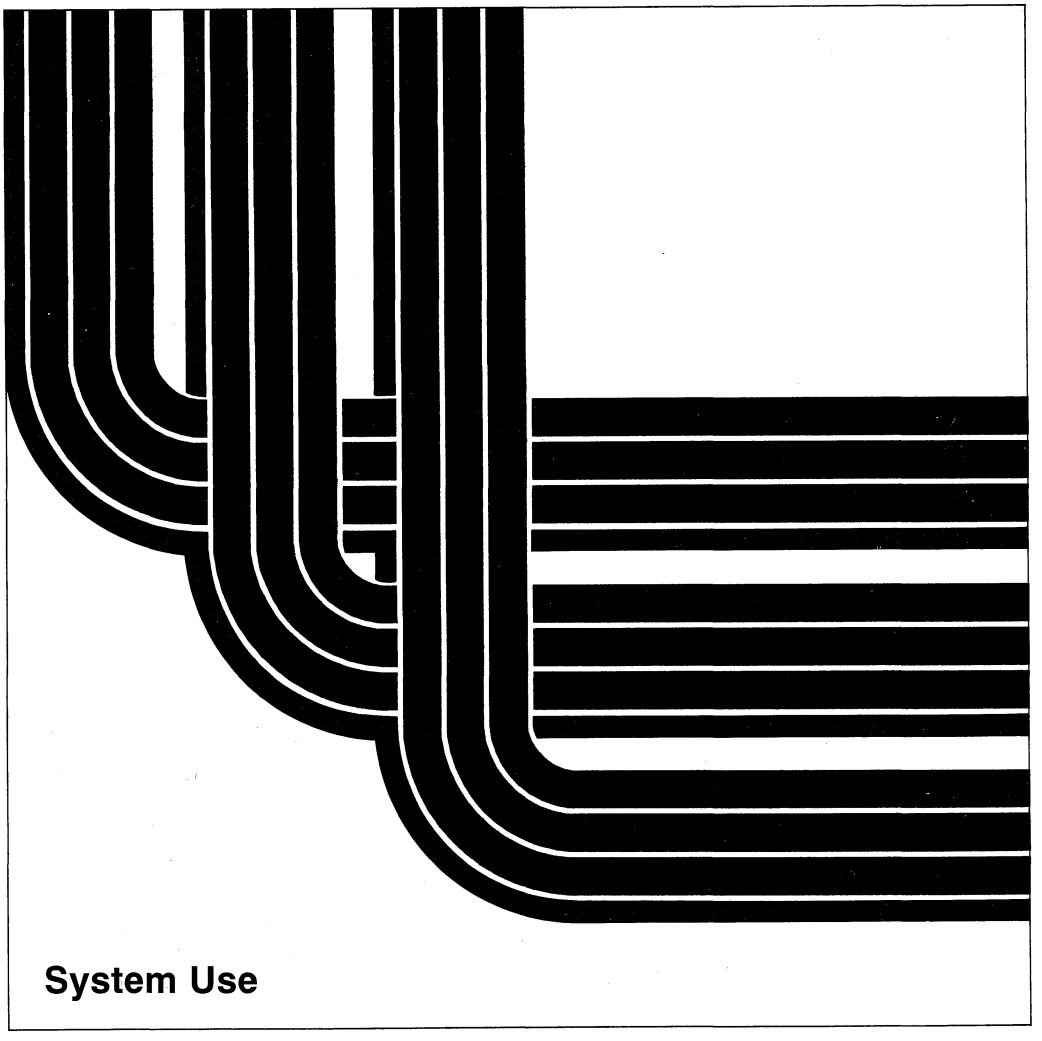
Application System/400

SC41-8082-02

System Operator's Guide

Version 2



System Use

Application System/400

SC41-8082-02

System Operator's Guide

Version 2

Take Note!

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

Third Edition (November 1993)

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Refer to the "Summary of Changes" on page xvii for a summary of changes made to the AS/400 and how they are described in this publication.

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About This Guide

As the system operator, you have many responsibilities. This guide can help you do your day-to-day tasks, such as operating the console, starting and stopping the system, responding to messages, controlling jobs and printer output, and backing up system data. It also provides information for those tasks that you may do once in a while, such as running recovery procedures, labeling and storing tapes and diskettes, applying program temporary fixes (PTFs), and initially diagnosing any system problems.

The following topics in this guide can help you maintain your system:

Messages: Chapter 6, "Handling Messages," gives you information on how to respond to messages sent to the system operator message queue (QSYSOPR), change message queues, and respond to error messages.

Tapes and Diskettes: Chapter 8, "Using Tape Units, Tapes, Diskettes, and Optical Libraries," gives you information on how to clean tape devices and handle tape media, which is important for your overall backup and recovery strategy.

