System i and System p

Service provider information
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Note

Before using this information and the product it supports, read the information in "Notices," on page 247 and the manual *IBM Systems Safety Information*, G229-9054.

Thirteenth Edition (September 2007)

Contents

Safety notices

Safety notices may be printed throughout this guide:

- **DANGER** notices call attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** notices call attention to a situation that is potentially hazardous to people because of some existing condition.
- **Attention** notices call attention to the possibility of damage to a program, device, system, or data.

Laser safety information

IBM System i and System p models can use I/O cards or features that are fiber-optic based and that utilize lasers or LEDs.

Laser compliance

All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

CAUTION:
This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

(C026)

CAUTION:
Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

CAUTION:
This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

CAUTION:
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

Service functions

The Service functions provide details for the service provider to gather information about hardware problems while under the direction of the next level of support.

Before using this information, you should know how to service this particular hardware model. You must also know how to safely work with electrical components.

Attention: Misuse of service tools or using them with inappropriate security safeguards might result in loss of data, programs, or other objects on the system.

Dedicated Service Tools (DST)

Dedicated service tools (DST) is used to work with Licensed Internal Code (LIC), disk units, 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."

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 i5/OS® is operational, and can be accessed using the STRSST CL command.

Dedicated Service Tools requirements

Note: It is a requirement to change the password the first time anyone signs on to DST or SST. The authorized service provider must provide 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. For more information, see "Work with service tools user IDs" on page 27.

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.

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.

Stand-alone paging (non-paging)

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, there is no operating system available, and only some functions of Licensed Internal Code are operational.

You can use this environment only by performing an alternate IPL to DST. For details, see "Performing an alternate IPL to DST (type D IPL)" on page 6.

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 8.

Limited paging

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

You can use this environment by performing an IPL to DST. For details, see "Performing an IPL to DST" on page 3.

You can access 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 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 i5/OS limited paging environment" on page 211.

- 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 8.

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 the full paging environment when you perform one of the following:

- Function 21 on the control panel or Work with Partition Status screen to access DST. For details, see "Selecting Function 21 while the system is operational" on page 5.

  Note: This option is available only from the primary partition.
- System Request key procedure. For details, see "Using the System Request Key" on page 5.
- Access system service tools (SST) on a system that uses i5/OS. For details, see "Accessing system service tools" on page 211.

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

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 security

Note: The following options are operating system-dependent. For a list of the options available for your operating system, see "DST in i5/OS full paging environment" on page 210.

- 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 8.

Accessing Dedicated Service Tools

You can access dedicated service tools (DST) in several ways, including by performing an IPL to DST, using the System Request Key, and selecting Function 21 while the system is operational.

Note: You can also use the function key F16, which is not displayed, while in DST debug mode during a step-mode IPL.

Performing an IPL to DST

You can perform an IPL to DST for an entire system that is not logically partitioned, or for the primary logical partition if you have logical partitions.

About this task

For secondary partitions, see "Performing an IPL to DST for logical partitions" on page 5.

To perform an IPL to DST, 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 159.

   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. Choose from the following options:
   - If there is a problem log entry 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.

     Attention: 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 Enter on the control panel to perform an IPL.
   - If the system is powered off, press the Power button on the control panel to perform an IPL.

     The IPL or Install the System display appears on the primary console.
3. Select the *Use Dedicated Service Tools* option. The DST Sign On display appears. For more information on how to identify the primary console, see “Determining a primary or alternative console” on page 125.
4. Sign on to DST with a valid user ID and password.

   Remember: 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.

   Notes:
   - If prompted for a password, be sure to give the new (changed) password to the customer.
   - 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. A user ID with a service tool security privilege must reset the ID.

   The Use Dedicated Service Tools (DST) display appears.

   Restriction: The system is in the limited paging environment. For details, see “Limited paging” on page 2 and “DST options” on page 8.

   This ends the procedure.

Changing a service tools user ID

You can use the Dedicated Service Tools (DST) to change a service tools user ID.

About this task

Use this procedure to change a service tools user ID:

1. Sign on to DST.
2. Select option 5 on the Use Dedicated Service Tools (DST) screen to work with the DST environment.
3. Select option 3 on the 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.

About this task

1. Sign on to SST with the QSECOFR authority.

2. Use the XPF CL command CHGDSTPWD with the *DEFAULT parameter value. This command enables the profile (if disabled), resets the profile's password to QSECOFR, and sets the password to expired.
3. 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 logical partitions

Provides resources for logical partitions.

About this task

You must use the Hardware Management Console (HMC) to load logical partitions and to work with logical partitions.

For information about using the HMC to power on logical partitions, see Activating a partition profile.

For information about using the HMC to power off logical partitions, see Shutting down i5/OS logical partitions.

For information about working with logical partitions, see Managing i5/OS logical partitions.

For general information about logical partitions, see General concepts for partitioning the server.

Using the System Request Key

If your system has the i5/OS operating system, you can access DST by using the System Request Key only when the system is in debug mode.

About this task

Debug mode is an environment to test programs. You can select a function key and access DST during the IPL process. For details, see "Perform an IPL" on page 9.

From the console, perform the following steps:

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

   Note: Commands are case-sensitive.
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. The Use Dedicated Service Tools (DST) display appears.

   Notes:

   - If prompted for a password, be sure to give the new (changed) password to the customer.
   - 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. A user ID with a service tool security privilege must reset the ID.

   For details on the DST options, see "DST options" on page 8. **This ends the procedure**.

Selecting Function 21 while the system is operational

You can access the dedicated service tools (DST) by selecting Function 21 while the system is operational.

About this task

Perform the following steps:

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

   Notes:

   a. If you enter Function 21 and the primary console is powered off or not usable, reference code A600500x 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 159.

2. 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. 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 125.

3. Sign on to DST.
4. Type QSRV as the valid user ID and get the password from the customer. The Use Dedicated Service Tools (DST) display appears.

   If the customer has changed the full DST authority user ID or password, ask the customer for the correct values.

   Notes:

   - If prompted for a password, be sure to give the new (changed) password to the customer.
   - 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. A user ID with a service tool security privilege must reset the ID.

   The system is now in the full paging environment. For additional details, refer to "System paging environments" on page 1 and "DST options" on page 8.

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 providers.

About this task

Perform the following steps:

1. Select the DST option **Work with alternate installation device**. This option is available in DST from control panel function 21 or a type D IPL. For details, see "Work with Dedicated Service Tools environment" on page 24 and "Work with alternate installation device" on page 28.
2. Determine the removable media units for an alternate IPL. For more information, see Performing an alternate IPL.
3. Power on the removable media units.
4. 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.
5. Load the media and make the media units ready. See the device information for instructions on loading the removable media.
6. Power off the system. If the system is running, end all jobs and perform the power off procedure.
7. 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 159.
8. Power on the console. For more information on how to identify the primary console, see "Determining a primary or alternative console" on page 125.

9. Insert the media and make the media unit ready.
10. Press the Power button to power on the system. 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.

    The following conditions might occur:

    - Some types of removable media units automatically reset. In this condition, SRC A1001933 (`Media device not ready`) may be displayed.
    - If the installation device is an optical device, you might need to perform an IPL of the system again. This action will make the unit ready.

      ```
      pwrdwnsys restart(*yes) IPL(D)
      ```

    - If the installation device is a tape unit, system reference code (SRC) `A1001933` is displayed until the device automatically makes itself ready.
11. Wait for the Install Licensed Internal Code display to appear on the console. The wait time varies depending on the speed of the removable media unit and the processor speed for the specific system model.

    Notes:

    a. If SRC A600 500*x* is displayed on the control panel, the system was not able to locate the console. Perform the following steps:
       1) Ensure that the console is powered on.
       2) Repair the console if necessary.
       3) Select Function 21 on the control panel to make DST available. For details, see Function 21: Service tool initiation.

    b. If an SRC other than A600 500*x* is displayed on the control panel, go to the Starting point for all problems in the Problem analysis information for your system.

    The Install Licensed Internal Code display appears on the console.
12. Choose from the following options:
    - If you want to access DST, select **Work with Dedicated Service Tools (DST)** and continue to the next step of this procedure.
    - If you want to install or restore Licensed Internal Code, select **Install Licensed Internal Code** and continue with the install or restore instructions. For details, see "Utility to install Licensed Internal Code" on page 166.
    - If you want to define the device from which the system LIC should be installed, select **Define alternate installation device**. This option also allows you to enable or disable the alternate installation device.
13. Reapply PTFs. For information on applying PTFs, see Getting fixes.
14. 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.

    The Use Dedicated Service Tools (DST) display appears.

    Notes:

    - If prompted for a password, be sure to give the new (changed) password to the customer.
    - 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. A user ID with a service tool security privilege must reset the ID.

    Options are limited because the system is in the stand-alone environment. For more information, see "System paging environments" on page 1 and "DST options" on page 8.**This ends the procedure**.

Using function keys in Dedicated Service Tools

The F3, F12, F16, and System Request function keys allow navigation through DST.

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) and end all DST functions, or you can allow the DST functions to remain active.

About this task

To exit DST and end all DST functions, perform the following steps:

1. 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
2. Select *Exit dedicated service tools (DST)* to exit and end all DST functions.

To exit DST and allow the DST functions to remain active, perform the following steps:

1. Ensure that the system is operating in debug mode.
2. 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 28

DST options

DST options vary depending on the paging environment and how you access DST.

For a list of specific options available in each paging environment, see Table 1. For more information on the system paging environment options, see "System paging environments" on page 1.

For details on accessing DST, see "Accessing Dedicated Service Tools" on page 3.

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

Table 1. DST options (continued)

DST options	Paging environment		
	D-IPL (non-paging)	Limited	Full
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
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] This option is operating system-dependent. It is available only under certain operating systems (see "i5/OS operating system" on page 210).			

Installing Licensed Internal Code

You can install or restore Licensed Internal Code.

If your system is a stand-alone environment, refer to "Utilities to install and restore i5/OS Licensed Internal Code" on page 165.

Attention: If you have logical partitions, you should not use the utilities to install and restore i5/OS Licensed Internal Code. It can cause damage to the logical partitions and loss of data.

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 27.

Perform an IPL

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

This option allows you to install and start the operating system from the disk. If you have installed the Licensed Internal Code and there is no operating system installed, install 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 "Fixes and cumulative PTF packages" on page 164 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, perform an IPL of 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. For details, see Using IBM i5/OS to remove the current server firmware level.

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 an installation or upgrade, a type A IPL will also be used.

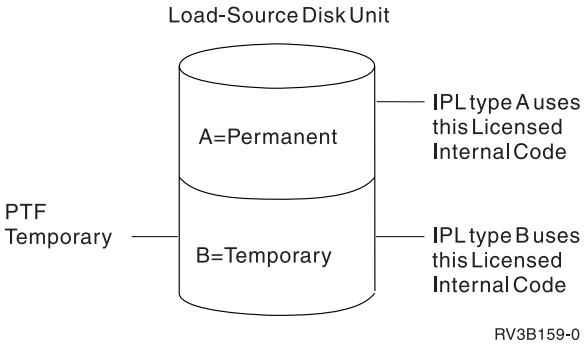

Figure 1. Copies of load-source Licensed Internal Code

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.

- 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 165.

- 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 165 and the system operation information.

Work with disk units

Create and update the disk configuration, and display the logical structure information.

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 IBM eServer™ iSeries® (http://ibm.com/eserver/iseries/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. For details, see "System paging environments" on page 1. Use Table 2 on page 12 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	1. Save load-source disk unit data 2. Copy load-source disk unit data 3. Display/change page data 4. Analyze disk unit surface 5. Initialize and format disk unit 6. Reclaim IOP cache storage 7. Stop device parity protection
Limited paging	• 1. Work with disk configuration – Display disk configuration - 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 - 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 - Display disk configuration - Start mirrored protection - Stop mirrored protection - Enable remote load-source mirroring - Disable remote load-source mirroring – Work with device parity protection - 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 - 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 – Save disk unit data – Restore disk unit data – Replace configured unit – Assign missing unit – Recover configuration – Disk unit problem recovery procedures - 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	1. Display disk configuration • 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 • 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 • Replace configured unit • Disk unit problem recovery procedures – 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:

Provides options and menu flow.

Options and menu flow for the *Work with disk configuration* option vary depending on the system paging environment see "System paging environments" on page 1. Options are:

Display disk configuration
For details on this option, see "Display disk configuration" on page 15.

Add units to ASPs
For details on this option, see "Work with ASP configuration" on page 15.

Add units to ASPs and balance data
For details on this option, see "Work with ASP configuration" on page 15.

Work with ASPs threshold
For details on this option, see "Work with ASP threshold" on page 15.

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 Enable remote load source mirroring.

Disable remote load-source mirroring
For details on this option, see Disable remote load source mirroring.

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:

Display the disk units that are attached to the auxiliary storage pool (ASP) and the status and capacity of the system auxiliary storage pool.

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
Display the status of all ASPs and the disk units that are configured on the system.

Display disk configuration capacity
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
Display the type of protection for each ASP and the assigned disk units within each ASP.

Display non-configured units
Display the status of all the disk units that are not configured.

Display device parity status
Display the status of the disk unit subsystems that have device parity protection on the system. For more information on device parity, see "Work with device parity protection" on page 17.

Disable remote load-source mirroring
For details on this option, see "Work with ASP threshold."

Display disk compression status
Display the compression status of compressed disk units.

Work with ASP threshold:

System auxiliary storage pool (ASP) threshold.

Select this option to display or change the threshold for the system ASP. The system issues a notice when it reaches the threshold value.

Note: The user ASPs are not supported.

Work with ASP configuration:

The Work with ASP configuration displays allows you to manage disk configuration capacity, delete a user ASP, and add units to an ASP.

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

Display disk configuration capacity
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. For details, see "Display disk configuration" on page 15.

Delete user ASP
Delete a user-defined ASP (ASPs 2 through 16).

Add units to ASPs
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
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
Delete the data in the ASP.

Change ASP storage threshold
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
Change the assignment of a disk unit to another ASP.

Remove units from configuration
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: Removing a disk unit from an ASP configuration 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:

Display, start, stop, enable, and disable mirroring.

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

Display disk configuration
For details on this option, see "Display disk configuration" on page 15.

Start mirrored protection
This option allows you to start mirrored protection on the selected ASP.

Stop mirrored protection
This option allows you to stop mirrored protection on the selected 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:

Device parity protection is a data redundancy feature available on some storage media units.

Select this option to perform the system functions that handle device parity protection on the system. 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. For an example, refer to Figure 2 on page 18.

Start device parity protection
Use this option to begin the process of protecting data on the system. Options include:

- Start device parity protection - RAID 5
- Start device parity protection - RAID 6
- Start device parity protection - RAID 5 with hot spare protection: This option automatically starts and configures RAID 5 with hot spare protection.
- Start device parity protection - RAID 6 with hot spare protection: This option automatically starts and configures RAID 6 with hot spare protection.

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.

Select parity optimization
This option allows you to optimize parity.For an example of the options, refer to Figure 3 on page 18.

Examples of device parity status screens

Display device parity status

```
                      Display Device Parity Status

Parity                       Resource                      Hot Spare
  Set  ASP Unit  Type Model Name       Status             Protection
    1            571F  001  DC17       RAID-5                  Y
         *    *  4326  071  DD031      Active
         *    *  4326  071  DD021      Active
         *    *  4326  071  DD020      Active
         *    *  4326  071  DD023      Active
         *    *  4326  071  DD022      Active
         *    *  4326  071  DD018      Active
         *    *  4326  071  DD024      Active
         *    *  4326  071  DD029      Active
         *    *  4326  071  DD026      Active
         *    *  4326  071  DD028      Active
         *    *  4326  071  DD030      Active
         *    *  4326  071  DD032      Active
         *    *  4326  071  DD033      Active
         *    *  4326  071  DD035      Active
         *    *  4326  071  DD036      Active
         *    *  4326  071  DD038      Active
         *    *  4326  070  DD039      Active

See help for more information

Press Enter to continue.

 F3=Exit         F5=Refresh          F9=Display disk unit details
 F11=Display disk hardware status    F12=Cancel
```

Figure 2. Display Device Parity Status

Select Parity Optimization

```
                        Select Parity Optimization

Select how you want the parity set optimized:


The current parity optimization is:  Balanced

Type choice, press Enter.
  Select parity optimization

     1. Availability
     2. Balance
     3. Capacity
     4. Performance
```

Figure 3. Select parity optimization screen

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:

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.

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, 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, a menu appears on the display with the status information.

Notes:

- This procedure does not save the Licensed Internal Code on the load-source disk unit.
- The option is not available 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, a menu appears on the display with the status information. If the replaced disk is load source, the system will perform an IPL to DST from the new disk. For the others, the system will not perform a 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 21.

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 performing an IPL. 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 **Recover mirrored load source** 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 perform an IPL to DST after 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.

Using hot spare device parity protection:

Protect your disk units with hot spare device parity protection.

Concepts for using device parity protection with hot spare disk units:

Device parity protection hot spare disk units are spare disk units stored on a system to replace failed disks in case a disk failure occurs.

A hot spare disk unit is stored on the system as a non-configured disk. When a disk failure occurs, the system exchanges the hot spare disk unit with the failed disk unit. Both of the disk units must be the same capacity for a Small Computer System Interface (SCSI) IOA, or the same or larger capacity for a

Serial Attached SCSI (SAS) IOA, and under the same IOA in order for the exchange to occur. After the exchange occurs, the system rebuilds the data on the new disk unit.

Include hot spare disk units in your system:

There are two ways to include the hot spare disk units in your system.

1. You can configure the hot spare disk unit when you initially start device parity protection. For details on how to include hot spare disk units when starting device parity protection, see "Starting device parity protection with hot spare protection." When selecting this option, the system automatically determines if one or two hot spares should be created and which available disk units are selected based on the total number and capacity of disk units attached to the IOA.

   Note: When you start device parity protection with hot spare disk units, the disk units are not designated to any particular parity set. The hot spare disk unit protects the first failed disk unit that has parity protection, is the appropriate capacity for the hot spare, and is under the same IOA as the hot spare.
2. You can create a hot spare disk unit from non-configured disk units on your system. For details on how to include hot spare disk units to your system, see "Starting hot spare protection" on page 23. When selecting this option, you should determine if one or two hot spares are desired and which available units will become hot spares based on the total number of disk units attached to the IOA and their capacity.

Costs and limitations of device parity protection with hot spare disk units:

There are costs and limitations to consider when using device parity protection with hot spare disk units.

- Hot spare disk units only protect parity sets with the same capacity disk units for SCSI IOAs, or only protect parity sets with the same or smaller capacity disk units for SAS IOAs.
- To create a new RAID 6 parity set with hot spare disk units, a minimum of five disk units is needed. If there are not at least five disk units, then the system will recommend the creation of a RAID 5 parity set with hot spare instead.

Planning for hot spare device parity protected disk units:

Successfully plan how to create hot spare disk units.

To use hot spare protection for your parity protected disk units, the following requirements must be met:

- The disk units must be parity protected.
- The hot spare disk unit must be under the same IOA as the disk units that you want protected.
- The hot spare disk unit must be the same capacity as the failed parity protected disk unit (for SCSI IOAs) or must be the same or larger capacity as the failed parity protected disk unit (for SAS IOAs).
- When an IOA controls the load source disk unit, the hot spare disk unit must be in a valid load source location. This may require additional planning when using a SCSI IOA since the valid load source locations are typically a subset of the possible disk unit locations within the enclosure. The system will not allow the **Start device parity protection with Hot Spare** to occur if this requirement is not met.
- The hot spare disk unit must be a non-configured and unprotected disk unit.

Setting up hot spare device parity protected disk units:

You can use the system service tools (SST) to set up hot spare device parity protected disk units.

Starting device parity protection with hot spare protection:

You can start device parity protection with hot spare protection using the system service tools (SST).

1. Start System Service Tools (STRSST), and specify the user name and password.

2. On the System Service Tools (SST) display, select **Work with disk units**.
3. On the Work with Disk Units display, select **Work with disk configuration**.
4. On the Work with Disk Configuration display, select **Work with device parity protection**.
5. On the Work with device parity protection display, select **Start device parity protection - RAID 5 with hot spare** or **Start device parity protection - RAID 6 with hot spare** depending on the level of parity protection that is desired.

   Note: If there is a sufficient number of hot spare disk units already available, the system will not create any additional hot spare disk units.

Starting hot spare protection:

You can start hot spare protection using the system service tools (SST).

