-----Location-----
Frame EIA Device Card
Opt ID Location Position Port Label
T1 T1 2 CTL01
T1 T1 3 CTL03
T1 T1 4 *INCORRECT
T1 T1 5 *NONE
T1 T1 4 *NONE
T1 T1 5 DKT01
T2 T2 2 *NONE
T2 T2 3 *NONE
T2 T2 4A QESLINE, QTILINE, ...
More...
F3=Exit F11=Display types/serial numbers F12=Cancel F17=Print

```

Press the F17 key to print a worksheet. If a printer is not available, continue the procedure by noting the information from the displays onto a piece of paper.

Note: Do not use the printout from the *Display Description Label Locations* display.

10. Use the *Change Description Label Locations* display or worksheet to verify that all of the system cables and devices are labelled correctly.
11. Compare the label that is attached to the cable or device with the name that appears in the *Label* column.
 - Label information matches if the following occurs:
 - a. The name on the label that is attached to the cable or device is the same as the information in the *Label* column on the display.

Note: If you replace the previously labeled cable or device during the system upgrade, be sure to transfer the existing label information to the replacement cable or device.

- Label information does not match if the following occurs:
 - a. There is information in the *Label* column, but no label is attached to the cable. (The following steps of this procedure instruct you to create a label.)
 - b. The label that is attached to the cable does not match the information in the *Label* column. (The following steps of this procedure instruct you to change the system label.)
 - c. *NONE appears in the *Label* column, and a label is attached to the cable. (The following steps of this procedure instruct you to change the system label.)
 - d. *INCORRECT appears in the *Label* column.

This indicates that the label that is attached to the cable does not match the information in the *Label* column. (The following steps of this procedure instruct you to change the system label.)
12. Does all of the label information match?

Note: It is normal for the resource names to change during the upgrade process. Do not use the resource name information from other displays to match the labels.

No **Yes**

↓ The system label information is the same as the (physical) label.

Press the F17 key on the *Change Description Label* display to request a printout of the new information for your records.

Go to step 23 of this procedure.

13. Do you need to create physical labels?

No **Yes**

↓ Perform the following if there is information in the *Label* column, but no label is attached to the cable:

a. Write the information that appears in the *Label* column on a blank label (labels were provided with the upgrade).

b. Attach the label to the cable or device.

c. Continue to the next step of this procedure.

14. Do you need to change the description label information in the system?

Yes **No**

↓ The system label information is the same as the (physical) label. Go to step 20 of this procedure.

15. On the *Change Description Label Locations* display, type 2 in the *Opt* column for each location that requires a label change.

Press the Enter key.

Note: You can make more than 1 selection at a time, but if *More...* appears on the bottom of the screen, do not press the Enter key. Page forward to select the remaining labels.

16. The *Change Description Label* display appears.

A list of possible label names is shown for the first item you selected.

To select the label name (on the display) that matches the label that is attached to that cable or device, perform the following:

a. Type 1 in the *Opt* column for each location that you want to change.

b. Press the Enter key.

Note: If you cannot find (on the display) the label that matches the label attached to that cable or device, verify that your information is correct. If it is correct, contact your next level of support for assistance.

17. If you chose to change more than one item, the *Change Description Label* display appears for the next label.

A message at the bottom of the display indicates whether the previous change was successful.

18. For all of the labels that require a change, repeat steps 14 through 17.

19. After you change the last label, the *Change Description Label Locations* display appears with the updated information.

A message at the bottom of the display indicates whether the last change was successful.

If More... appears on the bottom of the screen, scroll forward to view more information.

20. Press the F17 key on the *Change Description Label* display to request a printout of the new information for your records.
21. Verify that the labels on the printout match the labels that are attached to the cables or devices.
22. If you find any errors, go to step 14 on page 303 and repeat the instructions through step 21.

Continue with the next step if all description label information is correct.

23. Sign off from the system (you are signed on as QSRV).
24. Ask the customer to sign on as QSECOFR and change the QAUTOCFG and QIPLTYPE system values to the values you noted before the upgrade (see "Using the configuration description label information to prepare for a system upgrade" on page 298).
25. Select Normal mode.
Perform an immediate IPL by typing the following on the Main Menu:
pwrdownsys *immed restart (*Yes)
26. Return to the upgrade instructions that sent you here.

This ends the procedure.

Verify commands

Use the verify command to check for the correct operation of hardware and communications. To display a menu of the verify commands, type.

```
GO CMDVFY
```

You can also use the Hardware Service Manager function to verify hardware and communications (see "Verification procedures" on page 93).

Commonly used verify commands

VFYCMN

Use the VFYCMN command to verify the correct operation of a communications card, line, or interface. For information on the communication tests, see "Verify communications."

VFYOPT

Use the VFYOPT command to verify the correct operation of an optical library. For non-library optical units, use the verify option within the Hardware Service Manager.

VFYPRT

Use the VFYPRT command to verify the correct operation of a printer.

VFYTAP

Use the VFYTAP command to verify the correct operation of a tape unit.

Verify communications

Introduction

Use the VFYCMN (Verify Communications) command to:

- Verify the correct operation of the following hardware:
 - I/O processor and I/O adapter cards

- Remote communications - SDLC, ISDN, frame relay, and so on
- Local area networks - Ethernet, token-ring, wireless, LocalTalk, and so on
- Cryptographic resources
- Facsimile features
- Diagnose and verify communications hardware problems and cable problems.