Online Education: Chapter 9, "Online Education," can acquaint you with the support functions available with the AS/400 system. Take the following modules to become familiar with these services:

- "Support for Your AS/400 System"
- "Basic Problem Analysis"
- "Using the Q & A Function to Get Information"
- "Program Temporary Fix (PTF) Overview"

For information on how to start online education, see "Using Online Education" on page 9-1.

Keeping Your System Running Smoothly: Chapter 11, "Managing Your AS/400 System Operations," gives you information on how to clean up your system periodically to improve performance and maintain good running condition, as well as information on how to save and restore all of the important data that you keep on your system.

Program Temporary Fixes (PTFs): Chapter 12, "Working with Program Temporary Fixes (PTFs)," gives you information on how to order program temporary fixes (PTFs) for the problems you might encounter on your AS/400 system.

Problem Handling: Chapter 13, "Handling and Reporting System Problems," gives you information on how to solve any problem encountered on the system and Appendix A, "Problem Handling Tables and Procedures," gives you information on how to analyze and recover from problems you may encounter.

You may need to refer to other IBM manuals for more specific information about a particular topic. The *Publications Guide*, GC41-9678, provides information on all the manuals in the AS/400 library.

For a list of related publications, see the "Bibliography" on page H-1.

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Who Should Use This Guide

This guide is intended for, but not limited to, a system operator or administrator who is operating the AS/400 system.

To use this guide, you should already know how to operate the following:

Display stations
Printers
Tape devices
Diskette devices

You should already know how to do the following AS/400 system tasks:

- Sign on and off your display station
- Use function keys on your display station keyboard
- Use displays and menus, including:
  - Online help information
  - Index search
  - Send and receive messages

For information about how to do the above tasks, see the *New User's Guide*.

System/36 Environment Users

If you are using your AS/400 system in a System/36 environment, start the AS/400 system using an attended initial program load (IPL), and select the kind of environment you want to use. When you have completed the IPL, see the following manuals for information about the System/36 environment:

- *Concepts and Programmer's Guide for the System/36 Environment*
- *System Reference for the System/36 Environment*

Summary of Changes

Organization

- Information on backup and recovery has been split between the *Basic Backup and Recovery Guide*, SC41-0036 and Chapter 11 under "Saving and Restoring Objects and Information" on page 11-29.

Using Tape Units, Tapes, and Diskettes

- You can initialize a tape using the Initialize Tape (INZTAP) command. When a tape is initialized, any information previously recorded on the tape is erased and written over with new information. See "Tape Volume, Initialization, and Volume ID" on page 8-10 for more information.
- You can verify that your tape unit is working correctly. See "Verifying that Your Tape Unit Works Correctly" on page 8-1 for more information.
- Guidelines are provided for correcting common errors that can occur with tape units. See "Errors that Can Occur with Tape Units" on page 8-2 for more information.

System Management

- Using specific commands or working with options on the Save menu, you can save individual objects to a save file, tape, or diskette; save an entire user library; save documents, folders, mail and calendars; or save changed objects in a library. See "Saving and Restoring Objects and Information" on page 11-29 for more information.

9402 Server Series Model 100 System Unit and 9404 Server Series Model 135 and 140 System Units

The maximum number of display devices that may be operated concurrently (varied-on) is seven (7). Virtual display device types do **not** count toward the maximum.

All references to the 9402 System Unit also apply to the 9402 Server Series Model 100.

Changes have been made to differentiate between the 9404 Server Series Model 135 and 140 System Units. The main issues addressed are:

- Differences between the System Unit Control Panel on the 9404 Server Series System Units and the Control Panel on the 9404 System Unit.
- The absence of a Unit Emergency switch on the 9404 Server Series Model 135 and 140 System Units.

  The plug on the power supply cord serves as the emergency disconnect and the service disconnect device. Because of this requirement, ensure that the power outlet is near the equipment and is easily accessible.

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Chapter 1. What You Need to Know about Your AS/400 System

This chapter contains information about how to identify the lights, displays, and switches on the control panel of an Application System/400* (AS/400*) 9402 System Unit, a 9404 System Unit, or a 9406 System Unit.

AS/400 System Units

The AS/400 system units are shown in Figure 1-1.