About this task

To start hot spare protection with SST, follow these steps:
1. Start System Service Tools (STRSST), and specify the user name and password.
2. On the System Service Tools (SST) display, select **Work with disk units**.
3. On the Work with Disk Units display, select **Work with disk configuration**.
4. On the Work with Disk Configuration display, select **Start hot spare**.

Managing hot spare device parity protected disk units:

You can use the system service tools (SST) to manage your hot spare device parity protected disk units.

Stopping hot spare protection:

You can stop hot spare protection using the system service tools (SST).

About this task

To stop hot spare protection, follow these steps.
1. Start System Service Tools (STRSST), and specify the user name and password.
2. On the System Service Tools (SST) display, select **Work with disk units**.
3. On the Work with Disk Units display, select **Work with disk configuration**.
4. On the Work with Disk Configuration display, select **Stop hot spare**.

Determining which parity sets are hot spare protected:

You can determine which parity sets are hot spare protected using the system service tools (SST).

About this task

To determine which parity sets are hot spare protected, follow these steps:
1. Start System Service Tools (STRSST), and specify the user name and password.
2. On the System Service Tools (SST) display, select **Work with disk units**.
3. On the Work with Disk Units display, select **Work with disk configuration**.
4. On the Work with Disk Configuration display, select **Work with device parity protection**.
5. On the Device parity protection display, select**Display disk configuration** .
6. On the Display disk configuration display, select **Display Device Parity Status**.

Displaying hot spare status:

You can use the system service tools (SST) to display hot spare status.

About this task

To display hot spare status using SST, follow these steps:

1. Start System Service Tools (STRSST), and specify the user name and password.
2. On the System Service Tools (SST) display, select **Work with disk units**.
3. On the Work with Disk Units display, select **Work with disk configuration**.
4. On the Work with Disk Configuration display, select **Display disk configuration**.
5. On the Display disk configuration display, select **Display hot spare disk unit status**.

Troubleshooting hot spare device parity protection:

Identify some common conditions associated with hot spare device parity protection and failed drives.

If you are having trouble starting hot spare protection or device parity protection with hot spare protection

Ensure the following:

- There is an adequate number of disk units attached to the IOA which could become hot spare disk units.
- The disk units to become hot spares are in **Non-configured** status (not part of a disk pool).
- The disk units to become hot spares are of appropriate size to protect the disk units in the parity sets under the IOA.
- If the desired IOA is the load source IOA, the disk units to become hot spares must be installed in a valid load source location for the specific enclosure.

Notes:

- If you move a non-configured disk unit to a valid load source location and it is not shown as capable of becoming a hot spare, you may need to initialize or format the disk unit in its new location in order for it to become a hot spare.
- If the option to start device parity protection with hot spare protection is selected and the above requirements are not met, the desired IOA will not be shown as capable of starting device parity protection.
- If the option to start hot spare protection is selected and the above requirements are not met, the desired disk units will not be shown as capable of becoming hot spares.

To identify a failed disk unit which was automatically replaced by a hot spare

When a device parity protected disk unit fails and the automatic rebuild to the hot spare has started or completed, the failed disk will have a status of **Not operational** or **Read/Write protected**. Follow normal disk unit service and recovery procedures for replacement of the failed disk unit.

To identify if a hot spare disk unit itself has failed

When a hot spare disk unit fails, the failed disk will have a status of **Not operational** or **Read/Write protected**. Follow normal disk unit service and recovery procedures for replacement of the failed disk unit.

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:

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

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.

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 there are no displays 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:

Use this option to select the output printer, tape, or optical device and the console type.

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.

Selecting an output printer, tape, or optical device

On the Select Output Printer display, the Select Tape display, or the Select Optical Device display, the system completes 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 Enter 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 take effect only after performing an unattended IPL.

- 1 = twinaxial console
- 2 = Operations console (Direct)
- 3 = Operations 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		
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				

Table 3. **Service tools user IDs** *(continued)*

Privilege Description	QSECOFR	QSRV	″22222222″ (full)	″11111111″ (basic)	default
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:

You can work with system values using the Hardware Management Console (HMC) or the Advanced System Management Interface.

To work with system values using the HMC, see Viewing information about a managed system.

To work with system values using the Advanced System Management Interface (ASMI), see Viewing vital product data.

Attention: If the system has logical partitions, contact your next level of support before changing the system serial number. The logical partition configuration information will be impacted.

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 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. When an alternate bus load source is defined, the LIC also performs an IPL on 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 performs an IPL only on the IOPs on bus 1 and uses the IPL load source.

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 i5/OS operating system, this option requires the Install privilege. For more information on authority, see “Work with service tools user IDs” on page 27.
2. When your system is in the full or limited paging environment, the appearance of the **Select DST console mode** option varies depending on the operating system. For more information, see For more information, see “System paging environments” on page 1 and “i5/OS operating system” on page 210.

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

- You enter Function 21 (start 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

The DST Console Mode display includes options to exit DST and to start DST in debug mode.

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 allows the **Use Dedicated Service Tools (DST)** display to appear without requiring you to sign on to DST. For more information on the System Request Key procedure, see “Using the System Request Key” on page 5.

Start a service tool

The service tools include options to manage dumps, view logs, activate traces, collect performance data, and to activate the Hardware Service Manager.

Select the *Start a service tool* 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.

Display/Alter/Dump:

Display or change virtual storage data.

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 screen:

  - 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 screen 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.

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 removable 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.

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
- 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.

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 “Hardware Service Manager” on page 43.

Main storage dump manager:

Select this option from the Start a Service Tool display.

Notes:

- The **Main storage dump (MSD) manager** option is also available under System Service Tools (SST).
- 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 Main storage dump (MSD) library, it will be replaced by the next main storage dump and lost at the next IPL. An MSD library is available to access copies of main storage dumps 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.

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 42.
- 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 204.

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 "Working with Storage Dumps" on page 203.

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 "Product Activity Log" on page 92.

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, go to Collecting reference codes and system 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. Select **Performance data collector** only if directed by your next level of support.

To create the trace, you must specify the following:
- Collector mode
- Jobs or tasks from which to collect the data
- 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 only available 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.

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

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. To obtain the most accurate sample of your line status, whenever possible, start the communications trace before varying on the lines.

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 37.

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 "Format and print trace" on page 35.

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
```

Figure 4. Example Work with Communications Trace display

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

Formatting
Trace is being formatted.

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 5. Example Format Trace Data Display

Notes:

1. To view all the data associated with the trace, press Enter without changing to the defaults on the Format a Trace Data display. 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.
4. Not all combinations of options are valid for all protocols.
5. For more information about these options, use online help.

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 i5/OS is available, the trace might be in the job spooled files.

The structure 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 appears as follows:

```
  Record       Data    Record    Record           Data    Controller             Number   Number    Poll/
 Number  S/R  Length  Status    Timer            Type    Name/Number    Command  Sent     Received  Final
 ------  ---  ------  --------  ---------------  ------  -------------  -------  ------   --------  -----
      7   R       69  00000000  12:29:56.72963   EBCDIC  ZSDLLC30  /01   XID                         ON
          Data . . . . . :  3245056150080000 0084C00000000000  01010B0000010900 00000007000E0DF4   *.../&;...D{.....................4*
                            DADBCC4BDACBCDCE EFCGC5F31017F116  1101130011F9F4F0 F6F5F0F0F1F0F1F0   *ABC.ABCDEFG..1......94065001010*
                            C4C6C44040                                                            *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
          Data . . . . . :  2D00010200006B81 0031001307B0B051  3107878686870706 0200000000000000   *......,A.........GFFG.........*
                            944300000CDADBCC 4BEAEBCCD3D3C4F3  F02E000902E2D5C1 E2E5C3D4C7090300   *M....ABC.AABCLLD30....SNASVCMG...*
                            00BCF9CAD600000D 04DADBCC4BEAEBCC  D3D3C4F3F00A1300 7B00BCF9CAD60000   *..9.O....ABC.ABCLLD30...#..9.O..*
                            000CDADBCC4BEAEB CCD3D3C4F4F0                                         *..ABC.ABCLLD40                    *
     53   R      110  00000000  12:29:57.80065   EBCDIC  ABCLLC30  /01   I          0        1       ON
          Data . . . . . :  2F00010200006B81 0031001307B0B051  3107878686870706 0200000000000000   *......,A.........GFFG.........*
                            944300000CDADBCC 4BEAEBCCD3D3C4F4  F02E000902E2D5C1 E2E5C3D4C7090300   *M....ABC.ABCLLD40....SNASVCMG...*
                            00BCF9D56600000D 04DADBCC4BEAEBCC  D3D3C4F4F00A1300 7B00BCF9D5660000   *..9N.....ABC.ABCLLD40...#..9N...*
                            000CDADBCC4BEAEB CCD3D3C4F3F0                                         *..ABC.ABCLLD30                    *
* * * * *  E N D   O F   E X A M P L E   P R I N T O U T  * * * * *
```

Figure 6. 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. 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. The letter M in this column indicates 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.

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.

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
```

On the Start Trace display, enter the name of a communications configuration object description at the Configuration object prompt:

- For i5/OS 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.

  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, use a larger buffer size.

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 Enter. 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 with the buffer was full was selected.

Note: While the trace is active, you can exit the communications trace function to do other work.

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.

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 i5/OS 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 from a tape, optical media, or virtual optical image.

About this task

Results

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

- Tape
- Optical media
- Virtual optical - preselected image catalog

Note: When your system is in the full or limited paging environment (see "System paging environments" on page 1), the appearance of the *Perform an automatic installation of the operating system* option varies depending on the operating system. For more information, see "i5/OS operating system" on page 210.

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 1), the appearance of the *Save Licensed Internal Code* option varies depending on the operating system. For more information, see "i5/OS operating system" on page 210.

Work with save storage and restore storage

This option allows you to perform tasks such as resuming a restore storage process that was interrupted.

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 the 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, the appearance of the **Work with save storage and restore storage** option varies depending on the operating system. For details on system paging environments, see "System paging environments" on page 1. For more information, see "DST in i5/OS limited paging environment" on page 211.

Work with remote service support

This option provides a variety of functions such as testing remote service communications.

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

```
                          Work with Remote Service Support


Select one of the following:

1. Test remote service communications
2. Activate remote service support communication line
3. Deactivate remote service support communication line
4. Display security log
5. Print Security log
6. Clear security log
7. Change security log retention period
8. Change service attributes



Selection
_
F3=Exit    F12=Cancel
```

Figure 7. Example Work with Remote Service Support Display

Through remote service support, DST functions that would typically 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 at DST (that is, perform an IPL to DST), or past DST.
- Remote service support must be enabled and activated at the local site. For details, see "Allowing access for remote service support" and "Activating remote service support" on page 42.

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.

About this task

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" on page 42.

This ends the procedure.

Activating remote service support:

Remote service support enables you to securely give the service and support organization access to your server to enable problem analysis and determination.

About this task

Before you can activate a session, you must allow access for remote service support. For details, see "Allowing access for remote service support" on page 41. 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. For details, see "Function 66–Activate remote service" on page 148.
- Select the *Activate remote service support communication line* option on the Work with Remote Service display by performing the following 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.

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.

Work with system partitions

Working with system partitions topic index.

You must use the Hardware Management Console (HMC) to work with system partitions.

For information on working with logical partitions, see Managing i5/OS logical partitions.

For general information on logical partitions, see General concepts for partitioning the server.

For information on servicing logical partitions, see "Logical partitions" on page 129.

Work with system capacity

Display system capacity information, activate permanent system capacity, and work with temporary 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

There are three settings that can be changed on the Work with System Security display.

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

How to stop the batch job.

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.

Hardware Service Manager

The Hardware Service Manager allows you to display and work with system hardware (logical or packaging) and debug input-output processors (IOP) and devices.

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 . . . . . :   9406-570 10-0020A
    Release . . . . . :   V5R3M0

 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
    9. Work with resources containing cache battery packs

Bottom
Selection


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

Figure 8. Example Hardware Service Manager display (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

  Note: For details on how to interpret the Release field, see "Determining the dominant operating system" on page 123.
- A list of the Hardware Service Manager options

  Note: The options available vary depending on the system type and paging environment. For details, see "Hardware Service Manager options."
- Function keys

  Note: 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 58.

For more information on the system configuration and resources, see "System architecture and configuration" on page 168 and "Resource names" on page 175.

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 1.

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 – System bus resources – Processor resources – Main storage resources – High-speed link resources
Limited and full paging	• Packaging hardware resources – Change detail – Concurrent maintenance – Remove – Display detail – Associated logical resources – Hardware contained within package • Logical hardware resources – 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 • Work with resources containing cache battery packs

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 88.

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: 10-2F1BC

 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

                                    Type-                          Resource
 Opt Description                    Model     Unit ID              Name
     System                         9406-570  U9406.570.102F1BC    SYS01
      System Unit              +    7879-001  U7879.001.11315CC    FR02
      System Unit              +    7879-001  U7879.001.112F1BC    FR01
      System Expansion Unit    +    0595-002  U0595.002.104741C    FR05
      Virtual IOP              +  <  268C-001  U9406.570.102F1BC    P51
      Tape Unit                      6380-001                       SD001









 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 9. 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: 10-2F1BC

 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 Sytem--
                                  Type-                              Serial
 Opt Description                  Model     Unit ID              Type Number
     System                       9406-570  U9406.570.102F1BC    9406 10-2F1BC
      System Unit           +     7879-001  U7879.001.11315CC    9406 10-2F1BC
      System Unit           +     7879-001  U7879.001.112F1BC    9406 10-2F1BC
      System Expansion Unit +     0595-002  U0595.002.104741C
      Virtual IOP           +   <  268C-001  U9406.570.102F1BC
      Tape Unit                   6380-001

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 10. 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 58.

Logical hardware resources

Use the Hardware Service Manager display, 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 to show 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:

```
                        Logical Hardware Resources


Select one of the following:

     1. System bus resources
     2. Processor resources
     3. Main storage resources
     4. High-speed link resources









Selection


F3=Exit      F6=Print configuration      F12=Cancel
```

Figure 11. 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 75.

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 58.

For details on the symbols that appear next to the resource description field, see "Symbols on the Hardware Service Manager displays" on page 88.

Locate resource by name

Use the Hardware Service Manager to locate the 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:

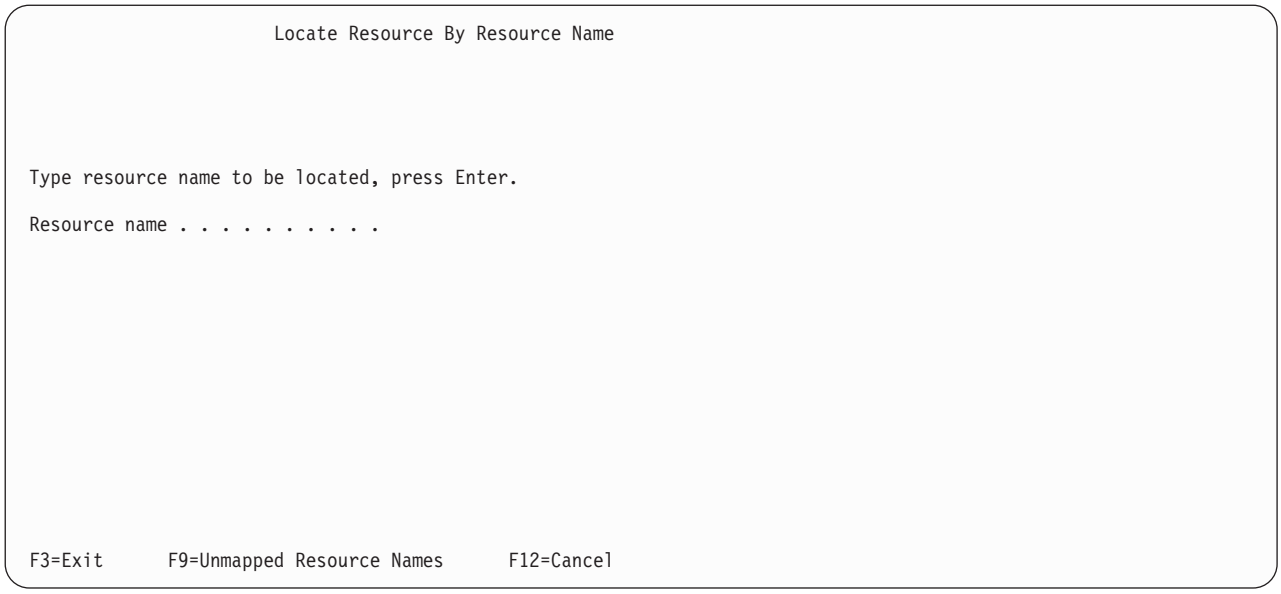

Figure 12. Example Locate Resource By Resource Name display

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 i5/OS 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 Figure 13 on page 50 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)
                                                                 Resource
Opt  Description                    Type-Model  Status         Name
 _   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 13. 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 Packaging Hardware Resources display appears.

```
                        Packaging Hardware Resources
                                              Unit ID: U7879.001.11315CC
 Type options, press Enter.
   2=Change detail         3=Concurrent Maintenance         4=Remove
   5=Display Detail        8=Associated logical resource(s)

                                 Type-     Resource
 Opt Description                 Model     Name        Location
     Communications Port         2793-001  P82         P1-C2-T1
```

Figure 14. 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 58.

Failed and non-reporting resources

View location information and display a list of the packaging hardware resources that either failed or did not report at the last IPL.

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 88.

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 67 or "Display non-reporting resources" on page 68.

```
           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)

                                                                Resource
Opt  Description                    Type-Model  Status         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 15. 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

For more information on these options, see "Collecting information and performing functions from the Hardware Service Manager displays" on page 58.

System Power Control Network (SPCN)

This option appears on the Hardware Service Manager display when the system is in the full or limited paging environment.

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 168.

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 . . : 10/03/02 11:38:59   To . . : 11/04/02 11:38:59

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    Count
     NEW     10/03/02  16:46:12   B60069C1   SOC02         14
     NEW     10/07/02  00:15:32   B60069C1   *PLATFORM     68
     NEW     10/08/02  17:26:29   B60069C1   SOC07         21
     NEW     10/08/02  19:08:11   B60069C1   SOC06         17
     NEW     10/09/02  16:58:34   B60069C6   BC04           1
     NEW     10/09/02  16:58:34   B60069C6   BC03           1
     NEW     10/09/02  16:58:34   B60069C6   BC02           1
     NEW     10/15/02  20:25:24   63A09355   TAP06          4
     NEW     10/23/02  09:25:38   B0061302   CMN111         1
     NEW     10/23/02  09:25:38   B0061304   CMB18          2

                                                                    More...


F3=Exit      F6=Acknowledge All Errors      F12=Cancel
```

Figure 16. Example Service Action Log Report display

Notes:

1. The special value *PLATFORM displays for the resource name when the log has come from the POWER™ hypervisor.
2. The F6 key allows you to deactivate the partition's Virtual System Attention Indicator (VSA). This key is shown only if the VSA is activated.

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.

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.

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 230.

Device concurrent maintenance

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 System i® is powered on and in use

For a configured disk unit device, this concurrent maintenance action is only allowed when the disk unit device has data storage protection. For example, if 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 Disk unit recovery procedures. 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:
          OR
     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




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

Figure 17. Example Device Concurrent Maintenance display

To perform concurrent maintenance on a device, specify the location of the device by providing the physical location of the device. If you do not know the location, use the following information to determine the correct location.

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. Refer to Figure 18 for an example of the disk unit hardware resource information details display.

```
        Disk Unit Hardware Resource Information Details


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

Physical location:
 Unit ID...................: U5079.001.10ABCDE
 Planar ID.................: P1
 Device....................: D1
```

Figure 18. Example Disk Unit Hardware Resource Information Details display

In Figure 18, the disk unit has physical location `U5079.001.10ABCDE-P1-D1`, and a Resource Name of `DD037`. To perform device concurrent maintenance on this unit, perform the following steps:

1. Enter the information as shown in Figure 19 on page 56.
2. Enter the information that was gathered from the Disk Unit Hardware Resource Information Details display.
3. Press Enter.

Note: If the device is unable to report in or you are installing a device into an empty slot, use Physical Location 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 19. Example Device Concurrent Maintenance with data for Physical Location

```
                        Device Concurrent Maintenance

Type the choices, then press Enter.


 Specify either Physical Location or Resource Name.
     Physical Location:
 >>> U5079.001.10ABCDE-P1-D1 <<<
           OR
     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




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

For information on how to perform concurrent maintenance for internal tape or internal optical units, see Removing and replacing parts.

For information on how to perform concurrent maintenance for internal disk units with storage protection, see Removing and replacing parts.

For details on IOA or IOP concurrent maintenance, see “Concurrent maintenance” on page 60.

Work with resources containing cache battery packs

The Work with resources containing cache battery packs option appears on the Hardware Service Manager display when the system is in the full or limited paging environment.

The **Work with resources containing cache battery packs** 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 packaging hardware resources that contain a cache battery pack. It also provides the capability to force the battery pack into an error state for replacement.