- Send test data to the remote equipment to verify correct connection.
- Analyze problems

Note: Use the VFYCMN command to assist in isolating hardware problems that the system does not detect.

- Run concurrent Link Problem Determination Aid-2 (LPDA-2) tests (see “Concurrent LPDA-2 tests” on page 313).
- Run wireless diagnostic tests.
- Monitor telephone lines and modems concurrently.
- Monitor modems interface signals.
- Verify a communications link.

For information on running a trace on a communications interface and other tests that are available, see “Communications tests” on page 312.

Procedure

To verify communications or devices on any iSeries 400 perform the following:

1. Check the operating system.
2. Use one of the following methods to verify communications:
 - Type the VFYCMN (Verify Communications) command and press the Enter key.
 - On the iSeries 400 Main Menu, select the *Problem handling* option. On the Problem Handling display, select the *Network problem handling* option. Then, select the *Verify communications* option.
3. Select the type of connection you want to test (see “Test descriptions”).

Using online help information, follow the system menus; for example, select the number of times you want the test to run. The system responds with either the Verification Successful message or the Errors Occurred message.

Note: Before running the verification test (which loads a diagnostic program into the card), ensure that the customer is not using the resource that you want to test.

For more details on verifying communications see the *iSeries Licensed Internal Code Diagnostic Aids - Volume 1* information.

Test descriptions

Diagnostic tests are supplied for the following:

- Remote modem
- Local modem
- Modem and coupler
- Communications cable
- Communications I/O adapter
- Communications I/O processor
- External ring
- I/O processor memory

- Communications/local area network link
- Wireless architecture
- Cryptographic architecture
- LocalTalk interfaces

When you run these tests, the system displays only that the test completed successfully or failed. You can get additional problem isolation information by running more than one test. For example, if the communications cable test is failing, before you can isolate positively the cable as the cause of the problem, you must also run the communications I/O adapter card test. If the communications I/O adapter card test completes successfully, the communications cable is failing. If the communications I/O adapter card test fails, the communications I/O adapter card is failing.

Remote modem test: The remote modem test verifies that the remote modem is operating correctly. For this test the remote modem must be compatible with LPDA-1 or LPDA-2 diagnostic tests and must be attached via a nonswitched telephone line. The MODEM parameter in the line description determines the diagnostic test to run. Because this test loads a diagnostic program into the card, you must vary off all lines from the communications I/O adapter before running the test. The diagnostic program takes the place of the programs that are used for normal operation.

If this test completes successfully, the remote modem and the telephone line are operating correctly.

If this test fails, the remote modem or the telephone line is the cause of the problem.

Local modem test: The local modem test verifies that the local modem is operating correctly. For this test the local modem must be compatible with LPDA-1, LPDA-2, or V.54 loop 3 diagnostic tests, or support the IBM ability to wrap. The MODEM parameter in the line description determines the diagnostic test to run. Because this test loads a diagnostic program into the card, you must vary off all lines from the communications I/O adapter before running the test. The diagnostic program takes the place of the programs that are used for normal operation.

If this test completes successfully, the local modem, the communications cable, and the communications I/O adapter card are operating correctly. However, modems that are not compatible with LPDA-1 or LPDA-2 diagnostic tests are not completely tested. It is possible that they are failing, although the local modem test completes successfully.

If this test fails, the cause of the problem is the local modem, the communications I/O adapter card, or the communications cable.

To further isolate the cause of the problem, run the communications cable test and the communications I/O adapter card test.

Communications cable test: The communications cable test verifies that the communications cable is operating correctly. Because this test loads a diagnostic program into the card, you must vary off all lines from the communications I/O adapter before running the test.

For this test the cable must be an IBM cable with a wrap connector plugged in (note that IBM token-ring cables are self-wrapping; no external wrap connector is needed).

If this test completes successfully, the communications cable and the communications I/O adapter card are operating correctly.

If this test fails, the cause of the problem is the communications cable or the communications I/O adapter card.

To further isolate the cause of the problem, run the communications I/O adapter card test.

Communications I/O adapter test: The I/O adapter test verifies correct operation of the communications I/O adapter. Because this test loads a diagnostic program into the card, you must vary off all lines from the communications I/O adapter before running the test.

For this test to run on a facsimile I/O processor, the wrap connector cable must be attached from port A to port B on the I/O adapter card. This test sends a facsimile signal from port A to port B and back again.

To run this test on a wireless LAN adapter, you do not need a wrap connector. To test the radio and RS-485 hardware, run the wireless echo back test (see “Wireless echo back test” on page 309).

To run this test on a communications adapter that has two ports, this is a two step test. The selected port on the on the two port adapter cable is tested first, then the I/O adapter card.

If this test completes successfully, the communications I/O adapter card is operating correctly.

If this test fails, the I/O adapter card might be failing.

Notes:

1. Verify that the wrap connector has the correct identifier (as indicated by the display prompt) and is correctly installed .
2. In some conditions, the associated I/O processor is the failing card. Select the I/O processor test option, if it is available on the display, to verify the I/O processor operation.