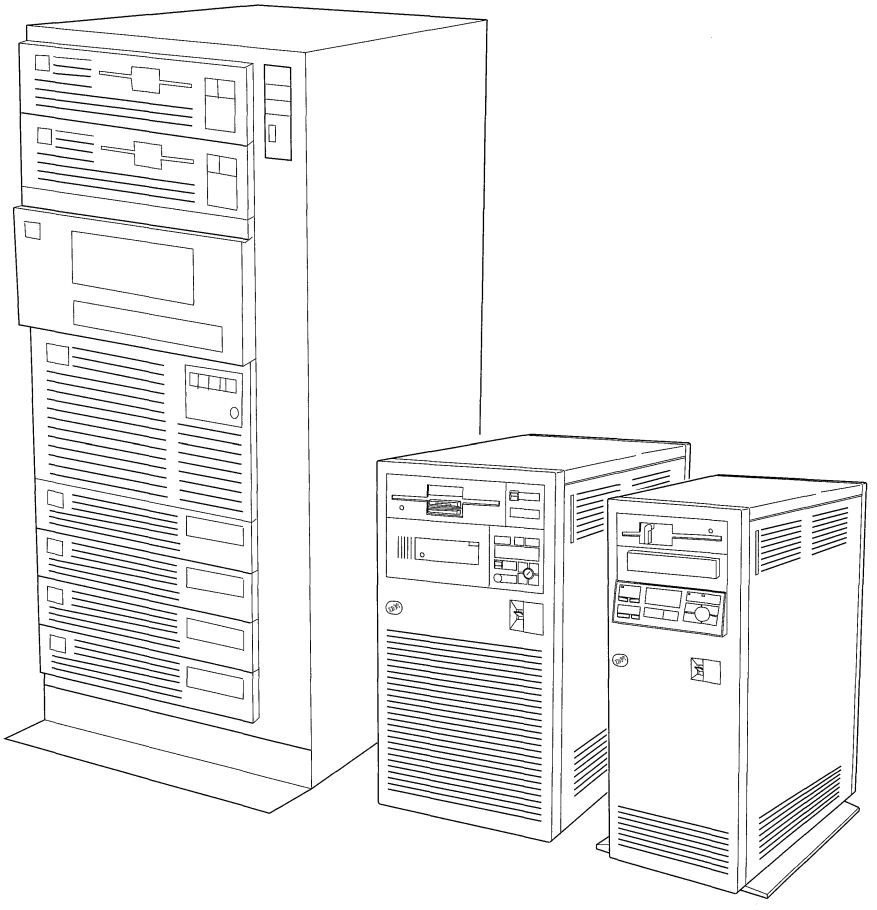

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Figure 1-1. 9406 System Unit in a Rack Enclosure (Left), 9404 System Unit (Middle), and AS/400 9402 System Unit (Right)

The following devices can be attached to your system:

- Printers
- Work stations
- Tape units
- Remote controllers
- Personal computers

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If you have an AS/400 9402 System Unit, 9404 System Unit, or 9406 System Unit, you may also have the expansion unit, which is an additional rack of equipment for expanding your system function.

Your system receives data (input) from each work station, from disk, from diskette, from tape, and from communications lines. The processing unit (in the system unit) processes the data and saves the data on disk, on diskette, or on tape. The processed data (output) can also be directed to a printer or a work station.

The system unit contains the main storage used for processing and has a control panel to control the way your system starts and stops.

The 9406 System Unit is installed in a rack. The system unit, along with disks, diskettes, and tape devices, are housed in one or more racks.

The 9402 and 9404 System Units are self-contained systems. The system unit, as well as the disk, diskette, and tape devices, are housed in a single cabinet.

Devices such as printers, remote controllers, and display stations can be connected to all three system types.

- Disk devices contain storage media of flat, circular sheets with magnetic surfaces (disks) on which information is stored. The system can read data from the disk and write data to the disk.
- A diskette can be placed in a diskette unit so that the system can read data from the diskette and write data to the diskette. Diskettes are used primarily to save and restore small amounts of data.
- A tape cartridge can be placed in a tape unit so that the system can read data from the tape and write data to the tape.
- Printers are used to write the data contained on the system on paper.
- A remote controller, which controls the operation of remote devices and allows you to communicate with other systems, is attached to a communications line.
- Display stations are used to supply data to the system or display data that is contained on the system.

The 9402 Server Series Model 100 System Unit and the 9404 Server Series Models 135 and 140 System Units are specifically designed for server applications. Because of this design, a program running in batch may perform better than the same program running interactively.

A second effect of this design is that these models have a maximum number of display devices that may be operated concurrently (varied-on). The maximum number of display devices is seven. This limit only applies to display device types of *RMT or *LCL, in any combination; the limit does **not** affect any other display device types, such as *VRT. The system console counts as one toward the maximum.

As an example, a 9402 Server Series Model 100 or a 9404 Server Series Model 135 or 140 System Unit could have the following display devices operating concurrently (varied-on):

Device Type	Number of Devices
Direct-attach System Console	1
Direct-attach User Terminal	3
Remote Displays	3
Total number of display devices:	7

The number of display devices configured as *VRT is only limited by what each system unit supports. The *VRT display devices do not count toward the limit of 7.

System Unit Control Panels

The control panel is used by system operators and service representatives. You can use the control panel to do an initial program load (IPL) and problem analysis. Following the illustrations, details of the control panels are described.