```
             Work with resources containing cache battery packs

Type the choices, then press Enter.
  2=Force battery pack into error state     5=Display battery information

Opt  Resource Name  Serial Number  Type-Model  Frame ID  Card Position
     DC05           10-1234175      2748-001    1            C06
     DC06           53-9249003      2748-001    1            C11









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

Figure 20. Example Work with resources containing cache battery packs display

For more information on collecting information and performing specific functions using the options and function keys from the Work with Resources Containing Cache Battery Packs display, see "Collecting information and performing functions from the Hardware Service Manager displays" on page 58.

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

Force battery pack into error state

The **Force battery pack into error state** option, available from the Work with resources containing cache battery packs display, allows you to force an IOA to put its cache battery pack into an error state. This IOA state requires replacement of the battery. Typically, this option is performed to ensure that write caching is stopped prior to replacing a cache battery pack (that is to prevent possible data loss) or when you are replacing a cache battery pack on one IOA, and want to replace other cache battery packs on IOAs in the same system which have not yet issued the cache battery warning or cache battery error.

Display battery information

The **Display battery information** option, only available from the Work with resources containing cache battery packs display, allows you to access information about the cache battery packs.

Figure 21. Example Battery Information

```
                       Battery Information

Resource name . . . . . . . . . . . :  DC05
Serial number . . . . . . . . . . . :  10-1234175
Type-model  . . . . . . . . . . . . :  2748-001
Frame ID  . . . . . . . . . . . . . :  1
Card position . . . . . . . . . . . :  C06
Battery type  . . . . . . . . . . . :  Nickel Cadmium (NiCd)
Battery state . . . . . . . . . . . :  No battery warning/error
Power-on time (days)  . . . . . . . :     84
Adjusted power-on time (days) . . . :     84
Estimated time to warning (days)  . :    827
Estimated time to error (days)  . . :    919



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

The following fields appear on the Battery Information 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.

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.

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

Frame ID
Hexadecimal identity of the frame enclosure.

Card position
The card position of the packaging hardware resource within the enclosure. This can be followed by a letter to specify the position of a second level card. This is represented by a decimal numeral.

Battery type
This field indicates the type of cache battery pack.

Battery state
This field indicates if an error condition currently exists related to the cache battery pack. See the following for possible values for this field:

- *No battery warning/error.* No warning or error condition currently exists.
- *Warning condition.* A warning condition currently exists (an entry has been placed in the PAL).
- *Error condition.* An error condition currently exists (an entry has been placed in the PAL).
- *Unknown.* Information is not available to determine whether a warning or error condition currently exists.

Power-on time (days)
This field indicates the raw power-on time, in units of days, of the cache battery pack.

Adjusted power-on time (days)
This field indicates the adjusted (prorated) power-on time, in units of days, of the cache battery pack.

Note: Some cache battery packs are negatively affected by higher temperatures and thus are prorated based on the amount of time they spend at various ambient temperatures.

Estimated time to warning (days)
This field indicates an estimated time, in units of days, until a warning is surfaced indicating that the cache battery pack replacement should be scheduled.

Collecting information and performing functions from the Hardware Service Manager displays

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.

You can select *Packaging hardware resources* and *Logical hardware resources* options from the Hardware Service Manager display (see “Packaging hardware resources” on page 45 and “Logical hardware resources” on page 47). 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

You can change detailed information about a specific resource by selecting the Change detail option or function key.

From packaging displays

To view or change detailed information about a specific resource, select 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 22. Example Change Packaging Hardware Resource Detail display

For definitions of the fields that appear on the Change Packaging Hardware Resource Detail display, see "Display resource details" on page 69.

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 73.

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 23. Example Change Logical Hardware Resource Detail display

Concurrent maintenance

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

From packaging 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 buses does not support powering individual I/O processor slots on and off. In contrast, the power control system for PCI buses 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
                                              Unit ID:  U7879.001.11315CC
Type options, press Enter.
  2=Toggle LED blink off/on           5=Display detail
  8=Associated logical resource(s)

                                              Power
Opt Description                    Type-Model  Status      Position
    System Unit                >     7879-001   On
     Active Backplane                 28DA       On          P1
      Combined Function IOP           2844-001   On          P1-C1
      Communications IOA              2793-001   On          P1-C2
       Communications Port            2793-001   On          P1-C2-T1
       Communications Port            2793-001   On          P1-C2-T2
      Unknown resource                            On          P1-C3
      Occupied Position                           On          P1-C4
      Empty Position                              Off         P1-C5
      Occupied Position                           On          P1-C6
      Empty Position                              On          P1-C7
                                                                        More...

F3=Exit      F5=Refresh      F6=Print      F7=Display partition information
F8=Display resource names      F9=Power off domain      F10=Power on domain
F11=In-use resources      F12=Cancel      F14=Work with controlling resources
```

Figure 24. Example Hardware Resource Concurrent Maintenance display

Create frame information

Create a new packaging resource.

From packaging displays

If you change detail or reserve frame space for a frame ID that currently does not exist, the following message appears:

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

Note: For details on changing resource details, see “Change resource details” on page 59. For details on reserving frame space, see “Reserve frame space” on page 79.

To create the frame information, perform the following steps:

1. 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.

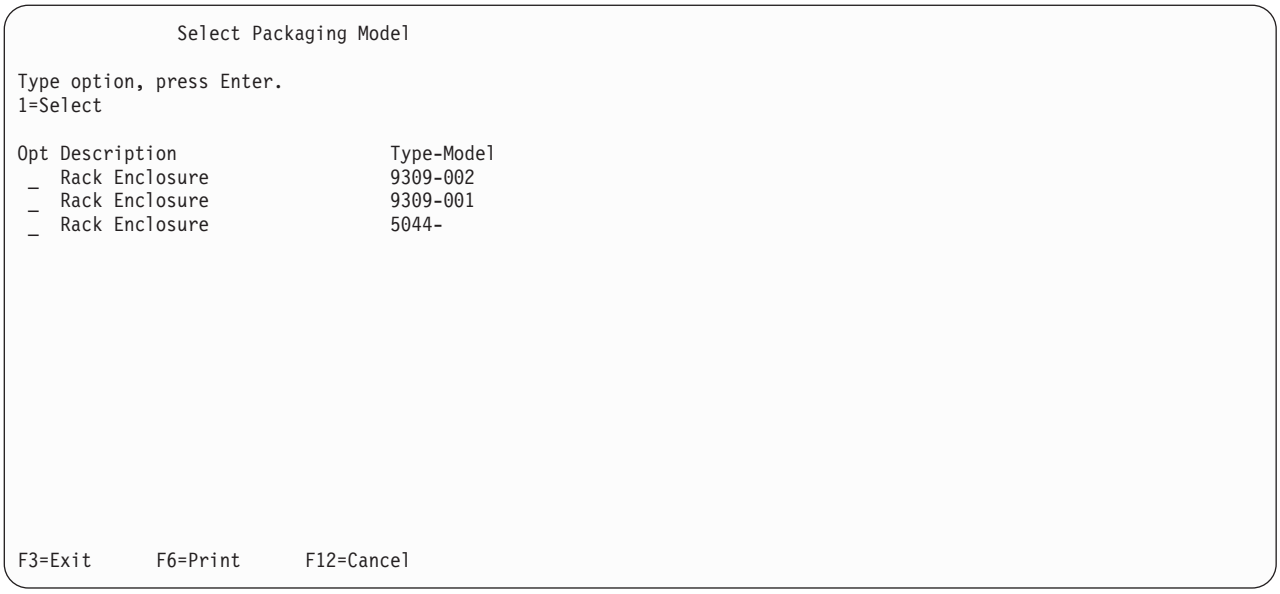

Figure 25. Example Select Packaging Model display

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

2. 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
3. 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.
4. Press Enter 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, select the **Associated packaging resource(s)** option. For details, see "Display associated resources" on page 64.

Debug the resource

You can access I/O debug from the packaging and logical displays.

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. For details, see "Display associated resources" on page 64.

From logical displays

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

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
Select this option to read or edit the I/O processor data

Dump I/O processor data
See "Performing an IOP dump" on page 209.

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 i5/OS vary command with the *reset* option. For details, see "How to reset an I/O processor card while the system is running" on page 223.

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 only for System i development use and is not for use in customer installations. Using this option can disrupt system operations and lead to unrecoverable system failures.

Disable I/O processor reset
Select this function key to disable IOP reset.

Attention: This function is only for System i development use and is not for use in customer installations. Using this option can disrupt system operations and lead to unrecoverable 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 System i development use only and is not for use in customer installations. Using this option can disrupt system operations and lead to unrecoverable system failures.

Disable I/O processor IPL
Select this function key to disable IOP IPL.

Attention: This function is for System i development use only and is not for use in customer installations. Using this option can disrupt system operations and lead to unrecoverable 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" on page 209.

Display address information
You can display address information from packaging hardware resources and from logical resources.

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. For details, see "Display associated resources."

From logical displays

Select the *Display detail* option on various logical resources to view address information. For details, see "Display resource details" on page 69.

Notes:

1. The system configuration list printout shows logical address information. For more information, see "Printing the System Configuration List" on page 89.
2. You can also view logical address information from the product activity log. For details, see "Product Activity Log" on page 92.

Display associated resources
Display the associated logical resources for a packaging communications IOP.

From packaging displays

Some packaging hardware resources have associated logical resources. Logical hardware resources represent the function of the hardware. Select **Associated logical resource(s)** 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:
                              Type-Model  Resource Name
     Communications IOP        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 26. 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 **Associated packaging resource(s)** 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:
                                    Type-Model  Resource Name
    Communications IOP               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 27. 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

I/O processor cards must be installed in a specified logical order.

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 Card Gap Information display appears.

```
                      Display Card Gap Information

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









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

Figure 28. 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

Detect failed hardware.

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 50).

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

`No failed logical hardware resources were found.`

Display hardware contained within package

This option is available only on the Packaging Hardware Resources displays.

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 88.

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 64).

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

This option is available packaging and logical displays.

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 64).

Display non-reporting resources

Non-reporting resources for packaging and logical displays.

From packaging displays

The *Non-reporting resources* function key appears on the Packaging Hardware Resources display (see “Packaging hardware resources” on page 45). 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 78.)
- 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 50).

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 50).

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

This option displays the selected IOP and lists all devices that are logically attached to it.

From packaging displays

The **Resources associated with IOP** option is available only on the Logical Hardware Resources on System Bus display. For details, see "Display system bus resources" on page 75. 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. For details, see "Display system bus resources" on page 75. 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)

                                                              Resource
Opt  Description                     Type-Model  Status        Name
 _   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 29. Example Logical Hardware Resources Associated with IOP display

Display resource details

View additional information about a specific resource.

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 . . . . . . . . . . :
  Unit ID . . . . . . . . . . . . . :   U9406.270.103YM1M
  Planar ID . . . . . . . . . . . . :   P1
  Card  . . . . . . . . . . . . . . :   C2
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 30. 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 standalone units, display the location of the frame which contains them. The stand-alone units display the text information for themselves.

Unit ID
This field displays the value of the unit enclosure identifier in uppercase alphabetic characters and digits, usually composed of the machine type, model, and serial number of the unit.

Planar ID
This field shows the decimal value of the planar identifier within the unit.

Virtual planar ID
This shows the decimal value of the position of the virtual planar resource within the hardware package.

Card This field shows the decimal value of the position of the card within the hardware package. This can be followed by additional card location labels which identify the decimal value of additional card positions of the resource on the card.

Port This field shows the decimal value of the port location within the resource. This can be followed by additional port location labels which identify the decimal value of additional port positions of the resource on the hardware package.

Device
This field shows the decimal value of the position of the device within the hardware package. This can be followed by additional device location labels which identify the decimal value of additional device positions of the resource on the hardware package.

Electrical
This field shows the decimal value of the position of the electrical resource within the hardware package. This can be followed by additional electrical location labels which identify the decimal value of additional electrical positions of the resource on the hardware package.

Air handler
This field shows the decimal value of the position of the air handler resource within the hardware package. This can be followed by additional air handler location labels which identify the decimal value of additional air handler positions of the resource on the hardware package.

Logical path
This field shows the decimal value of the logical path of the resource within the hardware package. This can be followed by additional logical path location labels which identify the decimal value of additional logical path data of the resource on the hardware package.

Worldwide port name
This field shows the hexadecimal value of the worldwide port name of the resource within the hardware package.

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 Communication Hardware Resource Detail 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.

```
                    Communication Hardware Resource Detail

Description . . . . . . . . . . . . :   Communications Port
Type-Model  . . . . . . . . . . . . :   2620-001
Status  . . . . . . . . . . . . . . :   Operational
Serial number . . . . . . . . . . . :   10-3157011
Part number . . . . . . . . . . . . :   0000059X4797
Resource name . . . . . . . . . . . :   CMN07
SPD bus . . . . . . . . . . . . . . :
  System bus  . . . . . . . . . . . :   1
  System board  . . . . . . . . . . :   0
  System card . . . . . . . . . . . :   6
Communications  . . . . . . . . . . :
  I/O bus . . . . . . . . . . . . . :   14
  Adapter . . . . . . . . . . . . . :   0
  Port  . . . . . . . . . . . . . . :   0
  Channel . . . . . . . . . . . . . :




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

Figure 31. Example Communication Hardware Resource Detail display

The following fields might appear on the detail display. For details on these fields, see "Display resource details" on page 69.

- Description
- Type-model
- Status

  Note: For details on the Status value, see "Display resource status" on page 74.
- 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

This function scans the system for packaging resources that need more information in order to be correctly displayed on the packaging displays.

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.

```
                          Hardware Resources That Require Attention

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

Opt  Description          Type-Model  Unit 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 32. Example Hardware Resources That Require Attention display

To update or change the resource information from the Hardware Resources That Require Attention display, select the **Change detail** option. For details, see "Change resource details" on page 59. 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.

```
                       Hardware Resource Attention Messages

Description              Type-Model  Frame ID  Resource Name
Disk Controller           9337-220              DE01

Message
Number    Message
0       Frame ID is blank.
1       EIA location is blank.
2       Mounting type needs to be verified.









Press Enter to change detail for this hardware resource...

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

Figure 33. Example Hardware Resource Attention Message display

To update or change the resource information from the Hardware Resources That Require Attention Messages display, press Enter. For details, see "Change resource details" on page 59.

Display resource status

Describes resource status from packaging and logical displays.

From packaging displays

Resource status information is available only on the Logical Hardware Resources displays. To access status information from the Packaging displays, select the **Associated logical resource(s)** option. For details, see "Display associated resources" on page 64.

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 to view the resource status. For details, see "Display resource details" on page 69. 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. For details, see "Debug the resource" on page 62 or "How to reset an I/O processor card while the system is running" on page 223.

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

Display serial and part number information on various packaging and logical hardware resources.

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 69). 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 64).

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 74.

Display system bus resources

This option is available only on the Logical Hardware Resources display.

From the Logical Hardware Resources display

The **System bus resources** option is available only on the Logical Hardware Resources display. For details, see "Logical hardware resources" on page 47. 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. For details, see "Debug the resource" on page 62.
  - Dump I/O processor data. For details, see "Performing an IOP dump" on page 209.
  - Reset I/O processor. For details, see "Debug the resource" on page 62.

- IPL I/O processor. For details, see “Debug the resource” on page 62.
- Enable I/O processor IPL. For details, see “Debug the resource” on page 62.
- Disable I/O processor IPL. For details, see “Debug the resource” on page 62.
- Enable I/O processor reset. For details, see “Debug the resource” on page 62.
- Disable I/O processor reset. For details, see “Debug the resource” on page 62.
- Enable bus trace. For details, see “Debug the resource” on page 62.
- Take/Release ownership. For details, see “Debug the resource” on page 62.

Note: Not all functions are available on all models.

- Display failed and non-reporting logical hardware. For details, see “Display failed resources” on page 67 and “Display non-reporting resources” on page 68.
- Remove non-reporting logical hardware. For details, see “Remove non-reporting resource information” on page 78.
- Display serial number and part number. For details, see “Display serial/part numbers, logical address, and status/resource name information” on page 75.
- Display resource status. For details, see “Display resource status” on page 74.
- Display resource name. For details, see “Display serial/part numbers, logical address, and status/resource name information” on page 75.
- Display or change resource detail. For details, see “Display resource details” on page 69 and “Change resource details” on page 59.
- Display system information. For details, see “Display system information” on page 77.

```
                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

                                                                 Resource
Opt  Description                    Type-Model  Status           Name
 _     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 34. 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

                                                                  Resource
Opt  Description                    Type-Model  Status           Name
 _   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      PCIO1D
 _       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 35. Example Logical Hardware Resources on System Bus display (frames with a PCI system bus)

Display system information

This option is available from the Logical Hardware Resources displays.

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 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 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 system that last had ownership of the resource is indicated as the owner.

Display unresolved locations

Covers packaging and logical displays.

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 64).

Print

Print from packaging and logical displays.

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 89.

Refresh the display

Refresh packaging and logical displays.

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

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

From packaging and logical 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 88). For more information on non-reporting resources, see "Display non-reporting resources" on page 68. 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

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

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 61.

From logical displays

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

Using High-Speed Link (HSL) specific options

Provides example of work with high speed Link (HSL) resources display

Note: The term *High Speed Link (HSL)* is interchangeable with the term *Remote I/O (RIO)*.

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

```
                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


                                                                 HSL
                             Resource   Hardware        Loop    OptiConnect
Opt Description              Name       Status          Number  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 36. 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
Select this option to display the details of the logical hardware resource. The information is device-dependent, meaning it might 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:

You can display detail on HSL loop resources in several ways.

Display details on an HSL loop resource

Select **Display details** on an HSL loop resource. The Display High-Speed Link (HSL) Information display will appear. This display shows the detail for an HSL loop. It also allows you to display each resource in the HSL loop. 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 37. Example Display High-Speed Link (HSL) Information display

Display details on an HSL I/O bridge

Select **Display details** on an HSL I/O bridge resource. The Display High Speed Link (HSL) Information display will appear. This display shows the details of an HSL I/O bridge resource. This screen is also displayed when F7 is selected and the previous resource is an HSL I/O bridge or 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 . . : 111111111111
   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 38. Example Display High Speed Link (HSL) Information display

Display details on a remote HSL NIC resource

Select **Display detail** on a remote HSL NIC resource. The Display High Speed Link (HSL) Information display will appear. This screen is also displayed when F7 is selected and the previous resource is a remote HSL NIC or 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 . . : 111111111111
   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 39. 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 numeric 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 through 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:

Available for an HSL I/O bridge resource.

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                  Status  . . . : Operational
  Serial number . . :  18-0166003            Part number . : 04N3903
  Resource name . . :  BC01                  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 40. Example of a Display HSL System Information display

The fields and functions that might appear, include:

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 numeric 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.

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
Resource Name  Port     Resource Name  Port     Connection     Status
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 41. Example Port Connection Information display

The fields for this display are as follows:

HSL loop number

Not all functions are available on all models 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.

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.

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 the Logical Hardware Associated With HSL Loops 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

                                     Resource                       Loop
Opt   Description                    Name         Status            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 42. Example Logical Hardware Associated With HSL Loops display

For a description of the options on this display, see "Using High-Speed Link (HSL) specific options" on page 79.

To view tower information, select F11 **Display tower information** from the Logical Hardware Associated With HSL Loops display. The Logical Hardware Associated With HSL Loops 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 43. Example Logical Hardware Associated With HSL Loops display

The Logical hardware associated with HSL loops display works with the HSL I/O bridge and remote HSL Network Interface Controller (HSL NIC) resources associated with a High Speed Link (HSL) Loop. For a description of the options on this display, see "Using High-Speed Link (HSL) specific options" on page 79.

Verify resources

Verify resources from packaging and logical displays.

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 64).

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 69).

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 91.

Symbols on the Hardware Service Manager displays

Describes symbol fields.

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 Performing an alternate IPL.

& 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 provides System type, model, serial number, and release, as well as other vital information.

About this task

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 123.
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.

Print the system configuration list
About this task

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. To request a printout, see Figure 8 on page 44.
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 "Product Activity Log" on page 92).

This ends the procedure.

Results

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.

Details on the system bus, main storage, or processor
About this task

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.