Communications I/O processor test: The communications I/O processor test verifies the correct operation of the I/O processor card. Because this test loads a diagnostic program into the card, you must vary off all lines from the communications I/O processor before running the test.

If the test completes successfully, the I/O processor card is operational.

If the test fails, the I/O processor card is failing.

Communications I/O processor memory test: The communications I/O processor memory test verifies that the storage of the I/O processor card is operational. Because this test loads a diagnostic program into the card, you must vary off all lines from the communications I/O processor before running the test.

If the test completes successfully, memory modules on the I/O processor card are operational.

If the test fails, a memory module on the I/O processor card is failing. If the memory modules on the card are replaceable, exchange the failing memory module. Otherwise, exchange the communications I/O processor card.

Communications Port A modem and coupler test: The communications port A modem and coupler test verifies that the modem (which is built into the I/O adapter card) and the externally attached coupler are operating correctly. The coupler is attached to the port of the I/O adapter card. Because this test loads a diagnostic program into the card, you must vary off all lines from the communications I/O adapter before running this test.

If these tests complete successfully, the modem and the coupler are operational.

If a modem error appears on the Results display, exchange the I/O adapter.

Note: A test is provided for both ports (A and B) on the I/O adapter card. If one port is operational, the I/O adapter card is still operational.

If a coupler error appears on the Results display, exchange the coupler.

External ring test:

Note: The External Ring Test is not supported on token-ring hardware for V4R5.

The External Ring test verifies that all hardware to the network is operational. It is available for token-ring networks and distributed data interfaces. To run this test, all hardware must be connected as it would be in normal operation. This test allows a signal to be sent through the network and wrapped (no wrap connectors are required).

If the test completes successfully, the adapter, cable, and access unit are operating correctly.

For further problem analysis if the test fails, run the cable and I/O adapter tests in the order in which the display lists them.

Communications/Local Area Network (LAN) link test: The communications/local area network link test allows you to send data to remote equipment using the Ethernet, token-ring, DDI, wireless, SDLC, X.25, or BSC protocols. This test is useful on multipoint lines to verify that a specific terminal is operating correctly without interrupting normal operation of the other terminals.

To run this test, you must have the line varied on, and you must make a connection with the remote equipment. This is necessary because the functional communications program performs this test. If you are using the BSC protocol and the remote equipment is not an iSeries 400 system, a service representative is needed at the remote location to start diagnostic programs. When you run a link test against the Local Area Network, you can enter *NONE in the controller description field to test a specific remote adapter address.

If this test completes successfully, all equipment within the communications link is operating correctly.

If this test fails and all other devices on the line are operating correctly, one of the following could be the problem:

- The remote device that is being tested
- The remote modem
- The cabling at the remote site

If this test fails and all devices on the line are not operating correctly, run the cable, modem, and I/O adapter tests in the order they are listed on the display for further problem analysis.

Wireless network management utility: The wireless network management utility (WNMU) test allows you to monitor the operation of a wireless network. This utility collects information that assists in analyzing network problems. Before running this utility, make sure that the line and the attached descriptions are varied on, and a job is active. The following functions are available:

- Display active network topology
- Collect wireless network statistics
- Display statistics for any node on the wireless network
- Run tests between any wireless network nodes

Notes:

1. Running the wireless network management utility might affect the performance of the network or decrease system performance.
2. For more information on the wireless LAN adapter indicators, see “Wireless LAN adapter card indicators” on page 312.
3. For more information on analyzing network problems, see the *LAN, Frame-Relay and ATM Support* information.

Wireless echo back test: The wireless echo back test verifies the correct operation of a device on the wireless network. Because this test loads a diagnostic program into the card, ensure that all lines from the communications I/O adapter are varied off before running the test.

Note: If more than one device is *not present* in the network, the test will fail.

The system allows you to perform the echo back procedure using the following:

- RS-485 cable connection
- Radio connection (that uses the system configuration)
- Radio connection (that uses a test configuration)

The *Echo back test on RS-485 cable connection* verifies communication to any device on the RS-485 wired network. If this test completes successfully, the adapter and RS-485 wired link are working correctly. If this test fails, run the I/O adapter tests in the order they are listed on the display to further analyze the problem.

The *Echo back test on radio connection using system configuration* verifies communication to any device on the radio network by using the configuration for the line selected. If this test completes successfully, the adapter and radio link are working correctly. If this test fails, run the *Echo back test on radio connection using test configuration*.

The *Echo back test on radio connection using test configuration* verifies communication to any device by using a test configuration. The device must be within radio range of the antenna that is connected to the Wireless LAN Adapter card. If this test fails,

run the I/O adapter tests in the order they are listed on the display for further problem analysis. If this test completes successfully, the adapter and radio link work successfully with the test configuration. If you performed this test after an *Echo back test on radio connection using system configuration* test failed and this test passed, a configuration problem exists.

2620/2628 cryptographic processor card test: The cryptographic processor test verifies the correct operation of the cryptographic I/O processor. To run this test, you must also refer to the *IBM Common Cryptographic Architecture Services/400 Installation and Operating Guide*, SC41-0102.

Before running this test, end the resource by entering the ENDCS (End Cryptographic Services) command. The test loads a diagnostic program into the cryptographic I/O processor.