AS/400 9402 System Unit Control Panel

Figure 1-2 shows the AS/400 9402 System Unit control panel.

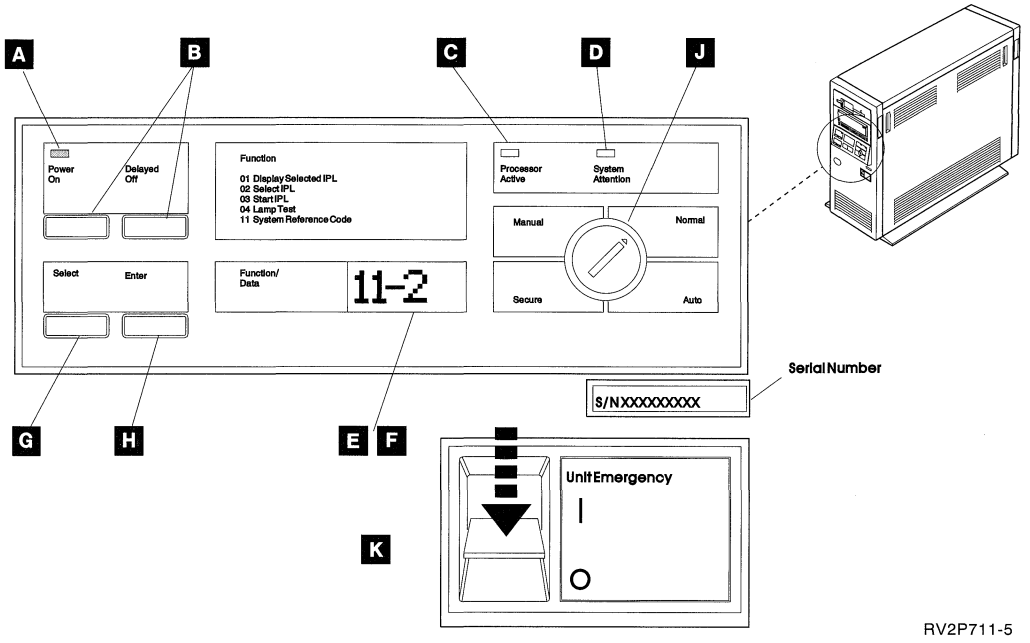

Figure 1-2. AS/400 9402 System Unit Control Panel

9404 System Unit Control Panel

Figure 1-3 shows the 9404 System Unit control panel.