Notes: 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. For details, see "Hardware Service Manager — Verify." If you need to run the `VFYCMN` command, you must perform an IPL to start i5/OS. For more information on running the `VFYCMN` command, see "Verify communications" on page 236.

Hardware Service Manager — Verify

Use the Hardware Service Manager to verify communications or devices.

About this task

To verify communications or devices on any System i 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.

Results

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

Provides optical storage unit test descriptions.

You can check optical storage units for correct operation by performing the verification procedure. For details on performing the *Verify* option, see "Hardware Service Manager — Verify."

Optical storage unit test descriptions

When you select the *Verify* option 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 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 "Product Activity Log").

For more information, see "Verification procedures" on page 91.

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 91 for details) or run VFYCMN (see "Verify communications" on page 236) 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.

Product Activity Log

The Product Activity Log allows you to display or print system data, Licensed Internal Code data, software components, subsystem information, and I/O device data that has been logged.

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 95. If a printer is available, you can create a printout of the product activity log. For an example of a Product Activity Log printed analysis report, see Figure 54 on page 104.

Figure 44. Product Activity Log

```
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
```

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.

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 and isolation procedure names, which then correspond to problem analysis procedures for the service representative. The SAL runs before the operating system is operational.

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 log files can be stored on any disk unit, so the system must IPL past storage management recovery to view the data.

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

In the limited paging environment, you are limited to messages sent to the display or the SRC on the control panel.

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 unrecoverable 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 97.

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 128 KB 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 1.

Options and function keys

Options include Analyze log, change log sizes, reference code description, and more.

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:

- Sort by...
- Address information
- Display hexadecimal report

Analyze log

Use the analyze log option 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.

Select **Analyze log** on the Product Activity Log display. The following options are available:

- 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

    Note: For details, see "Logical address format" on page 108.
  - 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. For details, see Figure 48 on page 99.

```
Select Analysis Report Options

Type choices, press Enter.

Report type . . . . . .   1   1=Display Analysis, 2=Display Summary
3=Print Analysis
Optional entries to include:
Informational . . . . . .   Y   Y=Yes, N=No
Statistic . . . . . .   N   Y=Yes, N=No

Reference code selection:
Option  . . . . . .   1   1=Include, 2=Omit
Reference codes
*ALL                                          *ALL...

Device selection:
Option  . . . . . .   1   1=Types, 2=Resource names
Device types or Resource names
*ALL                                          *ALL...




F3=Exit       F5=Refresh       F9=Sort by ...        F12=Cancel
```

Figure 45. Example Select Analysis Report Options display

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 99.

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. 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.

Figure 46 on page 98 shows an example of a lifetime entry report.

```
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 46. 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	• Replace the media if the format is: – 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

This option allows you to performs tasks such as displaying or printing session statistics for a diskette or tape unit.

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

This option allows you to view a description of the code that appears in the reference code field.

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

The sort option is used for problem analysis and preventive maintenance.

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 47. 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 48. Example Log Summary by Resource Name

Address information function

Select **Address Information** to display configuration information about a resource. You can use the details that are shown 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 108.

You can also display logical address information from the Hardware Service Manager function. For details, see “Hardware Service Manager” on page 43.

Note: The logical address field that appears on the Display Address Information for Resource display does *not* list the address in the BBCb format.

```
Display Address Information for Resource

Serial             Resource
Name               Type      Model       Number            Name
LWS                2661      000         00-00000          CTL01

Physical location:
Frame ID  . . . . . . . :     1
Card Position . . . . . :     5
Device Position . . . . :

Logical address:
SPD bus:
System bus  . . . . . . :      1
System board  . . . . . :      0
System card . . . . . . :      2



F3=Exit                  F12=Cancel
```

Figure 49. Example Address Information for Resource

View description function

Press the F11 function key to step through screens to view information.

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.

About this task

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. For details, see “Accessing Dedicated Service Tools” on page 3.

      Note: Do not IPL the system to get to DST.

   b. On the Service Tools display, select the **Start a service tool** option. For details, see “Start a service tool” on page 29.

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 Enter.
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

                                     Serial                 Resource
Name              Type      Model    Number                 Name
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 50. 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

                                    Serial                Resource
Name              Type      Model   Number                Name
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 51. Example Hexadecimal Report for Resource

4. Is offset 170 - 173 = 00000000?
   - **Yes**: Continue with step 5.
   - **No**: Continue with step 6 on page 103.
5. Page forward until you locate the offset location X'000180'.

   If the rightmost hex digit of offset 000182 is 8, then the unit address is hexadecimal offset 18C through 18F. If the rightmost hex digit of offset 000182 is 2, then the unit address is hexadecimal offset 192 through 195.

   Record this address information. Return to the procedure that sent you here, if applicable.

```
Display Hexadecimal Report for Resource

                                    Serial                Resource
Name              Type      Model   Number                Name
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 E0000008   ................
0001D0          00000000 00000000 00000000 00000000   ................
0001E0          00000018 00000002 E00401F0 10002000   ...........0....
0001F0          00000000 40000000 00000000 000002CC   .... ...........
000200          CCCC0000 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 52. Hexadecimal Report for Resource Offset Location Example where the rightmost hex digit of offset 000182 is 8

```
Display Hexadecimal Report for Resource

Serial                  Resource
Name              Type      Model       Number                  Name
STORAGE           571A      001         10-4294009              DC01

Offset          0 1 2 3  4 5 6 7  8 9 A B  C D E F    EBCDIC
000180          F8407200 F5F7F1C1 F0F0F0F1 3400031D   8 ..571A0001....
000190          00233104 00FFFFF4 F0F0F0F0 F0F0F0F0   .......400000000
0001A0          1104E255 F0F0F0F0 F0F0F0F0 40404040   ..S.00000000
0001B0          40404000 00FF0000 04440000 A1D0038D      .........}..
0001C0          0713000C 00000000 00000000 70000200   ................
More...

Press Enter to continue.

F3=Exit        F12=Cancel
```

Figure 53. Hexadecimal Report for Resource Offset Location Example where the rightmost hex digit of offset 000182 is 2

6. Using hexadecimal arithmetic, add the value in offsets 170 - 173 to the value in offsets 174 - 177. For example, 000001C8 + 00000410 = 000005D8

   If the value of the rightmost hex digit at this offset is 8: Using hexadecimal arithmetic, add 0000000A to the offset you calculated. This will be the location of the unit address in the form abcdefgh. For example, 00005DA + 0000000A = 000005E4

   If the value of the rightmost hex digit at this offset is 2: Using hexadecimal arithmetic, add 00000010 to the offset you calculated. This will be the location of the unit address in the form abcdefgh. For example, 00005DA + 00000010 = 000005EA

   Record this address information. If you were sent here by another procedure, return to the procedure that sent you here.

   This ends the procedure.

   For information on interpreting the hexadecimal report, see "Hexadecimal report" on page 109.

Interpreting Product Activity Log reports

The Product Activity Log provides details your system.

Keep the following in mind while viewing 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 54 on page 104 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                                                 Resource Type/Mod Serial    Physical Location
Ref Code  Date    Time     Class Logical Address         Name     Comp/Lib Number    Log ID   Frame Card Device
-------- -------- -------- ----- ----------------------- ------   -------- --------- -------- ----- ---- ------
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 54. Example Product Activity Log printed analysis report

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” on page 105.

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 55 on page 105 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                                  Resource      Resource
Opt  Ref Code     Date      Time      Class  Name          Type
_   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 55. Example Log Analysis Report

Resource name

You can change the assigned resource name.

The **Name** or **Resource name** field contains a description of the resource that is associated with the entry. Server hardware and server LIC will have the reserved name `*PLATFORM`.

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
2. Controller name
3. Line name
4. Network interface name
5. A name that is created based on the data in the entry

The following names are created:

Subsystem	**Possible Names**
Processor	System
Storage	Storage
Workstation	LWS
Communications	COMM
Power	Power
Software	PGM

To select the **Display report** option, type **5** in the Opt (option) field for a specific resource and press Enter. A detailed report for that resource appears. If more than one entry has the same log ID, they are presented in the order of occurrence.

```
Display Detail Report for Resource

                                      Serial                  Resource
Name             Type      Model      Number                  Name
LWS              7209      000        00-00000                CTL01

Log ID  . . . . . . . . . :   0102000A   Sequence . . . . . . . :       6308
Date  . . . . . . . . . . :   08/23/93   Time . . . . . . . . . :   12:30:00
Reference code  . . . . . :   102E       Secondary code . . . . :   00000000
Table ID  . . . . . . . . :   B600FA00           IPL source/state . . . :   A/1

Class . . . . . . . . . . :   Permanent
Description . . . . . . . :   Battery power unit needs service.
Out of alternate sectors for disk storage.



F3=Exit                              F6=Display hexadecimal report
F9=Address Information   F10=Previous detail report     F12=Cancel
```

Figure 56. Example Detail Report

For more information on resource names, see "Resource names" on page 175.

Resource type, model, and location

Pprovides entry information that can assist in problem analysis.

The *Type*, *Model*, and *Physical location* fields provide entry information that can assist in problem analysis. The *Physical location* field contains the location of the resource that is most closely related to the entry. You can also use the address information function (see "Address information function" on page 99) and the logical address (see "Logical address format" on page 108) to gather details about the resource type, model, and location. For more information on resources, see "Hardware Service Manager" on page 43.

Note: When the I/O processor is not known for I/O bus entries, press the **Address Information** function key from the *Display Detail Report for Resource* display to view the configuration information. Use the configuration information to determine the card position of the I/O processor.

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 List of system reference codes 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 field consists of a four-character hardware or software error group, followed by a four-character unit reference code.

The system reference code identifies a unique logging condition. The system reference code field consists of a four-character hardware or software error group, 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.

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 to identify the resource entry.

Use the logical address to identify the resource entry. For details, see Figure 54 on page 104.

To sort by logical address, select **Analyze log** 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. For details, see "Address information function" on page 99.

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. For details, see Table 6.

Note: To locate a device or card that is within the system unit, use the physical address information.

Sequence number

The sequence number increases by two each time an entry is placed in the log.

The sequence number increases by two each time an entry is placed in the log.

Secondary code

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 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.

The table ID identifies a group of reference codes for the system or device. For a complete listing of reference codes, see List of system 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, and the IPL source indicates the IPL mode (A, B, or D) that was selected at the time the entry was logged.

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.

For an example, see Figure 56 on page 106. This function is optional for this report, but it might provide additional information. Figure 51 on page 102 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 110 or Table 8 on page 110 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 111 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 111.

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
	2	Reserved
0054	12	Unit address
0060	4	Platform log ID
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

Table 8. Hexadecimal dump byte assignments for non-keyed data (continued)

Hexadecimal offset	Length in bytes	Description
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	4	Platform Event Log offset (zero if N/A)
0174	4	Platform Event Log length
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`. Use the following table to determine which figures or tables to use.

Note: If the rightmost hex digit of offset 000182 is 8, get the format number from offset 00019F. Then use the following table to determine what figure to use.

Table 10. Format example reference

Format number	Reference the following figures
01	Figure 1. Example Hexadecimal Report, Device Formatting Log (unformatted information) Figure 2. Example Hexadecimal Report, Device Formatting Log Template Figure 3. Example Hexadecimal Report, Device Formatting (As formatted information for A or B IPL)
02	Figure 4. Example Hexadecimal Report, Array Member Formatting Log (unformatted information) Figure 5. Example Hexadecimal Report, Array Member Formatting Log Template Figure 6. Example Hexadecimal Report, Array Member Formatting (As formatted information for A or B IPL)
03	Figure 7. Example Hexadecimal Report, Configuration Formatting log (unformatted information) Figure 8. Example Hexadecimal Report, Configuration Formatting Log Template Figure 9. Example Hexadecimal Report, Configuration Formatting Log (As formatted information for A or B IPL)
04	Figure 10. Example Hexadecimal Report, Array Addendum Formatting Log (unformatted information) Figure 11. Example Hexadecimal Report, Array Addendum Formatting Log Template Figure 12. Example Hexadecimal Report, Array Addendum Formatting (as formatted information for A or B IPL)

Note: If the rightmost hex digit of offset 000182 is 2, get the format number from offset 0001B5. Then use the following table to determine what table to use.

Table 11. Format table reference

Format number	Reference the following figures
01	Table 1. Format 01.
02	Table 2. Format 02.
03	Table 3. Format 03.
04	Table 4. Format 04.

Device formatting log example (unformatted information)

```
                  Display Hexadecimal Report for Resource

                                      Serial                  Resource
Name              Type      Model     Number                  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 57. Example Hexadecimal Report, Device Formatting Log (unformatted information)

Device formatting log template

```
                  Display Hexadecimal Report for Resource

                                       Serial                 Resource
Name              Type      Model      Number                 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          -------- -------- -------- ------01
0001A0          -------- -------- -------- --------
0001B0          -------- -------- -------- --------
0001C0          # errors # errors -------- --------
                detected logged   -------- --------
0001D0          Device1  Device1  Device1  New Dev1
                Type     Serial   UnitAddr Type
0001E0          New Dev1 IOP type IOP      Cache
                Serial   & model  Serial   Type/Mod
0001F0          Cache    -------- -------- --------
                Serial   -------- -------- --------
000200          -------- -------- Device2  Device2
                -------- -------- Type     Serial
000210          Device2  New Dev2 New Dev2 IOP type
                UnitAddr Type     Serial   & model
000220          IOP      Cache    Cache    --------
                Serial   Type/Mod Serial   --------
000230          -------- -------- -------- --------
                -------- -------- -------- --------
000240          Device3  Device3  Device3  New Dev3
                Type     Serial   UnitAddr Type
000250          New Dev3 IOP type IOP      Cache
                Serial   & model  Serial   Type/Mod
000260          Cache    -------- -------- --------
                Serial   -------- -------- --------
```

Figure 58. Example Hexadecimal Report, Device Formatting Log Template

Device formatting log example (as formatted information for A or B IPL)

```
                Display Additional Information for Resource

                                       Serial                 Resource
Name              Type      Model      Number                 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 59. 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

                                      Serial                  Resource
Name              Type      Model     Number                  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   ....SVCDOCSCPP29
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 60. Example Hexadecimal Report, Array Member Formatting Log (unformatted information)

Array member formatting log template

```
                  Display Hexadecimal Report for Resource

                                       Serial                 Resource
Name              Type      Model      Number                 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          -------- -------- -------- ------02
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 61. 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

                                       Serial                 Resource
Name              Type      Model      Number                 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 62. 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

                                      Serial                  Resource
Name              Type      Model     Number                  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   00000000000000D4
000250          F0F1F3F4 0000E8D5 00000000 00000000   0134..YN........
```

Figure 63. Example Hexadecimal Report, Configuration Formatting log (unformatted information)

Configuration formatting log template

```
                  Display Hexadecimal Report for Resource

                                      Serial                  Resource
Name              Type      Model     Number                  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  Current  Current  Current
                IOP type IOP      Cache    Cache
                & model  serial   type     serial
0001C0          Expected Expected Expected Expected
                IOP type IOP      Cache    Cache
                & model  serial   type     serial
```

Figure 64. Example Hexadecimal Report, Configuration Formatting Log Template

Configuration formatting log example (as formatted information for A or B IPL)

```
               Display Additional Information for Resource

                                      Serial                  Resource
Name              Type      Model     Number                  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 65. 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

                                      Serial                  Resource
Name              Type      Model     Number                  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   27570001..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 66. Example Hexadecimal Report, Array Addendum Formatting Log (unformatted information)

Array addendum log template

```
               Display Hexadecimal Report for Resource

                                    Serial                  Resource
Name             Type      Model    Number                  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 67. 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

                                    Serial                  Resource
Name             Type      Model    Number                  Name
STORAGE          2757      001      10-0322005              DC03

  Array Member  . . . . . :       10       11       12       13       14
      Type . . . . . :     6607     6607     6607     6607     6607
      Serial Number  . . . : 0026121D 00248B85 0014BE1F 0014C0F0 001403C8
    Unit Address:
      Current  . . . . . : 410500FF 410400FF 410300FF 410200FF 410100FF
      Expected . . . . . : 410500FF 410400FF 410300FF 410200FF 410100FF

  Array Member  . . . . . :       15       16       17
      Type . . . . . :     6607     ****     ****
      Serial Number  . . . : 0014BEA4 00000000 00000000
    Unit Address:
      Current  . . . . . : 410800FF 00000000 00000000
      Expected . . . . . : 410800FF 00000000 00000000
```

Figure 68. Example Hexadecimal Report, Array Addendum Formatting (as formatted information for A or B IPL)

Table 12. Format 01

Description	Hexadecimal offset
Device Errors detected	0001D6 - 0001D9
Device Errors logged	0001DA - 0001DD
Device 1 type	0001E6 - 0001E9
Device 1 serial number	0001EA - 0001ED
Device 1 unit address	0001EE - 0001F1
New device 1 type	0001F2 - 0001F5

Table 12. Format 01 (continued)

Description	Hexadecimal offset
New device 1 serial number	0001F6 - 0001F9
Device 1 IOA type and model	0001FA - 0001FD
Device 1 IOA serial number	0001FE - 000201
Device 1 cache type and model	000202 - 000205
Device 1 cache serial number	000206 - 000209
Device 2 type	00021E - 000221
Device 2 serial number	000222 - 000225
Device 2 unit address	000226 - 000229
New device 2 type	00022A - 00022D
New device 2 serial number	00022E - 000231
Device 2 IOA type and model	000232 - 000235
Device 2 IOA serial number	000236 - 000239
Device 2 cache type and model	00023A - 00023D
Device 2 cache serial number	00023E - 000241
Device 3 type	000256 - 000259
Device 3 serial number	00025A - 00025D
Device 3 unit address	00025E - 000261
New device 3 type	000262 - 000265
New device 3 serial number	000266 - 000269
Device 3 IOA type and model	00026A - 00026D
Device 3 IOA serial number	00026E - 000271
Device 3 cache type and model	000272 - 000275
Device 3 cache serial number	000276 - 000279

Table 13. Format 02

Description	Hexadecimal offset
Array member 0 type	0001D6 - 0001D9
Array member 0 serial number	0001DA - 0001DD
Array member 0 expected unit address	0001DE - 0001E1
Array member 0 current unit address	0001E2 - 0001E5
Array member 1 type	0001E6 - 0001E9
Array member 1 serial number	0001EA - 0001ED
Array member 1 expected unit address	0001EE - 0001F1
Array member 1 current unit address	0001F2 - 0001F5
Array member 2 type	0001F6 - 0001F9
Array member 2 serial number	0001FA - 0001FD
Array member 2 expected unit address	0001FE - 000201
Array member 2 current unit address	000202 - 000205
Array member 3 type	000206 - 000209
Array member 3 serial number	00020A - 00020D

Table 13. Format 02 (continued)

Description	Hexadecimal offset
Array member 3 expected unit address	00020E - 000211
Array member 3 current unit address	000212 - 000215
Array member 4 type	000216 - 000219
Array member 4 serial number	00021A - 00021D
Array member 4 expected unit address	00021E - 000221
Array member 4 current unit address	000222 - 000225
Array member 5 type	000226 - 000229
Array member 5 serial number	00022A - 00022D
Array member 5 expected unit address	00022E - 000231
Array member 5 current unit address	000232 - 000235
Array member 6 type	000236 - 000239
Array member 6 serial number	00023A - 00023D
Array member 6 expected unit address	00023E - 000241
Array member 6 current unit address	000242 - 000245
Array member 7 type	000246 - 000249
Array member 7 serial number	00024A - 00024D
Array member 7 expected unit address	00024E - 000251
Array member 7 current unit address	000252 - 000255
Array member 8 type	000256 - 000259
Array member 8 serial number	00025A - 00025D
Array member 8 expected unit address	00025E - 000261
Array member 8 current unit address	000262 - 000265
Array member 9 type	000266 - 000269
Array member 9 serial number	00026A - 00026D
Array member 9 expected unit address	00026E - 000271
Array member 9 current unit address	000272 - 000275

Table 14. Format 03

Description	Hexadecimal offset
Current I/O card type	0001C6 - 0001C7
Current I/O card serial number	0001CA - 0001CD
Current cache type	0001CE - 0001CF
Current cache serial number	0001D2 - 0001D5
Expected I/O card type	0001D6 - 0001D7
Expected I/O card serial number	0001DA - 0001DD
Expected cache type	0001DE - 0001DF
Expected cache serial number	0001E2 - 0001E5

Table 15. format 04

Description	Hexadecimal offset
Array member 10 type	0001B6 - 0001B9
Array member 10 serial number	0001BA - 0001BD
Array member 10 expected unit address	0001BE - 0001C1
Array member 10 current unit address	0001C2 - 0001C5
Array member 11 type	0001C6 - 0001C9
Array member 11 serial number	0001CA - 0001CD
Array member 11 expected unit address	0001CE - 0001D1
Array member 11 current unit address	0001D2 - 0001D5
Array member 12 type	0001D6 - 0001D9
Array member 12 serial number	0001DA - 0001DD
Array member 12 expected unit address	0001DE - 0001E1
Array member 12 current unit address	0001E2 - 0001E5
Array member 13 type	0001E6 - 0001E9
Array member 13 serial number	0001EA - 0001ED
Array member 13 expected unit address	0001EE - 0001F1
Array member 13 current unit address	0001F2 - 0001F5
Array member 14 type	0001F6 - 0001F9
Array member 14 serial number	0001FA - 0001FD
Array member 14 expected unit address	0001FE - 000201
Array member 14 current unit address	000202 - 000205
Array member 15 type	000206 - 000209
Array member 15 serial number	00020A - 00020D
Array member 15 expected unit address	00020E - 000211
Array member 15 current unit address	000212 - 000215
Array member 16 type	000216 - 000219
Array member 16 serial number	00021A - 00021D
Array member 16 expected unit address	00021E - 000221
Array member 16 current unit address	000222 - 000225
Array member 17 type	000226 - 000229
Array member 17 serial number	00022A - 00022D
Array member 17 expected unit address	00022E - 000231
Array member 17 current unit address	000232 - 000235

Service reference procedures

The service reference procedures include general tasks such as setting the system date and time, setting the system password, determining the dominant operating system, accessing the history file, and so on.

Setting the system date and time

The system date and time be set with various tools.

About this task

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.

Note: If the system is logically partitioned, then you must use the Advanced System Management Interface (ASMI) to set the system date and time. For information on using ASMI to set the system date and time, see Changing the time of day.

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.
- If the system is powered on, perform the following procedure:
  1. To set the correct date, enter the system command:

     ```
     CHGSYSVAL QDATE VALUE('mmddyy')
     ```

     where:

     mm = month
     dd = day
     yy = year
  2. Press Enter.

     Note: This sample uses the month, day, and year format. To determine the format for your system, enter `DSPSYSVAL QDATE`.
  3. To set the correct time, enter the system command:

     ```
     CHGSYSVAL
     QTIME VALUE('hhmmss')
     ```

     where:

     hh = 24-hour time
     mm = minutes
     ss = seconds
  4. Press Enter. **This ends the procedure.**

Determining the dominant operating system

How to determine the dominant operating system.

About this task

The operating system is a collection of system programs that control the overall operation of the system. i5/OS is an example of such an operating system. Systems can run one or more operating systems. When there is more than one operating system, i5/OS 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 i5/OS is dominant

This indicates that either i5/OS is the only operating system installed, or that more than one operating system is installed (and i5/OS is dominant).

For more information on the Hardware Service Manager function, see “Hardware Service Manager” on page 43.

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
```