Attention: Disconnecting or removing the type 2620 or type 2628 cryptographic I/O processor *for any reason* causes the loss of the master encryption key. Before disconnecting or removing the cryptographic I/O processor, ensure that the customer has access to a record of the master encryption key. The customer must reinstall the master encryption key after completing any service action that involves disconnecting or removing the cryptographic I/O processor before the data encryption function can be used again. Refer the customer to *IBM Common Cryptographic Architecture Services/400 Installation and Operating Guide*, SC41-0102, for more information.

If this test completes successfully, the cryptographic I/O processor is operating correctly.

If this test fails, exchange the cryptographic I/O processor card.

2620/2628 cryptographic processor card wrap test: The cryptographic processor card wrap test verifies the correct operation of the cryptographic I/O processor card. To run this test, you must also refer to the *IBM Common Cryptographic Architecture Services/400 Installation and Operating Guide*, SC41-0102.

Before running this test, end the resource by entering the ENDCS (End Cryptographic Services) command. The test loads a diagnostic program into the cryptographic I/O processor card.

If this test completes successfully, the cryptographic I/O processor card is operating correctly.

If this test fails, verify that the wrap connector is the correct part number (as indicated by the display prompt) and that it is installed correctly. Then, exchange the cryptographic I/O processor card.

Attention: Disconnecting or removing the type 2620 or type 2628 cryptographic I/O processor *for any reason* causes the loss of the master encryption key. Read the important information under “2620/2628 cryptographic processor card test” before disconnecting or removing the cryptographic I/O processor.

2620/2628 external cryptographic hardware tests: The external cryptographic hardware tests verify the correct operation of the hardware that is attached to the cryptographic I/O processor.

Note: When you have completed testing the external cryptographic hardware, you must perform the Reset Processor and Exit function to restart the encryption subsystem.

- Security Interface Unit Cable Wrap Test:

This test verifies the correct operation of the security interface unit cable.

If this test completes successfully, the security interface unit cable that is attached to the cryptographic I/O processor card and the cryptographic I/O processor is operating correctly.

If this test fails, verify that the wrap connector is the correct part number (as indicated by the display prompt) and that it is installed correctly.

To further isolate the cause of the problem, run the cryptographic processor card wrap test. If the security interface unit cable wrap test fails and the cryptographic processor card wrap test passes, replace the security interface unit cable.

- Personal Security[®] Card Test:

This test verifies the correct operation of the card reader and the personal security card with which you test the reader.

If this test completes successfully, the card reader and the personal security card are operating correctly.

If this test fails, repeat the test by using a different personal security card. If the repeat of this test completes successfully, you must replace the original card that was used. There are two types of personal security cards available. Verify the correct part number by using online help for this test option. If this test fails again, replace the security interface unit.

- Security Interface Unit Keypad Test:

This test verifies the correct operation of the unit keypad.

The test prompts the user to press specific keys. It displays the keys that were requested and the keys that were pressed for comparison. If the keys that were pressed match the keys that were requested, the keypad is operational.

If the keys that were pressed do not match the keys that were requested, replace the security interface unit.

- Security Interface Unit LED 1, LED 2 and Beep Test:

This test verifies the correct operation of LED 1, LED 2, and the beeper.

If this test completes successfully, LED 1 and LED 2 light and the beeper sounds.

If this test fails, replace the security interface unit.

- Reset Processor and Exit:

This function allows the encryption subsystem to be reset.

If this function completes successfully, you must ask the customer contact with the proper authority to start the subsystem again. This resets the encryption subsystem.

If this function fails, replace the cryptographic IOP.

Attention: Disconnecting or removing the type 2620 or type 2628 cryptographic I/O processor *for any reason* causes the loss of the master encryption key. Read the important information under “2620/2628 cryptographic processor card test” on page 310 before disconnecting or removing the cryptographic I/O processor.

LocalTalk interface test: The LocalTalk interface test verifies that the workstation I/O adapter card and the cable (connector box cable) that attaches to the workstation I/O adapter card are operating correctly. The workstations that support LocalTalk protocol and the connecting cables are **not** tested. Because the test loads a diagnostic program into the communications I/O adapter card, you

must run the test from a workstation that is not attached to the I/O adapter you are testing. To run this test, you must have more than one workstation I/O adapter on the system.

If this test completes successfully, the workstation I/O adapter card and the cable that attaches to the workstation I/O adapter card are operating correctly.

If this test fails, a display indicates the probable failure rates of the workstation I/O adapter card and the cable that attaches to the workstation I/O adapter card.

Communications tests

Wireless LAN adapter card indicators

The wireless local area network (LAN) adapter has two indicators located above the 8-pin RS-485 connector.

The top-most indicator shows the adapter card status. The indicator closest to the RS-485 connector shows data transmission or reception.

Use Figure 83 to assist in problem analysis.

Status	Data	Action
Blinking Green	Off	No action required
Solid Green	Green (momentarily)	No action required
Solid Red	Solid Amber	Run VFYCMN procedure
Solid Red	Solid Red	Run VFYCMN procedure
Solid Red	Solid Green	Run VFYCMN procedure
Off	Off	Run VFYCMN procedure
Solid Amber	Solid Amber	Verify configuration
Solid Red	Off	Verify configuration
Solid Amber	Off	Verify configuration

Figure 83. Wireless LAN adapter card indicators

Communications interface trace

The purpose of this test is to monitor the modem interface signals and to detect wrong or incompatible use of the modem interface.