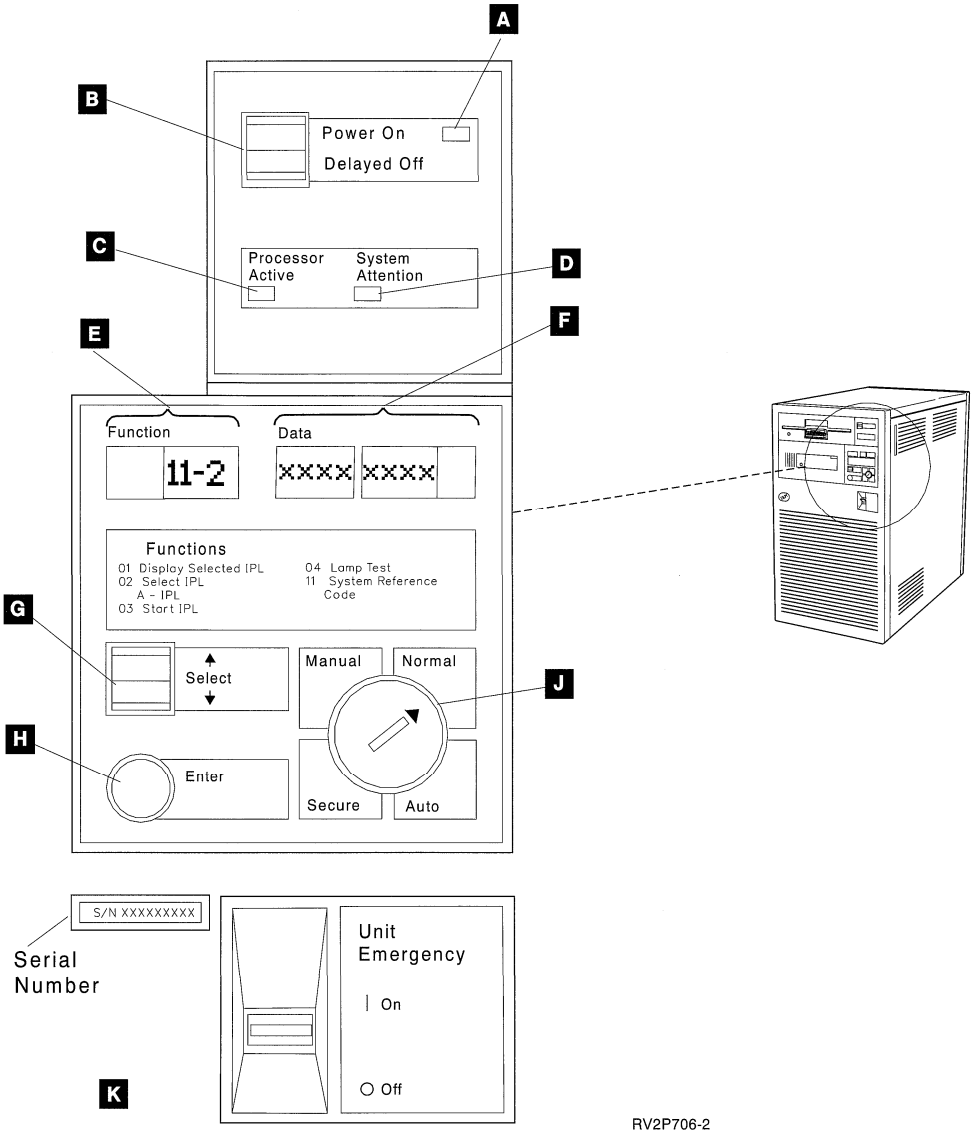

Figure 1-3. 9404 System Unit Control Panel

9404 Server Series Models 135 and 140 System Unit Control Panel

Figure 1-4 shows the control panel for the 9404 Server Series Model 135 and 140 System Units.

Note: The plug on the power supply cord serves as the emergency disconnect and the service disconnect device. Because of this requirement, ensure that the power outlet is near the equipment and is easily accessible.

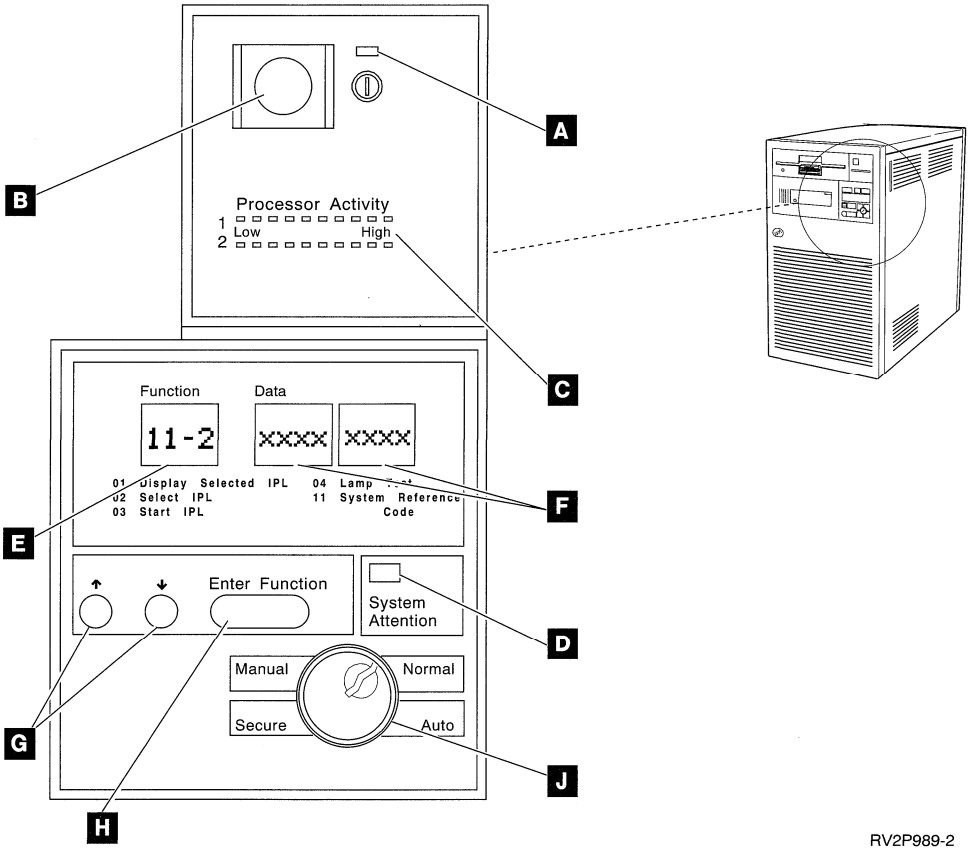

Figure 1-4. 9404 Server Series System Unit Control Panel

9406 System Unit Control Panel

Figure 1-5 shows Version 2 of the 9406 System Unit control panel.

Note: Some 9406 Version 2 control panels may have more than two rows of Processor Activity lights. If you are using Version 1 of the 9406 System Unit, your control panel looks slightly different.