Figure 69. Example of the Verification of System Password Failed display

When customer information is known by manufacturing, the new system will be shipped with the correct system password.

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 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) installation 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

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.

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” on page 126.

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 i5/OS, look for a sign-on display that shows DSP01 in the upper right 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 "Hardware Service Manager" on page 43.

Locating the system's load source from the system console

Use this procedure to locate the 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 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 i5/OS service commands" on page 224.

Data is sent to the history file when:

- Fixes are installed on 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.

Low-level debug and data collecting procedures

Use these procedures to collect data for problems with Licensed Internal Code or hardware that you have been unable to solve with other methods.

About this task

The low-level debug functions (Functions 63-70) use sub-functions. This means that these functions have a function range inside them (00-FF) where you can display or enter information.

For more information on the low-level debug control panel functions, see "Low-Level Debug (LLD) panel functions" on page 147.

For information on using the Hardware Management Console (HMC) to perform control panel functions, see Control panel functions.

Getting started
About this task

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 63 and 64

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.

About this task

Table 16. Data collection ranges. Functions 63 and 64

Function	Description	Range
63	Status SRC trace	6300 to 6318
64	Diagnostic SRC trace	6400 to 6420

Record the data:
About this task

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 sub-function mode. This is the *entry* point and *exit* point for sub-function 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 sub-function (example: 5401).
6. Press Enter on the control panel. Record the data.
7. Repeat steps 5 and 6, increasing the sub-function 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 sub-function back to ** (example: 633F to 63**).
9. Press Enter on the control panel. Doing this takes you out of sub-function mode, and ** no longer appears.

Results

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.

Logical partitions

Logical partitions are the distribution of resources within a single system to make it operate as if it were two or more independent systems.

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).

Failed partition

Failures can be reported from the partition that experienced the problem with a resource. Attempt to service from the failed partition unless otherwise directed.

System Attention Light

For partitions, the system attention light is represented as the partition's *State*.

Powering off and on

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.

- For information on using the Hardware Management Console (HMC) to power on logical partitions, see Activating a partition profile.
- For information on using the HMC to power off logical partitions, see Shutting down i5/OS logical partitions.

Note:

- To perform a main storage dump or platform dump of a partition, you must use the Service Focal Point. For information on using the Service Focal Point to perform a main storage dump or a platform dump, see Performing a platform or main storage dump.
- When servicing a 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 130.

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.

Determining the release level of a logical partition

Use this procedure to determine the release level of the logical partition.

1. In the Navigation Area of the Hardware Management Console (HMC), open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server which contains the partition profile with which you want to work.
4. Open **Partitions**.
5. Right-click the partition.
6. Right-click **Properties**.
7. Select the **General** tab.

Locating a partition's console and load source

Use this procedure to locate a logical partition's console and load source.

About this task

Use this procedure to locate a logical partition's console and load source.

1. In the Navigation Area of the Hardware Management Console (HMC), open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server which contains the partition profile with that you want to work.
4. Open **Partitions**.
5. Right-click the profile.
6. Right-click **Properties**.
7. Select the **Tagged I/O** tab.

Results

Querying logical partition time and date

Provides procedure to determine the local partition time and date values for the primary partition.

About this task

Use this procedure to determine the local partition time and date values for the primary partition.

1. From the 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.

Results

Finding the SRC history list for a logical partition

About this task

Use this procedure to find the SRC history list that is created during an IPL of a logical partition.

1. In the Navigation Area of the Hardware Management Console (HMC), open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server which contains the partition profile with that you want to work.
4. Open **Partitions**.

5. Right-click the partition.
6. Right-click **Properties**.
7. Select the **Reference code** tab.

Results

Accessing the control panel functions of a logical partition

Logical partitions should use the Hardware Management Console (HMC) to access control panel functions.

About this task

For information on using the HMC to perform control panel functions, see Control panel functions.

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.

About this task

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. In the Navigation Area of the Hardware Management Console (HMC), open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, right click the managed system.
4. Right click **Properties**.
5. Select the **I/O** tab.

Results

Selecting IPL source and mode for a logical partition

Use this procedure to set the IPL source and IPL mode for a logical partition.

About this task

Use this procedure to set the IPL source and IPL mode for a logical partition.

1. In the Navigation Area of the Hardware Management Console (HMC), open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server that contains the partition profile with which you want to work.
4. Open **Partitions**.
5. Right click the partition.
6. Right click **Properties**.
7. Select the **Settings** tab.

Results

For more information on changing the IPL source for a logical partition, see Changing the IPL type for an i5/OS logical partition. For more information on changing the IPL mode of a logical partition, see Changing the operating mode for an i5/OS logical partition.

Independent Auxiliary Storage Pool (IASP) and clustering

These service reference procedures include determining if a tower is switchable, and determining the power controlling and current logical system ownership of a tower.

Determining if a tower is configured as switchable under iSeries OptiConnect

You can determine if a tower is configured as a switchable tower under iSeries OptiConnect by performing the following procedure.

About this task

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 . . . :  111111111111
   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 70. 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 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 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 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

Determine the power controlling system of a tower and the current logical owning system.

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.″

Results

Determining the resource name and HSL loop number of an HSL I/O bridge

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.

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. For details, see “Determining the power controlling and current logical system ownership of a tower.”

```
                  Display HSL Information

 HSL loop number . . . . . :  257

 HSL I/O bridge resource
   Type-model  . . . :  1999-999             Status  . . . . . :  Operational
   Serial number . . :  21-1111111        Part number . . . :  111111111111
   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 71. 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 . . . . . :  111111111111
  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 72. 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.

About this task

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 OptiConnect user interface. Cluster Resource Group (CRG) problems may occur as the result of using this procedure when the iSeries 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 133.)
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. Select **Resources associated with loop**.
10. 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.
11. 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 I/O Debug Function display appears.

    Note: The following menus are shown for example use only. Due to release updates, the menus that appear on your display might be slightly different.

```
                    Select I/O Debug Function

Resource name . . . . . . . . . . : BC06
Type-Model . . . . . . . . . . . : 1999-999
Serial number . . . . . . . . . . : 21-1111111
Mode . . . . . . . . . . . . . . . : Switchable


Select the following:

        Take/release ownership









Selection

        -

F3=Exit       F12=Cancel
```

Figure 73. Example I/O Debug Function display

12. From the Select I/O Debug Function display, select the **Take/release ownership** option. The Confirm Release of Resource Ownership display appears.

```
                    Confirm Release of Resource Ownership

This system presently has ownership of this resource.
You have requested that the ownership of this resource be released.

Resource details
   Resource name:   BC06
   Type-Model . :   1999-999
   Serial number:   21-1111111

Current owning system
   Type. . . . .:   9406
   Serial number:   10-0033333

Potential owning system
   Type. . . . .:   9406
   Serial number:   10-1234567

Warning:  You should only attempt this action at the direction of your
          service representative.



Press Enter to release the ownership of this resource.



F12=Cancel
```

Figure 74. 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.
```

13. Record the **type-model** and the **serial number** of the HSL I/O bridge resource if you have not already done so.
14. Press Enter to confirm releasing the resource.

15. Move to the console of the other system that can take ownership of the switchable resources in the tower.
16. Sign on to System Service Tool (SST) or Dedicated Service Tool (DST).
17. Select **Start a service tool**.
18. Select **Hardware Service Manager**.
19. Select **Logical Hardware Resources**.
20. Select **High speed link resources**.
21. Select the function **Include non-reporting resources**.
22. 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.
23. Select the **I/O Debug** option.
24. From the Select I/O Debug Function display, select the **Take/release ownership** option. The Confirm Ownership Change display will appear.

```
                    Confirm Ownership Change

You have requested that this system take ownership of this resource.

Resource details
   Resource name:    BC06
   Type-Model . :    1999-999
   Serial number:    21-1111111

Warning:  You should only attempt this action at the direction of your
          service representative.



Press Enter to  take ownership of this resource.



F12=Cancel
```

Figure 75. Example Confirm Ownership Change display

25. 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.

About this task

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 134.

Attention: Perform this procedure only if you are not able to end the Cluster Resource Group (CRG) using the OptiConnect user interface. CRG problems may occur as the result of using this procedure when the 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:

```
                    Confirm Mode Change

You have requested the following change to a logical resource:

Resource details
   Resource name:   BC06
   Type-Model:      1999-999
   Serial number:   21-1111111

Present value
   Tower mode:   Switchable

Requested value
   Tower mode:   Private

Warning:  You should only attempt this action at the direction of your
          service representative.



Press Enter to confirm the change.



F12=Cancel
```

Figure 76. 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.

Adding expansion units to a large configuration with SPCN firmware update control

Add expansion units to a running system with ten or more expansion units, including those being added with SPCN firmware update control.

About this task

Important:

- Continue with this procedure only if you were directed here from the Connect your expansion unit topic.
- This procedure must be performed by an on-site service provider. If an on-site service provider is not available, return to the procedure that sent you here and choose a different option or contact your service provider.

1. Obtain a product engineering shell (PESH) and a celogin password.

a. Obtain the password for the HMC hscpe account.
   1) If the user ID of hscpe has not been created, generate this user ID with a task role of hmcpe.

      For more information about creating an HMC user ID, go to Creating an HMC user.

      The user ID can also be created using the command **mkhmcusr -u hscpe -a hmcpe --passwd <mypwd>** where <mypwd> is the password for the account.
   2) If the password has been lost, reset the password.

      For more information on changing HMC user passwords, go to Changing HMC user passwords.

      The password can also be reset from the command line using the command **chhmcusr –u hscpe –t passwd –v <newpwd>**, where <newpwd> is the new password for the account.

b. Open a terminal session for user hscpe. To open a terminal session for user hscpe select one of the following procedures:

   Procedure 1

   - Log off of the HMC, and then log back in as "hscpe" using the customer-supplied password.
   - With your cursor blinking on the HMC desktop, click your right mouse button. This will display the action box for terminals.
   - Select **rshterm** to open a terminal session.

   Procedure 2

   If a remote command execution is enabled, then a secure shell (ssh) can be used to log in as hscpe. At the restricted shell prompt type the command: **ssh hscpe@localhost**.

c. Obtain a pesh password from an authorized support center.
   1) From the restricted shell window, run the **lshmc –v** command. The output of this command will return several fields of information. The field labeled SE equates to the HMC serial number. Record this information.
   2) Find the field labeled N2 in the output from the lshmc command, record the HMC's current date.
   3) Give the serial number recorded above and date from the HMC to the authorized support center. They will generate the required pesh password needed to complete this procedure.

      Note: If the serial number of the HMC is not registered, you will not be able to generate a pesh password.

d. Obtain an ASMI celogin password from an authorized support center.
   1) Launch the ASMI and record the system date and serial number from the "Welcome" screen.
   2) Give the system date and system serial number obtained in the previous step to the authorized support center. The authorized support center will provide the ASMI celogin password.

e. Run the **pesh** command on the HMC.
   1) From the restricted shell window, type the following command: **pesh <serial number>** where <serial number> is the serial number recorded in step 1c1.

      Note: Type all alpha characters used in the serial number in uppercase characters containing no spaces or dashes.
   2) When prompted for a password, type the pesh password provided by the authorized support center. Ensure that the password is typed using all lowercase letters. When logged in, it will display `role=hmcpe` and a command prompt.

f. Switch to root on the HMC.
   1) At the pesh prompt, type **su -** and press Enter. When prompted, type the password for root.

      Note: If the password has been lost, log in as *hscroot* and reset the password. For more information, refer to Creating an HMC user.

2) Validate that you are now the root user by typing the **whoami** command on the HMC and noting that the command returns root.

2. Obtain access to the PHYP prompt.
   a. Access and then record the service processor IP address by issuing the command **lssysconn -r all**. Find the entry in lssyscon that is resource_type=sys, sp=primary, and record its IP address.
   b. Using the ASMI celogin password obtained in step 1d on page 139, log into ASMI as user celogin. For information on setting up the ASMI refer to Managing the Advanced System Management Interface (ASMI).
   c. Under Network Services, select **Debug Virtual TTY**.
   d. Enter 0 for both the partition ID and the session ID on the Debug Virtual TTY ASMI screen.

      Note: Five minutes of inactivity on a virtual TTY connection allows the debug virtual TTY connection to timeout and close.
   e. Click **Save Settings**.
   f. Telnet to the service processor on port 30002 to obtain the phyp prompt.
      1) For the HMC telnet client, you do this by issuing the command **telnet <service processor ip> 30002** where <service processor ip> is the name or IP address of the service processor determined in step 2a. For example, telnet 9.5.32.12 30002
      2) After the telnet session is established, wait for the 'phyp#' to indicate the phyp prompt is available. This part of the procedure might take several seconds to complete.

         Tip: The debug virtual TTY connection automatically closes after five minutes of inactivity. Periodically returning to this screen and pressing Enter during this procedure will allow you to avoid having to reconnect to the phyp prompt to enable SPCN firmware updates.
3. Disable SPCN firmware updates
   a. From the phyp prompt enter the **spcndownload -disable** command to disable SPCN firmware updates. The disable option will interrupt and disable the SPCN firmware updates.

      Note:
      - This option will begin an asynchronous process to stop the SPCN firmware updates. The process usually takes less than one minute to complete. However, in extreme cases where a large number of SPCN firmware updates are in progress when the stop step is initiated, the disabled process may take up to an hour to complete.
      - Disabling the SPCN firmware updates will not continue across a platform IPL. SPCN firmware updates will be enabled following a platform IPL.
   b. Enter the **spcndownload -status** command to determine if the disable process has completed.

      Attention: Do not proceed to the next step until the disable is complete. Output from the spcndownload -status command will let you know when the disable is complete.
4. Remove or open the back of the system.
5. Find the connector locations. If you need help finding the connectors on your expansion unit(s) or system unit, refer to Connector locations.
6. Go to Connect the expansion units with SPCN cables.
7. Connect the ac power cables to the expansion units being added.

   Tip: The power cable should be plugged into the power source prior to connecting it at the power supply of an expansion unit.

   If the expansion units have power switches ensure that they are in the on position. The expansion units will power on automatically. Verify that the expansion units are powered on.

   Note: For each expansion unit you just powered on, wait for the green power indicator to light up on the expansion unit's control panel. This might take up to ten minutes for each expansion

unit's green indicator to become lit. During this time, the yellow attention indicator might become lit on the control panel of the expansion unit that just powered on.

After the green power indicators on all of the expansion units are lit, wait an additional ten minutes for the hardware initialization to complete. and then go to step 8.

8. Go to Verify the System Power Control Network.

   Depending upon various factors in the system configuration and procedures, you might see the following error logs:

   - 1000 9135 informational or permanent log due to an open SPCN loop.
   - 1000 9139 informational log for SPCN closed loop in System Release SF240 or later.
   - 1000 9137 permanent error logs because the RIO/HSL cables are not attached.

9. Go to Connect the units with RIO/HSL cables. After connecting the RIO/HSL cables, the resources in the new expansion units will be initialized. Allow up to ten minutes for this to occur.
10. Go to Verify the new configuration is functioning. Depending upon various factors in the system configuration and procedures, you might see the following error logs:
    - B700 6907 information logs for each new expansion unit being added which has existing VPD from a system that the expansion unit was previously attached to.
    - B700 6985 informational logs before and after the B700 6907 information logs as well as B700 6984 informational logs to indicate a broken HSL loop.
11. Enable SPCN firmware updates using the PHYP prompt.

    Note: If the phyp prompt session has been inactive for more than five minutes, it may have timed out and you will need to reestablish the session using the procedure in step 2 on page 140.

    a. After the PHYP prompt has been established, enter the **spcndownload -enable** command .

       Note:

       - This command enables the SPCN firmware updates.
       - The enable option will enable, but not initiate SPCN firmware updates.

    b. Enter the **spcndownload - initiate** command to start the required SPCN firmware updates. The initiate option will asynchronously begin any required SPCN firmware updates.

       Note: The SPCN firmware updates will continue to be processed after the command has completed execution.

12. You might see one or more of the following firmware update informational logs. There is no need to check for these log entries.

    Broadcast SPCN firmware updates:

    - Informational 10009107 (download started)
    - Informational 100091DD (download done)

    HSL/RIO SPCN firmware updates:

    - Informational 1000910A (HSL/RIO download started)
    - Informational 100091DE (HSL/RIO download done)

13. If the system is logically partitioned, you can now assign the new hardware to a partition without waiting for the completion of the SPCN firmware updates.For more information about AIX® partitions, refer to Dynamically managing physical I/O devices and slots. For more information about Linux® partitions, refer to Dynamically managing physical I/O devices and slots on Linux. For more information about i5/OS partitions, refer to Dynamically managing physical I/O devices and slots.

Control panel functions

Covers some control panel functions. Systems managed by an Hardware Management Console (HMC) should use the HMC to perform control panel functions.

For details on using the control panel, see the following information.

Notes:

1. Systems managed by an HMC should use the HMC to perform control panel functions. For information on performing control panel functions using an HMC, see Control panel functions.
2. Some control panel functions might not be available on all system types.
3. The x can be any number 0 through 9, any letter A through F, or a blank.
4. If the customer was performing the function, find out why the customer selected the function and verify whether it is complete.
5. If you cannot change the *Function/Data* display or complete the selected function, go to Start of call procedure.

Values for IPL types, system operating modes, and speeds

Reference tables for IPL types, system operating modes, and speeds.

Table 17, Table 18, Table 19 on page 143, and Table 20 on page 143 describe the valid IPL types, system operating modes, speeds, and firmware IPL modes that are used in control panel functions 01 and 02. Table 21 on page 143 describes whether the Hardware Management Console (HMC) is active for HMC managed systems.