Starting the trace before varying on the communications lines provides the most accurate sample of the lines that are coming up.

Test description

This test monitors the following five modem interface signals:

- Data Terminal Ready (DTR)
- Data Set Ready (DSR)
- Request To Send (RTS)
- Ready For Sending (CTS)
- Carrier Detect (CD)

This test displays five of the modem interface signals in a graphic format, showing the time relationship of the signals to each other.

Data Terminal Ready (DTR)

Data terminal equipment (DTE) uses this signal to show the modem that the DTE is ready to transmit and receive data.

Data Set Ready (DSR)

For nonswitched telephone lines, the active DSR signal shows that the modem is powered-on and ready to transmit and receive data. For switched telephone lines, the active DSR signal shows that the modem is connected to the telephone line and is ready to transmit data.

Request To Send (RTS)

DTE uses this signal to activate or deactivate the modem's modulator lines. If the DSR signal is active, the RTS signal causes the modem to activate the carrier signal.

Ready For Sending (CTS)

The modem activates this signal in response to the Request To Send signal when the modem is ready to transmit data. When the CTS signal is active, the DTE can send data on the transmitted data line.

CTS delay is the time between the RTS signal active condition and the CTS signal active condition. On most nonswitched telephone line modems, there are three CTS delay options, ranging from 0 to 250 milliseconds (ms). Switched telephone line modems, operating in half-duplex mode, are normally set for 150 to 250 ms of CTS delay.

Carrier Detect (CD)

The modem uses this signal to show the DTE that the modem is receiving an acceptable carrier signal.

Because of hardware limits on taking short frame samples, the carrier detect signal might not be accurate. In this condition, an asterisk (*) takes the place of the sample data. The status is still correct.

Concurrent LPDA-2 tests

The purpose of these tests is to test the local and remote modems and get modem status information.

Test description

Use this option to run the Verify Link; it supports the LPDA-2 (VFYLNKLPDA) command. The concurrent LPDA-2 tests let you retrieve information from the data circuit-terminating equipment (DCEs). DCEs can be analog (modems) or digital (combined data service units (DSUs) and channel service units (CSUs)). You can get information from four tests:

- DCEs and line status
- DCEs and line test
- Analyze line
- Send and receive test

You can run the LPDA-2 tests on a line while applications are using the line. The tests do not interrupt communications but temporarily slow the data transfer.

The following restrictions apply to these tests:

- The DCEs must be compatible with LPDA-2.

- You can run the tests only on non-switched synchronous data link control (SDLC) lines.
- For multipoint DCEs, the DCEs and Line Status test does not interrupt normal communications. The other LPDA-2 tests might interrupt normal communications.
- You cannot run the tests on an active secondary line. A line is secondary if its data link role is either secondary or is negotiable and has negotiated to a secondary role. A line is active if a controller description under the line is varied on.

The *DCEs and line status* and *DCEs and line test* options are two modes of the same LPDA-2 request.

The DCEs and Line Status test reports parameters that the local and remote DCEs monitor during normal communications.

The DCEs and Line Test reports these parameters, runs internal tests, and reports the results. If poor line conditions are causing problems at normal speed, this test is sent over the communications line to the remote DCE at a slower transmit speed.

These two tests return the following information:

- Configuration summary
This includes DCE type and model, address, operating mode, transmit speed, network function, LPDA-2 code level, switched network backup (SNBU) status, data terminal equipment (DTE) interface connection, and installed features.
- DCEs and line parameters
These include receive level, number of received line signal detector (RLSD) losses, line quality, number of line errors, ages of remote DCE power-off and failure, ages of local DCE reinitialization and error conditions, DCE idle condition, base DCE in error, and features in error.
- Remote DCE interface status
This reports the current status and previous activity of the signals on the DTE interface lines attached to the remote DCE. The DCE monitors the following signals:
 - Request to send
 - Ready for sending
 - Transmit data
 - Receive data
 - Received line signal detector or carrier detect
 - Data signalling rate selector
 - Data terminal ready
 - DTE power loss detected
 - Test control

You can run the *Analyze line test* only on analog DCEs (modems). The test causes the modems to exchange test patterns on the line. The modems measure parameters of the analog signals. The modems report:

- Frequency shift
- Second and third harmonic distortion ratios
- Signal to noise ratio

- Phase jitter
- Receive level
- Transmit level
- Round trip delay time
- Modem type, model, address, and transmit speed
- Number of line errors and RLSD losses

The modem returns acceptable limits for some of the parameters.

The *Send and receive test* causes the DCEs to exchange several blocks of test patterns and track the errors that occur during transmission. The test reports the following:

- DCE type, model, address, and transmit speed
- Signal lost condition
- Worst line quality
- Number of line errors
- The number of blocks that are sent, received, and in error

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ac. Alternating current.

ACR. In data communications, abbreviation for abandon call and retry.

AER. Asynchronous error report.

APAR. See *authorized program analysis report*.

APPN. See *advanced peer-to-peer networking (APPN)*.

AROS. Alterable read-only storage.

ASCII. See *American National Standard Code for Information Interchange*.