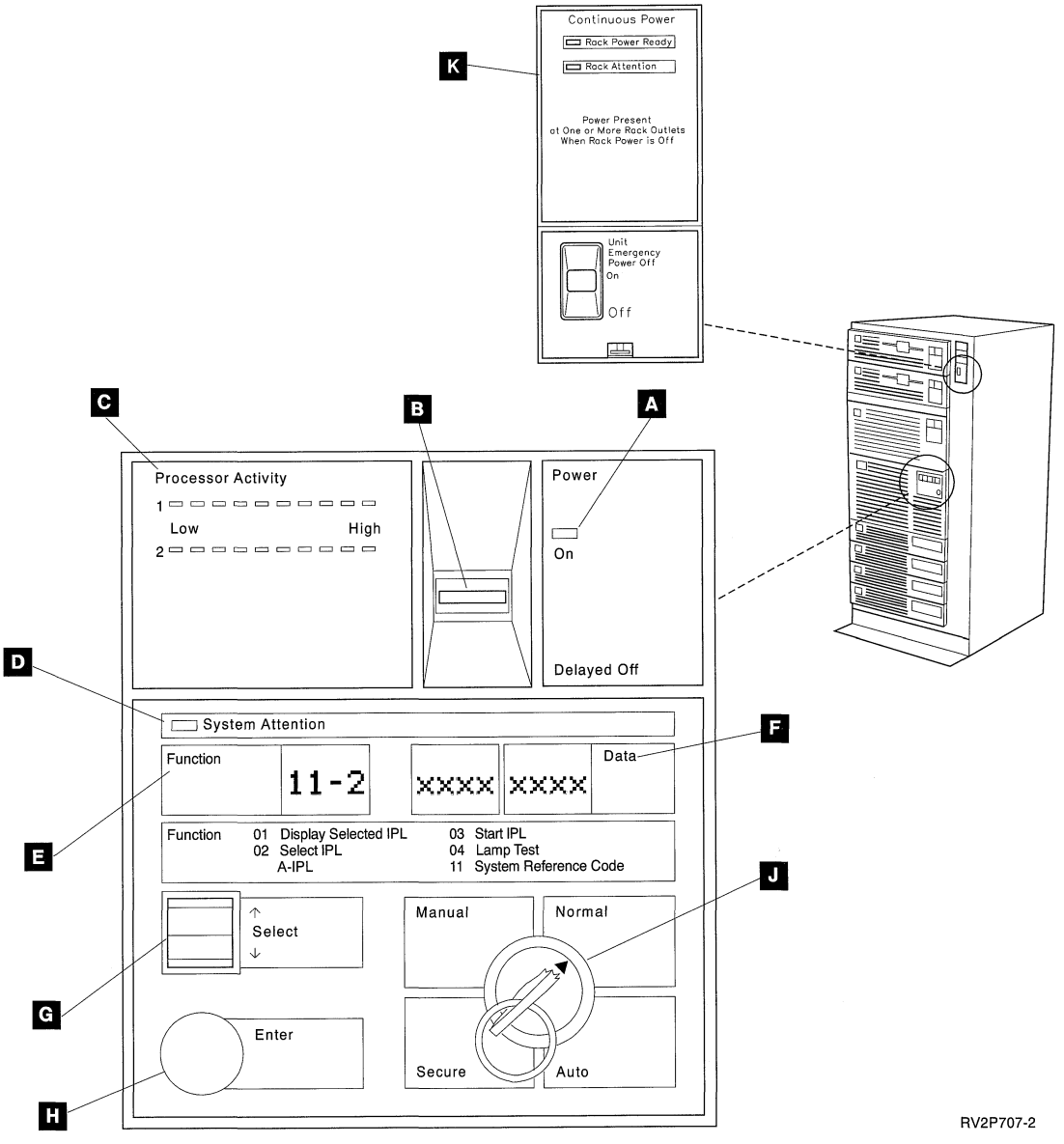

Figure 1-5. 9406 System Unit Control Panel

Control Panel Details

A **Power On:** The light comes on when there is power to the system unit.

Note: The Power On light blinks when the system is being started up and when the system is manually turned off. When the Power Down System (PWRDWNSYS) command or the options on the Power On and Off Tasks (POWER) menu are used, the Power On light does not blink.

B **Power switch:** For the AS/400 9402 System Unit, there are two separate switches for Power On and Delayed Off. You can press the Power On switch to start the system or the Delayed Off switch to stop the system.

For the 9404 Server Series Models 135 and 140 System Units, the power switch is a button. Press the button to start the system; press it again to stop the system.

Note: In most cases, use the Power Down System (PWRDWNSYS) command on any command line of your display station to stop the system. If you use the Power switch to turn off your system, errors may occur with your data files.

For the 9404 and 9406 System Units, the manual Power switch can be moved to the Power On (top) position to start the system or the Delayed Off (bottom) position to stop the system.

When you move the Power switch to either the Power On or Delayed Off position and remove your hand from the switch, the switch returns to the center position.