Notes:

1. Systems managed by the HMC should use the HMC to perform control panel functions. For information on performing control panel functions using the HMC, see Control panel functions.
2. OS IPL types are displayed only when the OS IPL mode has been enabled from the operating system.

Table 17. OS 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 18. System operating mode values

System operating 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**.

Table 19. IPL speeds

IPL speed	Action or description	Details
F	Fast override for one IPL.	Fast IPL run. Some hardware diagnostics are skipped.
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: • Main storage tests. • CEC Inter-chip interface tests (wire test). • Extended Logical Built-in Self Tests.
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.

Table 20. Firmware IPL types

IPL type	Action or description
P	IPL from disk using copy P of the system Licensed Internal Code.
T	IPL from disk using copy T of the system Licensed Internal Code.

Table 21. HMC indicators

HMC indicator	Action or description
HMC=1	The HMC is connected.
HMC=0	The HMC is disconnected.

Accessing the control panel functions

There are various methods to access control panel functions, including the physical control panel, an i5/OS virtual control panel or remote control panel, and through the Hardware Management Console (HMC).

Physical control panel

Figure 77 on page 144 shows the control panel for the OpenPower® server model.Figure 78 on page 144 shows the control panel for all other server models.

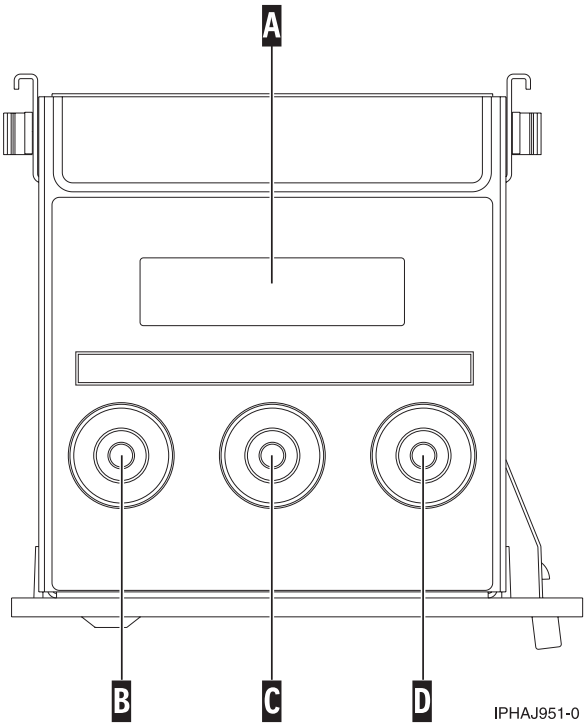

Figure 77. OpenPower server control panel

A LCD screen

B Decrement button

C Enter button

D Increment

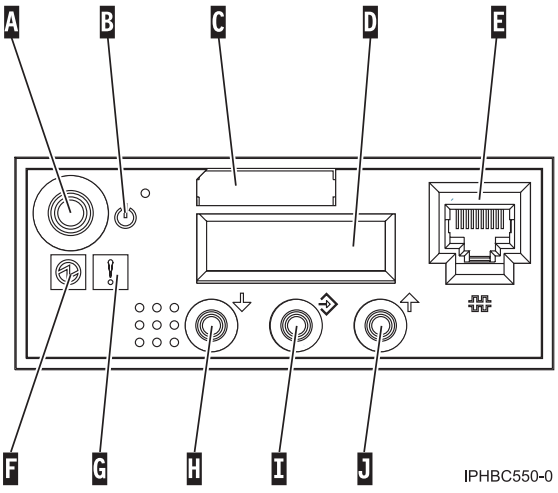

Figure 78. Control panel

A Power push-button

B On/off power symbol

C Type and serial number label

D Function/data display

E Ethernet connector

F Power on light
- A blinking light indicates standby power to the unit.
- A constant light indicates full system power to the unit.

G System attention light

Note: The system attention light does not appear on the control panel on the model 570.

H Decrement

I Enter push-button

J Increment

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.

Virtual or remote control panel

The i5/OS virtual control panel and remote control panel are graphical representations of the physical control panel. They install through Operations Console and allow you to access control panel functions using a PC. For information on using a virtual or remote control panel, see Operations Console virtual and remote control panel.

HMC

If you are managing the system with the HMC, you should use the HMC to perform control panel functions. The HMC affects the physical control panel in the following ways:
- Except for some limited auto-platform override function, such as Auto Power On Restart and Timed Power On, the system operating mode value has no meaning.
- The OS IPL type value is disabled in functions 01 and 02.
- Functions 11–19 will not display partition SRCs. It will continue to display SRCs from the platform LIC.
- Functions 21, 22, 34, and 65-70 are not selectable.

For information on using the HMC to access control panel functions, see Control panel functions.

Control panel function descriptions

This section lists control panel function topics.

Note: The primary control panel functions can be found in the Managing the control panel functions topic.

Extended control panel functions

Control panel functions 21 through 99.

The extended control panel functions consist of two major groups:
- Functions 21 through 49, which are available when you select Manual mode.

- Service provider 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).

Notes:

1. When a function has no data to display, `FF` is shown.
2. The Customer extended panel functions can be found in the Managing the control panel functions topic.

Service extended control panel functions:

Control panel functions 50 through 99.

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). Sub-functions 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 Sub-functions:

How to access and use sub-functions.

About this task

To work with sub-functions, 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 sub-functions are available.
2. Press the Increment button. The first sub-function number appears; for example, `5700`.
3. As the sub-function number is displayed, press Enter. The data associated with the sub-function number is displayed.
4. Press the Increment button. The next sub-function number appears; for example, `5701`.
5. As the sub-function number is displayed, press Enter. The data associated with the new sub-function number is displayed.
6. Repeat these steps to gather all the data that is associated with the sub-function.
7. Use the Increment or Decrement buttons to return to the function display with asterisks; for example `57**`.
8. Press Enter to exit the sub-functions.

Functions 50 to 54–Reserved CE functions:

These functions are reserved.

These functions are reserved.

Function 55–Platform dump override:

Use this function to view and change dump policy and override variables. This function is available in manual operating mode when activated by the FSP and when the CE functions have been enabled.

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 22. Override of platform dump functions in Function 55

Function	Action or Description
00	View policy override settings
01	Policy: As Needed
02	Policy: Never
03	Policy: Always
04	Content Override - Maximum
05	Content Override - As Required
06	Content Override - Minimum
07	Content Override - Optimum

Functions 56 to 62–Reserved:

These functions are reserved.

These functions are reserved.

Low-Level Debug (LLD) panel functions:

Control panel functions 63 through 99.

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 63–System status SRC trace:

Use this function to view a copy of the first word of the last 25 system status SRCs.

About this task

Typically, these are SRCs associated with the IPL sequence or power off sequence.

1. Select Function 63 and press Enter to display 63**.
2. Enter a sub-function between 0x00 and 0x18 to view the SRCs in sequential order, 0x18 being the most recent. Press Enter to display 63nn, where nn is the function that you selected.

Function 64–Diagnostic status SRC trace:

Use this function to view a copy of the first word of the last 25 diagnostic status SRCs.

About this task

Typically, these are SRCs associated with problem analysis and main store dump.

1. Select Function 64 and press Enter to display 64**.
2. Enter a sub-function between 0x00 and 0x18 to view the SRCs in sequential order, 18 being the most recent. Use sub-functions 0x19 and 0x1A to read extended SRC data associated with SRC 00x18. Press Enter to display 64nn, where nn is the function that you selected.

Function 65–Deactivate remote service:

Use this function to deactivate a remote service session.

Use this function to deactivate a remote service session. This function is available in manual operating mode when activated by the OS.

Function 66–Activate remote service:

Use this function to activate a remote service session.

Use this function to activate a remote service session. This function is available in manual operating mode when activated by the operating system.

Function 67–Disk unit IOP reset/reload:

Use this function to initiate an I/O processor dump and a disk unit I/O reset/reload.

Use this function to initiate an I/O processor dump and a disk unit I/O reset/reload. This function is available in manual operating mode when activated by the OS. This function is enabled only when the I/O processor of a displayed SRC supports a reset/reload function.

Function 68–Concurrent maintenance – power off:

Use this function to power off power domains to affect concurrent replacement of IOPs and IOAs.

Use this function to power off power domains to affect concurrent replacement of IOPs and IOAs. This function is available in manual operating mode when activated by the OS.

Function 69–Concurrent maintenance – power on:

Use this function to power on power domains to affect concurrent replacement of IOPs and IOAs.

Use this function to power on power domains to affect concurrent replacement of IOPs and IOAs. This function is available in manual operating mode when activated by the OS.

Function 70–IOP dump:

Use this function to initiate IOP dumps. This function is available in manual operating mode when activated by the OS.

Use this function to initiate IOP dumps. This function is available in manual operating mode when activated by the OS.

Functions 71 to 99–reserved:

These functions are reserved.

System Reference Code (SRC) Information

System reference codes (SRCs) are a sequence of data words (codes) that can help identify system status, describe a failure (for example, hardware, Licensed Internal Code (LIC), or software), and identify the failing unit and its location.

SRCs can display on the control panel, appear in a system console message, or appear in the product activity log. For details, see “Product Activity Log” on page 92. For details on how SRC information displays on the control panel, see “SRC formats.”

The system uses the following procedure to gather information about errors:

1. The system gathers information about an error as the system detects the error.
2. The Product Activity Log (PAL) records and stores the error information.
3. 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.
4. The SRC links to the problem determination procedure when the element detecting the failure cannot isolate the failing condition.
5. 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 (hardcopy or softcopy). Use the SRC and the problem determination procedures to isolate the problem.

SRC formats

Describes the SRC record structure.

The control panel automatically displays the first word of the SRC and the extended word 1 data in Function 11 when the panel shows an SRC (see “Word 1 - SRC general information” on page 150). You can select other SRC words (Functions 12 through 19) by using the control panel Increment (↑), Decrement (↓), and Enter buttons. Some portions of the SRC might not contain data. SRC records vary in length (up to 36 bytes for words 1 through 9 and there may be up to 24 bytes of extended word 1 data) 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 System Units (for example, `11-3 xxxx xxxx`).

The SRC record structure provides information about the machine at the time of the failure.

The control panel can display up to four words at a time. The first word of the SRC can consist of ASCII or hexadecimal characters. The other eight words of the SRC consist of hexadecimal data. Function 11 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 Function 11 to 13, thus disassociating the word number from the function number. Refer to “Product Activity Log” on page 92 for more information on the PAL and SAL. Refer to Table 23 on page 150 to see the SRC format.

Example SRC record structure

Table 23. Example SRC record structure

SRC word or FRU call-out data	Control panel function	Display characters	Format	Description
1	11	1–8	Axxx uuuu Bxxx uuuu	uuuu = unit reference code If any of these SRCs appears in a serviceable event view or in the control panel, the operator or service provider must take some action.
1	11	1–8	Cxxx uuuu Dxxx uuuu	uuuu = unit reference code Initial program load (IPL) progress codes.
1 – extended SRC information	11	9–32	text	Additional text about the failure. This text varies by SRC.
2	12	1–8	MIGVEPff	See "Hardware SRC formats" on page 155 for details.
3	12	9–16	Hexidecimal data	Varies by SRC format. See "Hardware SRC formats" on page 155 for details.
4	12	17–24		
5	12	25–32		
6	13	1–8		
7	13	9–16		
8	13	17–24		
9	13	25–32		
Replacement priority	14–19	1–2	Hexidecimal data	FRU call-out data. Displays the replacement priority, part number, part type, and location code.
Part number	14–19	3–9		
Part type	14–19	13–16		
Location code	14–19	17–32		

Note: Select Function 20 to display machine type, model number, and processor feature code.

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 24 on page 151.

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.

Function display	Description
11 Axxx xxxx	Attention or action required. The system is waiting for a user action, or the system is making the user aware of an event or condition that does not need any user action. Examples: 1. This type of SRC is displayed on a tape IPL if the tape unit is not ready. This requires user action. 2. This type of SRC is displayed when on demand resource allocations have timed out. This does not require user action.
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: • C1xx xxxx service processor • C2xx xxxx secondary partition • C3xx xxxx system processor • C5xx xxxx LIC system hardware initialization • C6xx xxxx Licensed Internal Code (LIC) • C7xx xxxx Server firmware • C9xx xxxx i5/OS Operating System • CAxx xxxx Partition firmware • 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 24. General System Reference Codes (SRCs)

Problem	SRC	Description
Machine problems	1xxx xxxx	Problem reported by system power control network
	2xxx xxxx through 9xxx xxxx	Hardware machine check, usually IO related
	A1xx xxxx	Service processor reference (error) codes
	A2xx xxxx	Logical partition reference codes
	A6xx xxxx	Licensed Internal Code reference codes
	A7xx xxxx	Platform Licensed Internal Code (LIC) Reference Codes
	A9xx xxxx	Reference codes
	AAxx xxxx	Partition firmware reference (attention) codes
	B001 xxxx - B002xx xxxx,	Reference codes
	B003 xxxx	Asynchronous communications reference codes
	B004 xxxx - B005 xxxx	Reference codes
	B006 xxxx	IOP common code
	B008 xxxx - B010 xxxx	Reference codes
	B013 xxxx - B015 xxxx	Reference codes
	B017 xxxx - B022 xxxx	Reference codes
	B025 xxxx - B026 xxxx	Reference codes
	B028 xxxx	Reference codes
	B030 xxxx	Reference codes
	B038 xxxx	Reference codes
	B040 xxxx	Reference codes
	B045 xxxx	Reference codes
	B070 xxxx	Reference codes
	B075 xxxx	Workstation adapter console reference codes

Table 24. General System Reference Codes (SRCs) (continued)

Problem	SRC	Description
	B1xx xxxx	Service processor machine check
	B143 xxxx	Service Processor PAL entry
	B2xx xxxx	LPAR error conditions
	B6xx xxxx	LIC machine check and LPAR configuration machine check
	B7xx xxxx	Platform Licensed Internal Code (LIC) Reference Codes
	B9xx xxxx	Operating system machine check
	BAxx xxxx	Partition firmware reference (error) codes
Operator intervention	A1xx xxxx	Operation interruption by service processor
	A2xx xxxx	Logical partition reference codes
	A6xx xxxx	Operation intervention by LIC
	A7xx xxxx	Licensed Internal Code (LIC) Reference Codes
	A9xx xxxx	Operation interruption by operating system
	AAxx xxxx	Partition firmware reference (attention) codes
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
	C700 xxxx	Server firmware IPL status progress codes
	C9xx xxxx	IPL status for i5/OS operating system program.
	CAxx xxxx	Partition firmware progress codes
General status	D1xx xxxx	General status for the service processor
	D6xx xxxx	General status for Main Storage Dump Manager, LIC run-time status, or LIC power off

Word 2 - System status information

Word 2 provides a fixed location for information common to all SRCs shown on the control panel.

Word 2 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 153.
3. For the coding of **G**, IPL type last initiated indicator, see "IPL Type Last Initiated Indicator (G)" on page 154.

Main Storage Dump Indicator (M):

Provides storage dump status.

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):

Indicates how far the IPL continued before the system displayed the SRC

The second digit that is displayed in Word 2 indicates how far the IPL continued 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 is coded as shown in Table 25.

Table 25. IPL type indicator

	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

Power-on IPL
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.

Programmed IPL
An IPL that results from the PWRDWNSYS command with Restart=Yes*FULL specified.

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 Enter.

Note: Selecting IPL type 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.

System Reference Codes (SRCs)

System Reference Codes information.

1. For information about general status SRCs, see "General status SRCs" on page 159.
2. For information about IPL status SRCs, see "IPL status SRCs" on page 159.
3. For information about other SRCs, see Reference codes.

System Reference Codes (SRCs)

Lists many, but not all, SRCs.

Note: This information does not list all SRCs. Start problem analysis with the Start of call procedure.

Table 24 on page 151 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 Reference codes.

Hardware SRC formats:

SRC format examples.

Notes:

1. Other formats exist; if necessary contact your next level of support.
2. For more information on formats 60–63, see "LIC-Detected Problem Reference Code Formats" on page 156.

Table 26. SRC format examples

SRC Word Number	Panel function, digits x to y (from left to right)	IOP SRC format 13	IOP SRC format 17	Device SRC format 27	IOP detected a failure format 29	LIC SRC Format 60	LIC SRC format 61	LIC SRC format 62	LIC SRC format 63
1	11, 1-8	TTTT RRRR	TTTT RRRR	tttt rrrr	B0XX RRRR	A6xx RRRR	B6xx RRRR	B6xx RRrr or B7xx Rrrr	A600 RRRR
2	12, 1-8	MIGV EP13	MIGV EP17	MIGV EP27	MIGV EP29	MIGV EP60	MIGV EP61	MIGV EP62	MIGV EP63
3	12, 9-16	BBBB Ccbb	BBBB Ccbb	BBBB Ccbb	BBBB Ccbb	PPPP 0000	cccc cccc	cccc cccc	AAAA BBBB
4	12, 17-24	aaaa aaaa	aaaa aaaa	aaaa aaaa	SAPP UUFF	BBBB Ccbb	pppp pppp	pppp pppp	CCCC DDDD
5	12, 25-32	TTTT LMMM	TTTT LMMM	tttt lmmm	TTTT FMMV	aaaa aaaa	qqqq qqqq	qqqq qqqq	EEEE FFFF
6	13, 1-8	uuuu uuuu	tttt lmmm	TTTT LMMM	tttt lmmm	tttt mmmm	qqqq qqqq	qqqq qqqq	GGGG HHHH
7	13, 9-16	uuuu uuuu	ZZZZ rrrr	ZZZZ RRRR	zzzz rrrr	ssss ssss	0000 0000	BBBB Ccbb	JJJJ KKKK
8	13, 17-24	uuuu uuuu	ssss ssss	ssss ssss	0sss ssss	NNNN 0000	0000 0000	TTTT MMMM	TTTT 0MMM
9	13, 25-32	uuuu uuuu	uuuu uuuu	uuuu uuuu	uuuu uuuu	0000 0000	0000 0000	0000 0000	SSSS SSSS

Table 27. SRC format examples (continued)

SRC format	Description
AAAA	Type of I/O Bus (see "Logical address format" on page 108 — field 'A').
aaaa	Unit address.
BBBB	System Bus Number (see "Logical address format" on page 108 — field 'B').
BBBBCcbb	Bus, bus, bus, bus, card, card, and board, board address (Direct Select Address or DSA). • For PCI system buses 0001-0003 and 0018-FFFF the Cc field is a one digit multi-adapter bridge number and a one digit multi-adapter bridge function number. • For SPD system buses 0004-0017 the Cc field is a two digit card number.
CCCC	System Board Number (see "Logical address format" on page 108 — field 'C').
cccc cccc	Component reference code. Format 62 varies by component.

Table 27. SRC format examples (continued) (continued)

SRC format	Description
DDDD	System Card Number (see "Logical address format" on page 108 — field 'D').
EEEE	(see "Logical address format" on page 108 — Unit Address type — field 'E').
FFFF	(see "Logical address format" on page 108 — Unit Address type — field 'F').
GGGG	(see "Logical address format" on page 108 — Unit Address type — field 'G').
HHHH	(see "Logical address format" on page 108 — Unit Address type — field 'H').
JJJJ	(see "Logical address format" on page 108 — Unit Address type — field 'J').
KKKK	(see "Logical address format" on page 108 — Unit Address type — field 'K').
LMMM	Level indicator plus 3″ digit model number (for example, 0001).
lmmm	Level indicator plus 3″ digit model number of failing device.
0MMM	Model number of failing device (i.e. MMM='001').
MIGV EP	General system status.
NNNN	Number of disk device facilities that are missing.
PPPP	Cause code.
pppp pppp	Programming reference code.
qqqq qqqq	Programming reference code qualifier.
RRRR	Unit reference code (URC).
rrrr	Outboard failing unit reference code (URC).
SAPP UUFF	Unit address.
SSSSSSSS	System Reference Code — this SRC is used to determine why the primary console failed to respond.
ssss	Serial number of failing unit.
TTTT	Type number or card identification number (hex).
tttt	Outboard failing unit type number (i.e. 6607).
uuuu	Unit-specific data.
ww	SRC type.
ZZZZ	Reserved.

Logical Partition - Work with Partition Status System Reference Code Descriptions and Actions:

For information on logical partition reference codes, see reference codes for logical partitions.

For information on logical partition reference codes, see Reference codes for logical partitions.

LIC-Detected Problem Reference Code Formats:

Reference code formats.