ASP. See *auxiliary storage pool*.

advanced program-to-program communications (APPC). Data communications support that allows programs on an iSeries 400 system to communicate with programs on other systems having compatible communications support. APPC on the iSeries 400 system provides an application programming interface to the SNA LU type 6.2 and node type 2.1 architectures.

alternate installation device. A tape device that is used to load Licensed Internal Code (LIC) from the tape to the load source disk unit during a restore or installation operation. The alternate installation device can be on a different bus unit or on a different

input/output processor (IOP) than the load source disk unit. See also *installation device*.

alternate installation IPL. A special type of installation (D) IPL in which the system uses the installation device to IPL itself, then uses the alternate installation device to copy the LIC to the load source disk unit from. See also *alternate installation device*.

alternate installation media. Media (tape) that contains the Licensed Internal Code (LIC) that will be installed or restored on a system during an alternate installation IPL (type D IPL). It is placed in an alternate installation device.

American National Standards Institute (ANSI). An organization that is sponsored by the Computer and Business Equipment Manufacturers Association for establishing voluntary industry standards.

American National Standard Code for Information Interchange (ASCII). The code that was developed by the American National Standards Institute for information exchange among data processing systems, data communications systems, and associated equipment. The ASCII character set consists of 7-bit control characters and symbolic characters, plus one parity-check bit.

attended IPL. An initial program load that allows you to change configuration options from the display to manually control how the system does an IPL and how the system runs.

authorized program analysis report (APAR). A request for correction of a defect in a release of an IBM-supplied program.

auxiliary storage pool (ASP). A group of disk units that are defined from the auxiliary storage devices. See also *system ASP*.

BAT. See *basic assurance test*.

BBBB Ccbb. Addressing scheme for the bus (BBBB), card (Cc), and board (bb).

bis. In data communications, secondary (as in V.27 bis, the identifier assigned by the International Telecommunications Union (ITU)). There is an ITU V.27, ITU V.27 bis (where V.27 bis is basically a secondary method of achieving V.27), and ITU V.27 ter (where ter = tertiary). This term is also used with X.21 and V.25.

bpi. Bits per inch.

Bpi. Bytes per inch.

BSC. Binary synchronous communications. A form of telecommunication line control that uses a standard set of transmission control characters and control character sequences, for binary synchronous transmission of binary coded data between stations.

BTM. Bus transport message.

basic assurance test. An automatic test to test the I/O processor.

browse. To look at records in a file. To rapidly scan information on the screen of a visual display unit by vertical scrolling.

card enclosure. The area that contains the logic cards.

CD. (1) In data communications, carrier detector. See also *RLSD*. (2) In storage media, compact disk. See also *CD-ROM*.

CD-ROM. Compact disk-read only memory.

CEC. (1) In data communications, connect data set to line. (2) Central electronics complex (formerly called central processing unit or CPU). (3) Card enclosure cage.

checksum. A utility that writes data in a sector for error detection purposes.

CI. (1) In data communications, calling indicator. (2) Callable interface.

CID. In data communications, cable identification (ID) usually for a common return.

CLK. In data communications, clock.

CNTL A, B. In data communications, Control A or B. A and B refer to each individual signal of a differential pair of signals.

collision wrap. A method of testing the power, ground, and signal lines on the interface of an Ethernet adapter. This test requires the use of specialized wrap connectors.

concurrent maintenance. The process of removing or replacing hardware while the system is in use.

configure. To describe to a system the devices, optional features, and programs installed on the system.

confirm. To remove doubt about any authoritative act or indisputable fact.

cpi. See *characters per inch*.

CPM (continuously powered main storage). Continuously powered main storage. When utility power is lost on some iSeries 400 models with SPCN, the system applies power only to the main storage

cards for a varied amount of time (for example, one day). This process is called continuously powered main storage (CPM).

CPM increases the system availability. It provides full operating power for a short time to allow a system shut-down procedure. CPM allows the customer data to be stored and minimizes recovery time.

CRQ. (1) In data communications, call request. (2) Change request.

cryptography. A method of transforming customer data to conceal its meaning. Cryptographic services include data encryption and message

CTL A, B. In data communications, control. See *CNTL*.

CTS, CTSA, CTSB. In data communications, clear to send (A and B refer to each individual signal of a differential pair of signals).

CTSB. In data communications, clear to send B.

DASD. Direct access storage device.

dc. Direct current.

DCE. In data communications, data communications equipment.

DCLK, DCLKA, DCLKB. In data communications, data clock (A and B refer to each individual signal of a differential pair of signals).

DDI. Distributed data interface. The term *DDI* is used to represent all local area network (LAN) types based on the fiber distributed data interface (FDDI) specifications, regardless of the media used (optical fiber, copper, or shielded twisted pair).

DE. See *disk enclosure*.

debug. To check diagnose and eliminate errors in programs.

debug mode. An environment in which programs can be tested.

dedicated service tools (DST). The part of the service functions used to service the system.

disk enclosure. The part of a disk unit that contains the read and write heads, the magnetic disks, and the actuators.

DLO. (1) In data communications, data line occupied. (2) Document library object.

DMA. Direct memory access channel (hardware for I/O device access to main storage).

download. To transfer data from a processing unit to an attached device, such as a microcomputer, for processing.