If you have a 9406 System Unit and the keylock switch is in the Manual or Normal position, the system unit and the racks, if attached, will do an IPL when the Power switch is moved to the On position. Similarly, if the keylock switch is in the Manual position when the Power switch is moved to the Delayed Off position, the system unit and racks, if attached, turn off.

Note: If there is a power failure, the 9406 System Unit and the racks also turn off.

If you have an AS/400 9402 System Unit or 9404 System Unit and the keylock switch is in the Manual or Normal position, the system unit and the expansion unit, if attached, will do an IPL when the Power switch is moved to the On position. Similarly, if the keylock switch is in the Manual position when the Power switch is moved to the Delayed Off position, the system unit and expansion unit, if attached, will turn off.

Note: If there is a power failure, the AS/400 9402 and 9404 System Units turn off. If there is an expansion unit attached to the 9404 System Unit, it will also turn off. If there is an expansion unit attached to the AS/400 9402 System Unit, a utility power failure does not cause the expansion unit to power off, but a system power supply failure probably will power off the expansion unit.

If you have an AS/400 9402 System Unit and the keylock switch is in the Manual or Normal position, the system unit will do an IPL when the Power On switch is pressed. Similarly, if the keylock switch is in the Manual position when the Delayed Off switch is pressed, the system unit will turn off.

For more information on stopping the system, see "Stopping the System" on page 2-23.

C **Processor Activity** (Figure 1-5 on page 1-7) or **Processor Active** (Figure 1-3 on page 1-5): On the 9406 and the 9404 Server Series Models 135 and 140 System Units, the Processor lights provide a graphical display of the processor activity. On the AS/400 9402 and 9404 System Units, the Processor Active light blinks when programs are running.

D **System Attention:** This light comes on when the system requires operator attention, such as correcting a severe system failure. For information about correcting system problems, see Chapter 13, "Handling and Reporting System Problems."

E **Function display:** The Function display shows the function information that has been entered. The left two positions indicate the number that is selected using the Select switch.

Function/Data display: The AS/400 9402 System Unit has only one display for both function and data. When you press the Select switch, the function number appears in the Function/Data display. Then when you press the Enter pushbutton, the function number disappears, and the data is shown for the previously displayed function. The AS/400 9402 System Unit Function/Data display can display up to 8 digits.

Notes:

1. Only the numbers of those functions that can be done in the present keylock position are displayed.
2. When the Select switch is pressed, the Data display is cleared.
3. The selected function is not sent to the processing unit until the Enter pushbutton is pressed.

F **Data display:** The 9404 and 9406 Data displays can show up to 8 digits for system reference codes or other information from the processing unit or the control panel.

The Data display clears whenever the Select switch is pressed or a different function is shown on the Function display. When you press the Enter push-button, the Data display can again display data.

G **Select switch:** The Select switch can be used to increase or decrease the number shown in the Function display. The Select switch can also be used to change the data shown in the Data display when you are selecting an initial program load (IPL).

For the 9406 and 9404 System Units, the numbers in the Function display decrease in value when you press the lower portion of the Select switch. Similarly, when you press the upper portion of the Select switch, the numbers in the Function display increase in value.

When the Function display has reached its maximum number and the upper portion of the Select switch is pressed again, the next number shown is the minimum number. Similarly, when the Function display has reached its minimum number and the lower portion of the Select switch is pressed again, the next number shown is the maximum number.

There are two Select switches for the 9404 Server Series Models 135 and 140 System Units. The first switch increases the values in the Function display, and the second switch decreases the values.

For the AS/400 9402 System Unit, the number on the Function/Data display increases in value when you press the Select switch, until it reaches the maximum value. If you press the Select switch again, the next number shown is the minimum number.

H **Enter pushbutton:** The Enter pushbutton is used to send function information shown in the Function display to the processing unit or save the type of IPL you selected.

J **Keylock switch:** This switch has four positions: Manual, Normal, Auto, and Secure. You can stop the system by using the Power Down System (PWRDWNSYS) command on the command line of any display station when the keylock is in any position. For more information, see "Stopping the System" on page 2-23.