Formats 60–63 in Table 1. SRC format examples represent 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 qualifer 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 "System Reference Code (SRC) Information" on page 149 for more information.)

x Any hexadecimal number

Notes:

1. For information about Function 11 and 12, refer to "System Reference Code (SRC) Information" on page 149.
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).
3. Refer to Licensed internal code (LIC) isolation procedures and perform the problem isolation procedure used by the reference code to further define any significant data.

LIC Unit Reference Code Groups

Provides reference for four-digit unit reference codes.

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 POWER 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 POWER 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, see Using system reference codes.

A main storage dump is taken for most of the LIC URCs unless otherwise indicated in the description of the URC.

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.

For a information on IPL status SRCs, see List of progress codes.

General status SRCs

Refer to List of system reference codes.

For a list of general status SRCs, see List of system reference codes.

Initial program load (IPL) information

Linked topic index for IPL information.

For information on performing an IPL using the Hardware Management Console (HMC), see Powering on and off the system using HMC.

For information on performing an IPL using the Advanced System Management Interface (ASMI), see Using the system power control.

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.

Note: Systems managed by the Hardware Management Console (HMC) should use the HMC to perform control panel functions. For information on performing control panel functions using the HMC, see Control panel functions.

- 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, system operating mode, and IPL speed for more information about function 01.
- Refer to the information in Table 19 on page 143 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:

- OS IPL types, see Table 17 on page 142.
- Firmware IPL types, see Table 20 on page 143.
- IPL modes, see Table 18 on page 142.
- IPL speeds, see Table 19 on page 143.
- Control panel functions, see "Control panel function descriptions" on page 145 or the system operator information.

Methods to perform IPL

Methods used to perform IPL.

Table 28. 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 if the IPL speed is set to slow. If the IPL speed is set to fast, some diagnostic functions will be overridden. For more information on IPL speeds, see IPL type, mode, and speed options. You can perform this IPL from either the control panel or the Hardware Management Console (HMC). For information on the control panel, see Control panel functions. For information on using the HMC, see Powering on and off the system using HMC.
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. You can perform this IPL from either the control panel or the Hardware Management Console (HMC). For information on the control panel, see Control panel functions. For information on using the HMC, see Powering on and off the system using HMC.
Programmed IPL without parameters	This IPL is started by the operating system. A PWRDWNSYS command with RESTART (*YES) will initiate this IPL.
Remote power on	An unattended IPL is started from a remote location. 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

Enable alternative 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 24 or "Work with alternate installation device" on page 28. This option is available in DST from control panel function 21 or a type D IPL.

For more information on alternate IPL, see Performing an alternate IPL.

Platform IPL sequence

Provides steps for initial program load.

About this task

The IPL consists of the following steps:

1. Service processor's performing power-on tests and loading the system processor
2. POWER Hypervisor initialization
3. If the system is partitioned, POWER Hypervisor loads the partition's SLIC code
4. Licensed Internal Code (system) initialization
5. Installing or starting the operating system program

Results

For information on IPL status SRCs, see "IPL status SRCs" on page 159.

For information on IPL for i5/OS logical partitions, see Restarting and shutting down i5/OS in a logical partition.

Service processor initialization

The service processor runs on its own power boundary and continually monitors hardware attributes and the environmental conditions within the server.

Functions performed

The service processor runs on its own power boundary and continually monitors hardware attributes and the environmental conditions within the server. The service processor is controlled by firmware and does not require an operating system to be running to perform its tasks.

When external power is applied to the system, the service processor is activated. The service processor does the following:

- Runs diagnostic routines to verify its hardware and firmware.
- Gathers vital product data (VPD) from the electronic components in the server.

When the service processor has successfully completed these tasks, it is in the standby state. The control panel displays `01`. You can now power up the server.

When you power on the server using the power button on the control panel, the Advanced System Management Interface (ASMI), or the Hardware Management Console (HMC), the service processor turns on the system power. The service processor does the following:

- Runs diagnostic routines to verify the operation of the system processor and system memory.
- Verifies that it can communicate with the environmental sensors and monitors in the system.

When the service processor completes these diagnostics, it turns control over to a system processor. Server firmware starts executing on the system processor.

Abnormal ending

The service processor ends an IPL when a condition is detected that prevents the base machine from functioning. 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

Includes functions like setting the internal processing unit registers and arrays.

Functions performed

The following list is a high-level description of the functions that are performed by LIC during an initial program load (IPL):

1. LIC sets the internal processing unit registers and arrays.
2. When the initialization is complete, LIC signals the service processor of the event.
3. LIC enters the disabled state (task dispatcher is disabled). After the service processor starts the processing unit, the earlier constructed queue is made ready. The LIC then does its normal work-time functions.

See “IPL status SRCs” on page 159 for information that is displayed on the control panel during an IPL.

Abnormal ending

LIC 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 LIC initialization to fail are:

- LIC hangs (loops or waits), causing a LIC initialization time-out. The processor gives control to the service processor which, in turn, ends the IPL.
- LIC that is not compatible with the control storage.

  Some of the LIC is in main storage in an area that is known as the LIC overlay area. If this code is not compatible with resident code in control storage, the IPL might end during the LIC initialization phase.
- Bad data on file.

  If bad data is not detected when read from the file but is detected by the LIC 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 LIC again to correct this problem. If the system does not complete an IPL after initializing the LIC again, the LIC tape is bad.
- Hardware errors.

  If hardware errors occur during the LIC initialization step, the IPL ends. If the hardware error is associated with the file, you might need to install the LIC again.

At any point in the LIC 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, LIC log, or the Product Activity Log contain information about the condition that caused the ending.

Initialization output

The output that is created when the LIC 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.
- Product Activity Log and LIC 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.

Logging is a function of Licensed Internal Code and starts during Licensed Internal Code initialization. Licensed Internal Code parts (see "Licensed Internal Code" on page 164) 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 system or partition control panel during the following processes:

- System IPL
- DST functions (local or remote)

- Dump functions
- System power-down

For more information on SRCs, see the following:
- For status SRCs, see “IPL status SRCs” on page 159.
- For general SRCs, see “General status SRCs” on page 159.
- For reference codes for logical partitions, see Reference codes for logical partitions.

Licensed Internal Code

Lists various fixes and PTF packages.

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 hardware failure and a code problem that is fixed by a PTF.

For information on server firmware, Hardware Management Console (HMC), and operating system fixes, see Getting fixes.

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 165. To display the operating system fixes and cumulative PTF packages that are on your system, see “Displaying i5/OS PTFs” on page 222.

Some PTFs fix problems that might appear to be hardware failures. *Always ensure that the recommended PTFs are applied before you exchange hardware.*

Cumulative PTF packages

Cumulative PTF packages contain fixes for a given release of the i5/OS operating system and associated licensed programs. You should install the entire cumulative PTF package after you first load or reload the operating system and periodically throughout the release as defined in your maintenance strategy.

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.

Displaying Licensed Internal Code fixes

You can use the Start Service Tools, Dedicated Service Tools, or the HMC to determine the Licensed Internal Code fixes that are on the system.

About this task

To determine the operating system fixes that are on the system, see "Displaying i5/OS PTFs" on page 222.

Use the Start Service Tools (SST) to display Licensed Internal Code (server firmware) fixes. If it is not available, use the Dedicated Service Tools.

Note: You can also use the HMC if your system is managed by an HMC.

Using SST to determine the Licensed Internal Code level

1. Type `STRSST` at an i5/OS command line and press Enter. The Start Service Tools (SST) Sign On display is displayed.
2. Type in your user ID and password and press Enter.
3. Select Start a Service Tool.
4. Select Display/Alter/Dump.
5. Select Display/Alter storage.
6. Select Licensed Internal Code (LIC) data.
7. Scroll down and select Advanced analysis.
8. Scroll down and select FLASHLEVELS.
9. When the Specify Advanced Analysis Options screen is displayed, press Enter.

   The PTFs for server firmware updates are displayed with the Licensed Internal Code product (5722999) and begin with the prefix `MH`. For example, `MH`*nnnnn* where *nnnnn* is the number associated to the specific server firmware fix.

Results

Note: During the normal shut down of the service partition, i5/OS verifies that the firmware level on the service processor is at the same level as the i5/OS firmware load source (PTF level). If they are different, then the firmware is updated. This process is known as LS Flash Synching (Firmware Load Source to Fsp Flash synchronization).

Using DST to determine the Licensed Internal Code level

1. Access DST. For details, see "Accessing Dedicated Service Tools" on page 3.
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.

   Note: To display PTF requirements, supersede information, and dependent fix information, use the function keys on the *Display Fix Information* display.

Utilities to install and restore i5/OS Licensed Internal Code

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 i5/OS PTFs" on page 222.
- 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 165. The first entry that is displayed is the latest.

For more information on fixes, see "Fixes and cumulative PTF packages" on page 164.

For information on fixes for the Hardware Management Console (HMC), see HMC fixes

For information on server firmware fixes, see Server firmware fixes.

Utility to install Licensed Internal Code

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.

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 167.

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 IBM Software Manufacture and Delivery (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 to make DST available. For details, see Function 21: Service tool initiation.
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 165.

While this utility is running, the control panel displays SRCs until DST becomes active. After DST is active, the displays on the console prompt the user and show the install status.

Installing LIC

1. Perform steps 1 through 9 of the alternate IPL to DST procedure. For details, see "Performing an alternate IPL to DST (type D IPL)" on page 6.
2. Select the *Install Licensed Internal Code* option on the Install Licensed Internal Code display.

   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.
3. 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 installation status. User intervention might be required.
4. 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

Install the new Licensed Internal Code in place of the system's existing Licensed Internal Code without losing customer data already on the system.

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 165.

Restoring LIC

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 6 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)

Submit problem analysis report.

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. Because operating system and Licensed Internal Code fixes might solve program and LIC problems, perform the procedures in "i5/OS or LIC APAR information" on page 222 before submitting the report.

System architecture and configuration

Topic index for system architecture and configuration.

System power overview

System power overview topic index.

Power supply

Provides power supply description and link to other information.

Power for the iSeries systems is supplied by one or more power supplies. Each power supply provides all the voltages that are needed in the system. Two or more installed power supplies provide redundancy and allows power supply replacement with the system powered on. For information on the power distribution, see Dual power installation configurations.

Battery power unit

The battery power unit provides temporary auxiliary power to the tower in the event of an ac power loss.

The battery power unit is available on the 5074 iSeries I/O expansion tower. It provides temporary auxiliary power to the tower in the event of an ac power loss.

System Power Control Network (SPCN)

Problems detected by SPCN are reported to the operating system and logged.

The SPCN is a concept of power distribution and control for the iSeries system. Problems detected by SPCN are reported to the operating system and 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 the i5/OS Hardware Service Manager, see "SPCN menu flow."

SPCN power components

Most power components in a system contain an SPCN node. The SPCN node contains a microprocessor-based controller that controls and monitors the power in that node. 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 located in the system unit and is the controlling node in the network. This node is located on a separate card that is installed in the rear of the system or is part of the backplane 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). 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.

The primary node collects command responses and error status from the secondary nodes and formats them for return to the operating system.

Secondary node

The secondary node is a microprocessor-based controller located on a card, or on a backplane.

Each secondary node is programmed to collect unit power status and respond to commands from the primary node. The secondary node also controls the unit's display panel. The following information is displayed on the unit display panel:

- Normal - Type, model, serial number of the unit and type, model, serial number of the power controlling system
- Error - Type, model, serial number of the unit and power reference code

In frames with a PCI system bus, the secondary node is located on a card in the PCI cage, or on the backplane.

SPCN addressing

Each unit in the SPCN network is identified and located by a four-character frame address and a two-character unit address. A frame address is assigned by the primary node or by the operating system and will usually be 3Cxx, where xx is any hex digit. A unit address is fixed and is either 00 or 01.

SPCN menu flow

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 "Hardware Service Manager" on page 43.

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 Enter to continue.

```
                 System Power Control Network

Internal processing is being done to display the
configuration of the system power control network.

Up to five minutes may be required from the
time you press Enter at this display.









Press Enter to continue

F3=Exit  F12=Cancel
```

The second System Power Control Network display allows you to choose the frame or unit with which you want to work.

```
System Power Control Network

Type options, press Enter.
5=Display detail

                              Serial
Opt   Frame   Unit    Type    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
```

Fields on the System Power Control Network display:

Allows you to work with Opt, Frame, Unit, Type, Serial number, and Fault fields.

Opt

This field allows you to choose to work with the frame or unit components.

The following options are available for the *Opt* field: 5 (Display detail). For details on this option, see Display Detail option.

Frame

This field refers to one of the system frames. The value is the SPCN address.

Unit

The unit value is a 01, 0C, or 00; a unit value of zero indicates a system frame node.

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.

Display Detail option:

Show detailed SPCN information.

You can select the *Display detail* on the System Power Control Network (SPCN) display to show detailed SPCN information about a frame or unit.

Fields on the Display detail for Frame display:

The display detail for frame option shows details for a frame, such as alert status, serial number, and so on.

If you select the **Display detail** next to the entry for a frame, the Display detail for frame display appears.

```
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.

Fields on the Display Detail for Unit display:

The display detail for unit option shows details for a unit, such as alert status, serial number, and so on.

If you select option 5 (Display detail) next to the entry for a unit, the following display appears with detailed information about the unit:

Note: The Display status of regulators function key (F6) on the Display Detail for Unit display is not recommended for service representative use.

```
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 a 1 or C.

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 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 a power or functional fault currently exists. Field values are `Yes` or `No`.

High Speed Link and Remote I/O

High Speed Link (HSL), also known as Remote I/O (RIO), resources provide the connection between system I/O busses and the system processor.

HSL/RIO resources are normally configured in loops with the system unit having an HSL/RIO 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 or RIO 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 controller resource(s)* of other processing units in the RIO loop, called Remote High Speed Link Network Interface Controllers (Remote HSL NICs).
- *HSL loop resource(s)* under the controller listed above the loop.
- *HSL I/O adapter resource(s)* 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/RIO links consist of these items:

- A port from either the controller or an adapter on the loop.
- An HSL/RIO connection which is either an internal connection or an external HSL/RIO 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/RIO controller, for example, the A0 and A1 ports.

When you view an HSL/RIO 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/RIO resource. The *Leading link* usually refers to the connection between the resource's 0 port to the next HSL/RIO resource on the loop. The *Trailing link* usually refers to the connection between the resource's 1 port to the next HSL/RIO 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, or as –Tx. When port pairs are on an expansion tower they are labeled on the frame as 00 and 01, or as Tx.

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 or RIO adapter.

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 or RIO adapter. 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

Covers how to display and change 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 "Hardware Service Manager" on page 43.
- 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 "Hardware Service Manager" on page 43 and "Product Activity Log" on page 92.

Table 29. 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

Note: Names for displays and printers are defined by the user as any two characters.

***** 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.

****** An inoperative resource (ERR) is one that is not operational. Full vital product data might not be provided.

******* 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.

Table 30. Packaging resource naming formats

Name	Description	Example
C	Card	C01
CE	Card enclosure (rack-mounted)	CE01
DE	Device enclosure (rack-mounted)	DE01
EE	Card enclosure (enclosure-mounted)	EE01

Table 30. Packaging resource naming formats (continued)

Name	Description	Example
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

Lists restrictions that apply for the hardware that is associated with resources

The following restrictions apply for the hardware that is associated with resources. For more information, see "Hardware Service Manager" on page 43.

- 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

A few of the communication cards, cables, and wrap connectors include: single-port communications adapter card and TPAC wrap connector, high speed communications card and wrap connector wiring, and the advanced PCI communications console cable.

Single-port communications adapter card and TPAC wrap connector

Note: TPAC = Two-Port Adapter Cable.

Table 31. 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

Table 31. 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
6 to 20	6	DSR	IND-A	Not Used
7	7	SGND	SGND	SGND
8 to 16,18	8	CD	SET-B	RX-A
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 32. 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
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

Table 32. High speed communications (continued)

Wrap connector pin to pin	Connector pin	Signal destination
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 33. 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 34. 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 35. 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

Table 35. 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
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
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

Table 35. 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
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 36. 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

Table 36. ISDN (continued)

Wrap connector pin to pin	Connector pin	ISDN
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
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

Table 36. ISDN (continued)

Wrap connector pin to pin	Connector pin	ISDN
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 37. 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
7	21	Not Used
8	Not Used	Not Used
9	Not Used	2

Table 37. Two-port communications adapter cable wiring (continued)

50-pin connector	Port 1 DTE connector number	Port 2 DTE connector number
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
47	Not Used	1
48	Not Used	10
49	Not Used	12

Table 37. Two-port communications adapter cable wiring (continued)

50-pin connector	Port 1 DTE connector number	Port 2 DTE connector number
50	Not Used	13

RJ-45 cable wrap connector

Table 38. 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 39. 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 39. 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 40. 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 41. 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 42. 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
Notes: [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 43. 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
Transmitter Clock (TCLK)	29	15

Table 43. EIA 232 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
Reciver Clock (RCLK)	26	17
Data terminal ready (DTR)	4	20
Ring Indicate (RI)	31	22

EIA 232 advanced wrap connector wiring

Table 44. 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 45. 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
Calling indicator	125	27	22
Cable ID 1, 4 common return	102	(17, 33, 7)	7

Table 45. EIA-232/X.21bis communications adapter cable (continued)

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
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 46. 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 47. 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
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

Table 47. EIA-232/X.21bis cable wrap connector wiring (continued)

Signal designation	Wrap connector pin to pin
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 48. 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 49. 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
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

Table 49. V.36/EIA 449 high speed communications adapter cable wrap connector wiring (continued)

Signal designation	Wrap connector pin to pin
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 50. 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 51. 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 52. V.24 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)	7,27	7
Received line signal (carrier) detector (CD)	20	8

Table 52. V.24 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
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 53. 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 54. 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
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

Table 54. V.35 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
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 55. 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 56. 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

Table 56. V.35 communications adapter cable (continued)

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
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 57. 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 58. 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
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

Table 58. V.35/High speed communications adapter cable (continued)

Signal designation	Interchange circuit number	Adapter connector pin number	DCE connector pin number
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 59. 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 60. 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
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

Table 60. V.36/RS-449 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
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 61. 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
SC-GND to RC-GND	37 to 20

X.21 communications adapter cable

Table 62. X.21 Communications Adapter Cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitted data A, B	2, 4	2, 9

Table 62. X.21 Communications Adapter Cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
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 63. 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 64. 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 65. X.21 advanced PCI communications cable

Signal designation	Adapter connector pin number	DCE connector pin number
Transmitted data A (TD-A)	13	2
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

Table 65. X.21 advanced PCI communications cable (continued)

Signal designation	Adapter connector pin number	DCE connector pin number
Received data B (RD-B)	5	11
SET-B	28	13

X.21 advanced wrap connector wiring

Table 66. 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 67. 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 68. 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
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		

Table 68. 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)
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 69. 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 70. 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 71. 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

Table 71. PCI communications card wrap connector wiring (continued)

Signal destination	Wrap connector pin to pin
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 RI, 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

Communications signal voltage levels for several interface types, including V.24 EIA-232 X.21bis, V.35, X21, and ISDN.

Table 72. 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%.

Table 72. Communications signal voltage levels (continued)

Interface type	OFF voltage level	ON voltage level
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).

Working with Storage Dumps

Covers how to perform a main storage dump.

A main storage dump (MSD) is a process of collecting data from the system's main storage. For more information on main storage dumps, including POWER5™ platform system dumps, see Performing a platform or main storage dump.

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 using control panel functions when the system waits, loops, or appears to have an operating system failure. For more information on control panel functions, see "Control panel functions" on page 142.

For more information on working with storage dumps, see the following:

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 a main storage dump (MSD) or to verify that a current MSD is on the system, see "Error recovery for dumps" on page 207.

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 159.

When the system completes the dump, some of the data for the current MSD is copied to the load-source disk, and the other data is held temporarily 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 will appear as soon as the last disk unit reports in. For an example, see Figure 80.

Note: If all disk units do not 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 Enter. When the Main Storage Dump Manager display appears, refer to "Copying a main storage dump."

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)

A main storage dump is a collection of data from the main storage of the i5/OS operating system. It can be manually initiated when the system administrator suspects a system wait or loop, or automatically by the server firmware as the result of a system failure.

For information on performing a main storage dump, see Performing a dump.

Copying a main storage dump

Lists how to copy main storage dump data.

About this task

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

For information on copying a dump, see Copy a dump.

Work with current main storage dump

Options available while working 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:

```
                    Work with Current Main Storage Dump

 Select one of the following:

      1. Display/Print
      2. Copy to media
      3. Copy to ASP

Selection
     _
F3=Exit     F11=Display copy status     F12=Cancel
```

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 31.