DPR. In data communications, digit present.

DSC. In data communications, distant station connected.

DRS. In data communications, data signal rate selector.

DSA. (1) Direct select address. (2) Directory system agent.

DSR. In data communications, data set ready.

DST. See *dedicated service tools*.

DTE. In data communications, data terminal equipment.

DTR. In data communications, data terminal ready.

EBCDIC. See *extended binary-coded decimal interchange code*.

EEPROM. Electrically erasable programmable read only memory.

EPF. Enable panel (sub)function.

extended binary-coded decimal interchange code. A coded character set of 256 eight-bit characters.

fault. An accidental condition that causes a functional unit to fail to perform its required function.

fax. To transmit an image using a telephone system and facsimile machines.

facsimile machine. A functional unit that converts images to signals (from a telephone system) or that converts received signals back to images.

fiber optics. The technology of guiding optical power (light) through thin, transparent strands (fibers) that are made of glass, fused silica, or plastic.

frame. A general term which refers to a rack or expansion unit.

frame relay. A protocol for routing frames through the communications network.

FSIOA. File server input/output adapter.

FRU. Field-replaceable unit.

GND. Ground (electrical).

guest partition. Select this option if the partition being created will not have licensed internal code and OS/400 installed, and instead is intended to use another operating system such as Linux.

HDLC. High-level data link control.

HIPER. High impact or pervasive APAR

HRI. (1) Hardware resource information. (2) Human readable interpretation.

ICT. I/O configuration table.

ID. Identification.

IDE. Interactive device exerciser.

IDLC. Integrated Services Digital Network Data Link Control

IND, IND-A, IND-B. In data communications, indicator (A and B refer to each individual signal of a differential pair of signals).

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.

input/output. Data provided to the computer or data that results from computer processing.

input/output processor. One or more circuits that process programmed instructions. It controls one or more input and, or output device or adapters.

installation IPL. The process of loading code into main storage and preparing for system operation from an input/output hardware unit other than the system's primary load-source disk unit. This is also referred to as a type D IPL or D-mode IPL.

installation device. A tape or optical device [CD-ROM or a digital video disc (DVD)] that is used on a type D IPL to load Licensed Internal Code (LIC) segments into main storage. The installation device must be on the same input/output processor (IOP) as the load source. This device can be used to load LIC code from the tape or optical device onto the load source during restore or installation operations.

intelligent printer data stream (IPDS™). An all-points-addressable data stream that allows users to position text, images, and graphics at any defined point on a printed page.

intermittent. Occurring or appearing in interrupted sequence.

I/O. See *input and, or output*.

IOA. Input/output adapter.

IOBU. I/O bus unit.

IOP. See *input/output processor*.

IPDS. See *all-points-addressable data stream*.

IPI-3. The IBM implementation of the proposed ANSI/X3T9.3 standard defining the electrical, data link protocol, and functional interface.

IPL. See *initial program load*.

ISMD tapes or CD-ROM. IBM distribution-removable media.

isolation. See *problem isolation procedure*.

LAN. See *local area network*.

LED. Light-emitting diode.

LGND. In data communications, logic ground.

LIC. See *Licensed Internal Code*.

license. A permission granted by competent authority to engage in a business or occupation or in an action otherwise unlawful.

Licensed Internal Code. Programming that defines logical operations on data.

licensed program (LP). A separately orderable program, supplied by IBM, that performs functions related to processing user data. Examples of licensed programs are Client Access for OS/400, COBOL/400®, iSeries 400 Application Development Tools, OfficeVision/400™, and so on.

LICTR. Licensed Internal Code trouble report, which is more commonly known as a LIC APAR. See *authorized program analysis report (APAR)*.

LID. (1) Load ID. (2) Local identifier.

LLB. In data communications, local loop back.

load source. A device used to move data or programs into the system, for example, a CD-ROM or tape device.

load source disk unit. The disk unit that contains the Licensed Internal Code (LIC) for the system. This unit is always identified as unit number 1 in the disk configuration displays.

local area network. The physical connection that allows transfer of information among devices that are on the same premises.

LP. See *licensed program (LP)*.

LPP. See *licensed program (LP)* (formerly licensed program product).

machine interface (MI). The instruction set that tells the computer how to operate.

MED. Machine exception data.

media. Any storage type device.

MFIOF. Multifunction input/output processor.

mirrored protection. A function that protects data by duplicating all disk unit data on one storage unit in an auxiliary storage pool to another storage unit within the same auxiliary storage pool.

MISR. Machine initialization status record.

MRI. Machine-readable information.

MSD. Main storage dump.

MSIOP. Magnetic storage device input/output processor.

MTR. Microcode trouble report. Obsolete term; see *authorized program analysis report (APAR)*.

NACA. Node address communication area

NB2. In data communications, number bit 2.

NIA. Next instruction address register.

NWI(D). Network interface (description).

NWS. (1) Network server. (2) Nonprogrammable workstation.

OEM. Original equipment manufacturer.

OH or DP. In data communications, on hook/dial pulse.

online problem analysis and resolution. Online PAR manages system errors and gives the customer maximum system availability, effective problem analysis, and a set of software tools for analyzing, repairing, and reporting problems.

Operations Console. Allows a personal computer (PC) to become a local or remote console to your iSeries server. Operations Console has been enhanced to enable connections or console activities across a local area network (LAN), besides enabling directly cabled and dial-in (modem) connections.

overview. A general survey or summary.

PAR. See *online problem analysis and resolution*.

PCC. Power control compartment.

PCI. In data communications, peripheral connector interface (type of cable).

PIP. See *problem isolation procedure*.

planar. A circuit board that other cards plug into.

PM. Preventive maintenance.

PND. In data communications, present next digit.

pool. (1) A readily available supply. (2) A designated place to store data.

POR. Power on reset.

port. System hardware where the input/output devices are attached.

POSIX. Portable operating system interface for computer environments.

problem analysis. The process of finding the cause of a problem.

problem isolation procedure. Written information used by service representatives to repair IBM equipment. A PIP contains questions and procedures that direct the user to the failing part of the equipment.

protocol. A set of rules that controls the communication and transfer of data between two or more devices (or systems) in a communications network.

PSP. Preventive service planning.

PTF. Program temporary fix. A temporary solution to, or bypass of, a defect in a licensed program.

PWI. In data communications, power indicate.

RAM. Random access memory.

RAS. Reliability, availability, serviceability.

RC-GND. In data communications, receive circuit ground.

RCLK. In data communications, receive clock.

RD. (1) In data communications, received data. (2) Remove Directory (RD).

replace. To exchange; for example, to exchange one part with another.

restore. To return to an original value or image; for example, to restore data to main storage from auxiliary storage.

RGND. In data communications, return ground.

RI. In data communications, ring indicate.

RISC. Reduced instruction set computer.

RLB. In data communications, remote loop back.

RLSD. In data communications, received line signal (carrier) detector. See also *CD*.

ROS. Read only storage.

RPQ. Request for price quotation

RSET A, B. In data communications, receiver signal element timing (A and B refer to each individual signal of a differential pair of signals).

RTS. (1) In data communications, ready to send. (2) Reliable transfer server.

SAG. Shared access group.

save media. Recorded and saved system data that is generated by the save command.

SC-GND. In data communications, send circuit ground.

SCPE. Start-control-program-function job.

SCS. See *SNA character string*.

SCSI. Small computer system interface.

SDLC. Synchronous Data Link Control

SGND. In data communications, signal ground.

shadow log. A portion of the product activity log that is maintained by Licensed Internal Code.

SID. (1) Segment ID. (2) Subject identifier.

sign on. The procedure by which the user starts a terminal session.

SLID. Error log ID (for error log entries).

SNA. See *Systems Network Architecture*.

SOM. System object model.

SP. Service processor.

SPCN. System power control network. An asynchronous serial communications network. SPCN connects 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.

SRC. See *system reference code*.

SSB. In data communications, select standby.

SST. System service tool.

STBY. In data communications, stand by.

storage management recovery. A function that prepares the system to access data from all disk units configured to the system.

subfunction. A set of functions that are contained in a specific control panel function.

subset. A set of elements that are part of a specified set.

SUID. System-unique identifier. A 12-character ID that is assigned by the iSeries 400 manufacturer to support SOM software functions.

system ASP. The auxiliary storage pool where system programs and data reside. It is the storage pool that is used if the user does not define a storage pool. See also *auxiliary storage pool* and *user ASP*.

Systems Network Architecture. The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through and controlling the configuration and operation of networks.

task. One or more sequences of instructions that are treated by a control program as an element of work to be accomplished. The basic unit of work from the standpoint of a control program.

TCLK. In data communications, transmit clock.

TD. In data communications, transmitted data. Also labeled XD.

TDE. Task dispatching element.

TI. In data communications, test indicator.

TSET. In data communications, transmitter signal element timing.

TX A, B. In data communications, transmit clock (A and B refer to each individual signal of a differential pair of signals).

type D IPL. See *installation IPL*.

UA. (1) Unit address. (2) User agent.

Unattended IPL. An initial program load that is done automatically by the system after the system power is on.

UEPO. Unit emergency power off.

upgrade. To change or add to the system; to add devices, features, or programs.

uninterruptible power supply. A battery installed between commercial power and the system that provides power to keep the system running, if a commercial power failure occurs, until it can complete an orderly end to system processing.

URC. Unit reference code.

user ASP. One or more auxiliary storage pools used to isolate journals, journal receivers, and save files from the other system objects that are stored in the system ASP. See also *auxiliary storage pool* and *system ASP*.

vital product data. 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 manufacturer's ID and other fields. For programs, it is compiled as a data area that accompanies the program. Data includes the name of the licensed program or Licensed Internal Code group, the release and modification, the program module names, the national language or languages selected, and possibly other fields. Vital product data is transferred from the device to the system and kept for display. Vital product data is also visible on the device name plate or a similar tag.

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*.

VTOC. See *volume table of contents*.

word. 4 bytes.

XD. In data communications, transmitted data. Also labeled TD.

X.25. In data communications, a specification of the International Telegraph and Telephone Consultative Committee (CCITT) that defines the interface to an X.25 (packet-switching) network.

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