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 Enter, 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.

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 “Working with Storage Dumps” on page 203.

This option allows you to perform the following functions:

- Display an MSD in the MSD library
- Delete an MSD from the MSD library
- Rename an MSD in the MSD library
- Copy an MSD
  - From the MSD library to removable media
  - From removable media to the MSD library

```
                    Work with Copies of Main Storage Dumps

 Type option, press Enter.
   4=Delete     5=Display/Print     7=Rename     8=Copy to media

 Opt    ID  Date      Level   SRC       Description
  _   ____  ________  ______  ________  ________________________________
  _   ____  ________  ______  ________  ________________________________
  _   ____  ________  ______  ________  ________________________________
  _   ____  ________  ______  ________  ________________________________
  _   ____  ________  ______  ________  ________________________________
  _   ____  ________  ______  ________  ________________________________
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  _   ____  ________  ______  ________  ________________________________

F3=Exit     F9=Copy from media     F11=Display copy status     F12=Cancel
```

Follow the on-line instructions on the displays to work with an MSD copy.

Main storage dump status

During a main storage dump, the control panel shows MSD status SRCs.

During a main storage dump, the control panel shows MSD status SRCs (D1xx 3xxx and C6xx 44xx). For more information on these SRCs, see "General status SRCs" on page 159.

The main storage dump ends successfully if the Main Storage Dump Occurred display appears. The main storage dump ends unsuccessfully if a terminating SRC appears at the control panel.

Terminating System Reference Code (SRC)

For information on using the Hardware Management Console (HMC) to collect reference codes, see Collecting reference codes and system information.

A lit *System Attention* light indicates dump termination. The terminating SRC displays after the main storage dump completes.

- In the case of an automatic dump (system stopping, including a main storage dump), the normal terminating SRC is the one associated with the system error that started the dump.
- In the case of a manual dump (Function 22), the normal terminating SRC is a service processor completion code (A1xx 300x or B1xx xxxx):

MSD status	Function performed
11 xxxx xxxx	System terminating SRC. See "Error recovery for dumps."
11 A1xx 300x 11 A6xx4404	Main storage dump successful completion. See "Copying a main storage dump" on page 204.
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, and reporting the error.

Determining whether main storage dump data was written to disk

About this task

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 204 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 204 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
About this task

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 system operating mode to Manual.
   b. Record all of the SRC data words available from function 11 through function 20
2. Save the service processor dump.
   a. Select control panel function 43 and press Enter. See "Performing a service processor dump."

   Note: You can initiate a service processor dump on a POWER5 system only by using function 43.
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 204.

Performing a service processor dump

A service processor dump is a collection of data from a service processor either after a failure, external reset, or manual request.

About this task

Perform the following to obtain a storage dump of the service processor:

1. Select Manual system operating 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 43 (service processor dump).
7. Press Enter on the control panel.
8. Wait for the status SRCs to complete (D1xx 1xxx 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. For details on managing the dump, see Managing dumps.

Copying the IOP storage dump to removable media

Start from the Start a Service Tool display to begin the storage dump.

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.

Performing an IOP dump

You can perform I/O processor storage dumps by using the control panel or by using the Hardware Service Manager.

About this task

Choose from the following to perform an IOP dump:

- "Performing an IOP dump using the control panel"
- "Performing an IOP dump using the Hardware Service Manager" on page 210

Performing an IOP dump using the control panel

About this task

Do the following to perform an IOP dump:

1. Select Manual system operating 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 67 (disk unit IOP reset/reload).
7. Press Enter on the control panel.
8. Wait for one of the following completion SRCs:
   - 11xx A1XX8ABF
   - 11xx B1XX8ABF
   - 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" on page 208.

Performing an IOP dump using the Hardware Service Manager
About this task

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 "Hardware Service Manager" on page 43.

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

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.

About this task

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 "Product Activity Log" on page 92.
2. Display the detailed entry.

   Note: Multiple entries (with the same log ID) are associated with this dump. Press Enter 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.

---

i5/OS operating system

Lists operating system topic index.

DST in i5/OS full paging environment

DST operates in stand-alone (non-paging), limited, and full paging environments.

DST operates in stand-alone (non-paging), limited, and full paging environments.

The DST tools and functions vary depending on the paging environment and operating system that is used. For details, see "System paging environments" on page 1.

The full paging environment is used during normal system operation. The following options appear on the `Use Dedicated Service Tools (DST)` display for the i5/OS 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 8. For general information on DST, see “Dedicated Service Tools (DST)” on page 1.

DST in i5/OS limited paging environment

DST operates in stand-alone (non-paging), limited, and full paging environments.

DST operates in stand-alone (non-paging), limited, and full paging environments.

The DST tools and functions vary depending on the paging environment and the operating system used. For details, see “System paging environments” on page 1.

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 i5/OS 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 8. For general information on DST, see “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.

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 i5/OS operating system is running on your system, see “Determining the dominant operating system” on page 123. 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

Access SST when the system is in the full-paging environment.

About this task

You can access SST only when the system is in the full-paging environment (see "System paging environments" on page 1). 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:
About this task

1. At the Main Menu, select the *Problem handling* option. The *Problem Handling* display appears.
2. Select the *System service tools* option. The *Start Service Tools (SST) Sign On* display appears.
3. Type in your user ID and password and press Enter. The *System Service Tools* display appears.

What to do next

For more information on SST options, see "SST options." **This ends the procedure.**

Entering the Start System Service Tools (STRSST) command:
About this task

1. Type `STRSST` on the command entry line at the Main Menu and press Enter. The *Start Service Tools (SST) Sign On* display appears.
2. Type in your user ID and password and press Enter. The *System Service Tools (SST)* display appears.
3. The *System Service Tools (SST)* display appears.

What to do next

For more information on SST options, see "SST options." **This ends the procedure.**

SST options

SST options topic index.

When you access SST (see "Accessing system service tools" on page 211), the following options are available:

Start a service tool:

Covers various SST options.

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 "Dedicated Service Tools (DST)" on page 1. The following options are available under SST:

- Product activity log - For details, see "Product Activity Log" on page 92.
- Trace Licensed Internal Code - For details, see "Licensed Internal Code (LIC) trace" on page 31.
- Work with communications trace - For details, see "Work with communications trace" on page 33.
- Display/Alter/Dump - For details, see "Display/Alter/Dump" on page 29.
- Licensed Internal Code log - For details, see "Licensed Internal Code (LIC) log" on page 30.
- Main storage dump manager - For details, see "Main storage dump manager" on page 31.
- Hardware service manager - For details, see "Hardware Service Manager" on page 43.

Work with active service tools:

Shows how to list active service tools and their status.

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 26.

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 11.

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 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 214.
- 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 215.
- 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 215.

- 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 215.

- 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 216.

Processing restrictions:

This option cannot duplicate diskettes containing data sets that have data set directories in the data area, and might not read VTOC or data set identification sectors into a space object.

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 Alter Diskette Data display allows you to view and alter diskette data.

```
                          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

1. Select **Alter diskette data** on the Work with Diskette Data Recovery display. The alter diskette data window appears.
2. Perform the following actions:
   - Press F15 to advance one sector at a time.
   - Press F14 to return to the previous sector.
   - Type over the Starting sector address to gain access to any sector on the diskette.

Read data from diskette:

This option reads cylinder 0, sector by sector, and cylinders 1 through 74 with one request.

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.

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:

View diskette data a sector at a time.

Select **Display diskette data** on the Work with Diskette Data Recovery display. The display Diskette Data display appears.

```
                        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 Enter, 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.

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:

Use the recover diskette data option to correct diskette problems.

1. Select the **Work with diskette data recovery** option on the System Service Tools (SST) display. The Work with Diskette Data Recovery display appears.

```
                        Work with Diskette Data Recovery

Warning:  Work with Diskette Data Recovery should only be used when
directed to by your service representative.

Type option, press Enter.
2=Alter diskette data      3=Read data from diskette
4=Write data to diskette   5=Display diskette data    6=Print reports

Opt     Device
_       DKT01
_       DKT02
_       DKT03
_       DKT04
_       DKT05
_       DKT06
_       DKT07
_       DKT08
_       QDKT




F3=Exit   F12=Cancel
```

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 Enter.

   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:

Some functions are restricted to DST use only and cannot be performed from SST.

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:

Some functions are restricted to DST use only and cannot be performed from SST.

For more information on the *Work with system capacity* option, see "Work with system capacity" on page 42.

Note: Some functions are restricted to DST use only and cannot be performed from SST.

Work with system security:

Some functions are restricted to DST use only and cannot be performed from SST.

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:

Some functions are restricted to DST use only and cannot be performed from SST.

For more information on the *Work with service tools user IDs* option, see "Work with service tools user IDs" on page 27.

Note: Some functions are restricted to DST use only and cannot be performed from SST.

SST Function keys

Covers F3, F5, F10, F12, and F16 SST function keys.

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.

i5/OS online problem analysis and resolution

Problem analysis and resolution (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.

For information on using the Service Focal Point application on the Hardware Management Console (HMC) for online problem analysis and resolution, see Using Service Focal Point.

For information on problem analysis and resolution on logical partitions, see Troubleshooting logical partitions.

Online PAR performs the following functions:

- Displays and prompts the customer and service representative through problem analysis
- Provides problem analysis for the hardware and software parts of the devices to perform problem analysis
- Contains a problem log, which contains system problem descriptions and the status of each problem
- Contains the Service Support Facility, which reports the problems to the service and 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 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 228.

System failures fall into two groups: System-detected and customer-detected.

i5/OS 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.

For information on using the Service Focal Point application on the Hardware Management Console (HMC) for online problem analysis and resolution, see Using Service Focal Point.

For information on problem analysis and resolution on logical partitions, see Troubleshooting logical partitions.

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 Enter.
- 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. To see available online help, press the Help key. For more information, see Start of call procedure.

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

Online PAR guides the customer through a series of panels to solve customer problems, analyze problems for a failing part, or generate a symptom string for reporting.

Customer-detected problem management is activated when the customer detects a problem that was not detected by the system.

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. After 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 i5/OS PTFs

For information on displaying the operating system PTFs that are installed on your system, see Operating system fixes.

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 164.

For information on displaying the operating system PTFs that are installed on your system, see Operating system fixes.

i5/OS or LIC APAR information

Tasks to perform before requesting a new APAR.

Use the system operation or the service library information to assist in performing the tasks that are listed in Table 73. This ensures that the system is current for all known problems before you create an authorized program analysis report (APAR).

Table 73. Tasks to perform before requesting a new i5/OS 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 5722SS1 and DSPPTF 5722999. 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 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 5722999 and compare with the latest PSP.	See "Displaying i5/OS PTFs."
Obtain a list of HIPER PTFs not in the latest cumulative PTF package.	SNDPTFORD SF98VRM	System operation information

Table 73. Tasks to perform before requesting a new i5/OS or LIC APAR (continued)

Task to be performed	What to do	Location of instructions
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 running

Covers various scenarios on how to reset an I/O processor card while the system is running.

About this task

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 62).

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

1. Do you want to reset the local workstation IOP?

   No: Continue with the next step.

   Yes: Vary off the local workstation IOP (see "Varying configuration descriptions on and off" on page 224). Then, go to step 6 on page 224 of this procedure.
2. Do you want to reset the communications IOP?

   No: Continue with the next step.

   Yes: Vary off all the lines on a communications IOP (see "Varying configuration descriptions on and off" on page 224). Then, go to step 6 on page 224 of this procedure.
3. Do you want to reset the cryptographic IOP?

   No: Continue with the next step.

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.**

4. Do you want to reset a tape, optical, or disk IOP without an attached disk unit?

   Yes: Continue with the next step.

   No: **This ends the procedure.**

5. Vary off all the IOPs and device descriptions on the IOP (see "Varying configuration descriptions on and off").
6. Enter the VRYCFG (Vary Configuration) command. Then, press F4 for prompting.
7. Enter STATUS *ON RESET *YES Then, press Enter. **This ends the procedure.**

Results

Varying configuration descriptions on and off

Access all lines, devices, and IOPs and to see and change (vary on or off) the configuration status for these resources.

About this task

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 i5/OS service commands

Service command references.

The following list provides a quick reference to commands that are commonly used in servicing the System i. For more information on some of these service commands, see the iSeries Information Center.

i5/OS 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 231)

i5/OS Command	Function:
CHGXMTLVL	Change transmit level of the facsimile I/O processor (see “Change Transmit Level (CHGXMTLVL) command” on page 229)
CRTCTLBSC	Create a controller description for a BSC controller
CRTCTLLWS	Create local workstation I/O processors
CRTDEVDSP	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.
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 “Using the configuration description label information to prepare for a system upgrade” on page 231)
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 i5/OS program; Display national language
GO MAIN	Go to the main menu
GO ORDER	Display the IBM market support commands

i5/OS Command	Function:
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
PRTERRLOG	Print information from the error log
PRTINTDTA	Print the Vertical Licensed Internal Code exception information
PWRDWNSYS *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
STRSST	Start the system service tools (see “System Service Tools (SST)” on page 211)
SNDSRVRQS	Test the support link
VFYCMN	Show the Communications Verification display (see “Verify communications” on page 236)
VFYOPT	Verify optical storage unit or library
VFYPRT	Verify printer prints a pattern on the printer
VFYTAP	Verify tape unit
VRYCFG	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 “i5/OS online problem analysis and resolution” on page 219)
WRKHDWPRD	Show the Work with Hardware Products display (see “Work with Hardware Products (WRKHDWPRD) command” on page 230)
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 Information Center.

About this task

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:
About this task

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 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" on page 228).

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, the CRITMSGUSR function specifies who is sent a *BREAK message at the time of a failure.

Use the CRITMSGUSR (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. For details on how to set up automatic problem analysis, see "ANZPRBAUTO."

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"), the RPTPRBAUTO function specifies whether the software service provider is notified. For more information on the service provider function, see "RPTSRVPVD" on page 229. 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:

This function specifies the name of the service provider for your system.

When problems are automatically reported (see "RPTPRBAUTO" on page 228), 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:

This function sends data that was collected at the time of the failure to the specified service provider.

When problems are automatically reported (see "RPTPRBAUTO" on page 228), 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

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

TELPORT specifies the port with which you want to work. The only choices are FAX1 or FAX2.

XMTLVL

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:

- At each ADDFAXCRD command request, the I/O processor tables are initialized.
- There is no online help information available for the CHGXMTLVL command.

Work with Hardware Products (WRKHDWPRD) command

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 233.

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.

About this task

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 Main Menu, type `wrksysval qipltype` and press Enter.
   b. Type 5 in the *qipltype* field to display the value. Press Enter.
   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 Main Menu, type `wrksysval qautocfg` and press Enter.
   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 Main Menu, type the `wrkhdwprd` command and press Enter: The Work with Hardware Products display appears.
4. Select **Display description label locations** and press Enter. The Display Description Label Locations display appears.
5. 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              CTL01
T1                          3              CTL03
T1                          4              BLDG6, CTL02
T1                 4                       TAP01
T1                 5                       DKT01
T2                          2              TCTCONNECT, TRNLINE
T2                          3              TRNBACKUP
T2                          4A             QESLINE, QTILINE,
QTIPASLIN
T2                          4B             *NONE
T2                          5A             SANFRAN
T2                          5B             DALLAS
T2                          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.

     Note: If no label is attached to the cable, *NONE indicates that it is not necessary to attach a label to the cable.
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 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.

Results

After completing the upgrade, verify that labels that are attached to the cables or devices match label information in the system. For details, see "Using the configuration description label information after a system upgrade."

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.

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 Enter.

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 Main Menu, type the following and press Enter: wrkhdwprd The Work with Hardware Products display appears.
8. Select **Change description label locations** and press Enter. 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  Position  Port  Label
     T1                            2           CTL01
     T1                            3           CTL03
     T1                            4           *INCORRECT
     T1                            5           *NONE
     T1                   4                    *NONE
     T1                   5                    DKT01
     T2                            2           *NONE
     T2                            3           *NONE
     T2                            4A          QESLINE, QTILINE, ...
     More...
F3=Exit   F11=Display types/serial numbers   F12=Cancel   F17=Print
```

9. 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 on page 236 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 on page 236 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 Enter.

Note: You can make more than one selection at a time, but if `More...` appears on the bottom of the screen, do not press Enter. 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 Enter.

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 235 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. For details, see "Using the configuration description label information to prepare for a system upgrade" on page 231.
25. Select Normal mode.

    Perform an immediate IPL by typing the following on the Main Menu:

    ```
    pwrdwnsys *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.

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. For details, see "Verification procedures" on page 91.

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

Use the `VFYCMN` (verify communications) command to verify correct hardware operation.

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. For details, see "Concurrent LPDA-2 tests" on page 245.
- 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 243.

Performing the verify communications procedure:

You can verify communications by using the `VFYCMN` command or the problem handling option.

About this task

To verify communications or devices on a System i, perform the following steps:

1. Check the operating system.
2. Use one of the following methods to verify communications:
   - Use the `VFYCMN` (Verify Communications) command: Type the `VFYCMN` command and press Enter.
   - Use the *Problem handling* option:
     a. On the Main Menu, select the *Problem handling* option.
     b. On the Problem Handling display, select the *Network problem handling* option.
     c. Select the *Verify communications* option.
3. Select the type of connection you want to test. For details, see "Test descriptions." Use the online help information to 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.

Test descriptions:

You can test various resources including modems, cables, I/O adapters, and Local Area Network (LAN) links.

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 properly. 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).

Notes:

- If this test completes successfully, the communications cable and the communications I/O adapter card are operating properly.\
- 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.

Note the following when testing:

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.

A wireless LAN adapter
You do not need a wrap connector.

The radio and RS-485 hardware
Run the wireless echo back test. For details, see "Wireless echo back test" on page 241.

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.

Test results:

- 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 properly 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:

The External Ring test verifies that all hardware to the network is operational.

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 and, or Local Area Network (LAN) link test:

The communications and, or 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 a System i, 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:

This utility allows you to monitor the operation of a wireless network.

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

Note:

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 243.

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:

Verify the cryptographic I/O processor cards.

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" on page 241 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 241 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

Communications tests include the wireless LAN adapter and indicators test, communications interface trace, and concurrent LPDA-2 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 Table 74 to assist in problem analysis.

Table 74. Wireless LAN adapter card indicators

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

Communications interface trace

The communications interface trace monitors the modem interface signals and detects wrong or incompatible use of the modem interface.

To achieve the most accurate sample of the lines, start the trace before varying on the communications lines. This test monitors the following modem interface signals:

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)
The request to send trace 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.

This test displays five of the modem interface signals in a graphic format, showing the time relationship of the signals to each other.

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 multiport 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

Appendix. Notices

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Regulatory notices

Class A Notices

The following Class A statements apply to the IBM System i models and IBM System p servers with the exception of those that are specifically identified as Class B.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A respecte est conforme à la norme NMB-003 du Canada.

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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Electromagnetic Interference (EMI) Statement - People's Republic of China

声　明

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種情況下，使用者會被要
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The following is a summary of the EMI Taiwan statement above.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user will be required to take adequate measures.

IBM Taiwan Contact Information

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台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

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Radio Protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit Dem deutschen EMVG vom 9.Nov.92 das EG–Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese von Geräten gilt folgende Bestimmung nach dem EMVG:

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(Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Hinweis

Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.

Class B Notices

The following Class B statements apply to model 9111-520 (stand-alone version), 9131-52A (stand-alone version), 7047-185 and the 9111-285.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables or connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interferences, and (2) this device must accept any interferences received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

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VCCI Statement - Japan

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The following is a summary of the VCCI Japanese statement in the box above.

This is a Class B product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

IBM Taiwan Product Service Contact Information

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

Electromagnetic Interference (EMI) Statement - Korea

이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거 지역에서는 물론 모든 지역에서 사용할 수 있습니다.

Radio Protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit Dem deutschen EMVG vom 9.Nov.92 das EG–Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B. Für diese von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.

(Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Hinweis

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For Taiwan: Please recycle batteries.

For California:

Perchlorate Material - special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

IBM Cryptographic Coprocessor Card Return Program

The following information applies only for systems originally sold prior to July 1, 2006:

This machine may contain an optional feature, the cryptographic coprocessor card, which includes a polyurethane material that contains mercury. Please follow local ordinances or regulations for disposal of this card. IBM has established a return program for certain IBM Cryptographic Coprocessor Cards. More information can be found at http://www.ibm.com/ibm/environment/products/prp.shtml.

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