You can also display the kind of IPL the system is set to do when the keylock is in any position. The following table summarizes what you can do with the keylock switch in the Manual, Normal, Auto, or Secure position:

Operation	Manual Keylock Position	Normal Keylock Position	Auto Keylock Position	Secure Keylock Position
Turn on system (Power switch)	Allowed	Allowed	Not allowed	Not allowed
Delayed off	Allowed	Not allowed	Not allowed	Not allowed
Display Selected IPL	Allowed	Allowed	Allowed	Allowed
Select IPL	Allowed	Not allowed	Not allowed	Not allowed
Start IPL	Allowed	Not allowed	Not allowed	Not allowed
Display system reference code	Allowed	Allowed	Allowed	Allowed
Remote IPL	Not allowed	Program control allowed	Program control allowed	Not allowed
Timed IPL	Not allowed	Program control allowed	Program control allowed	Not allowed
Restart IPL (after power failure)	Not allowed	Program control allowed	Program control allowed	Not allowed
Power Down System command	Program control allowed	Program control allowed	Program control allowed	Program control allowed

Manual:

When the keylock switch is in the Manual position, the system allows you to do all manual IPLs, such as an operator-attended IPL from disk or tape, and manual control functions, such as select an IPL or display the kind of IPL that the system is set to run. When the keylock switch is in the Manual position, you cannot do a remote IPL, IPL by date and time, or an IPL after a power failure.

If the keylock switch is in the Manual position, you can stop the 9406 System Unit or the 9404 System Unit by moving the Power switch to the Delayed Off position; for the AS/400 9402 System Unit, press the Delayed Off switch to stop the system.

For more information, see "Stopping the System" on page 2-23.

Note: You should only move the keylock switch to the Manual position when necessary. This will ensure that no one accidentally moves the Power switch to the Delayed Off position and causes the system to stop.

Normal:

The Normal position of the keylock switch allows you to manually turn the power on and to do each of the automatic operations. That is, you can start the system by doing a manual or remote IPL, an IPL by date and time, or an IPL after a power failure.

If you want to stop the system when the keylock switch is in the Normal position, use the Power Down System (PWRDWNSYS) command at any display station. You must have QSYSOPR authority to use the Power Down System (PWRDWNSYS) command.

Secure:

The Secure position locks the control panel on the system unit. You can only stop the system from a display station using the Power Down System (PWRDWNSYS) command.

Auto:

The Auto (automatic) position of the keylock switch allows a remote IPL, IPL by date and time, and an IPL after a power failure.

When the keylock switch is in the Auto position, you cannot:

- Start the system by doing an IPL manually.
- Stop the system by moving the Power switch to the Delayed Off position or by pressing the Delayed Off switch.
- Select a different IPL method using the Select switch.

For more information about the types of IPLs, see Chapter 2, "Starting and Stopping the System."

K **Unit Emergency switch:** This switch has two positions: the On (top) position and the Off (bottom) position.

On the 9406 System Unit, this switch controls the power to all units and devices attached to or contained in the frame.

On the 9404 System Unit, this switch controls the power to the system unit and the expansion unit, if one is attached. The expansion unit also has a Unit Emergency switch (located in the same relative position as the switch on the system unit), which controls the power to the expansion unit only.

Notes:

1. There is no Unit Emergency switch on the 9404 Server Series Model 135 and Model 140 System Units.
2. The plug on the power supply cord serves as the emergency disconnect and the service disconnect device. Because of this requirement, ensure that the power outlet is near the equipment and is easily accessible.

On the AS/400 9402 System Unit, this switch controls the power to the system unit and all devices contained in the system unit and causes the expansion unit to power off, if one is attached. The expansion unit also has a Unit Emergency switch (located in the same relative position as the switch on the system unit), which controls the power to the expansion unit only.

Warning: If you use the Unit Emergency switch to stop the system, you may have results that cannot be predicted in your data files, and it may cause the next IPL to take longer to complete.

System Power Control Network Control Panel

The system power control network (SPCN) control panel (available only on Version 2 of the 9406) is an asynchronous communications network that gives the Operating System/400* (OS/400*) licensed program control of electrical power. This control panel allows the SPCN to display power fault information for the unit.

Figure 1-6 shows the SPCN control panel that contains a power switch, a Power On light, an Attention light and an 8-digit liquid crystal display (LCD).

Note: This control panel is available only on the expansion and extension units (5040 and 5042) and the 9406 Removable Storage Unit (5032).

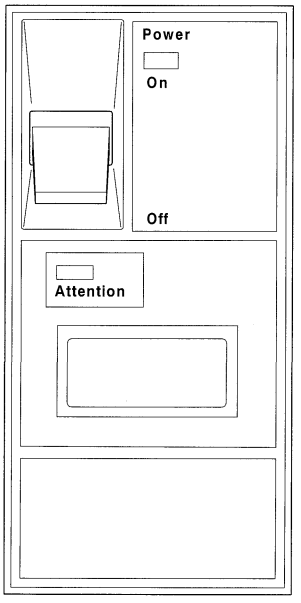

Figure 1-6. SPCN Control Panel

The following are components of this panel:

Power switch Controls the power for everything that is installed in the unit.

Power On light Indicates when power is available to the unit.

Attention light Used by the SPCN to indicate that a power fault has been detected.

8-digit LCD Used to display the SPCN address, power status, or an SPCN reference code.

Address and Fault Displays

The SPCN control panel is used by the system power control network to display the unit's power address during normal conditions and an error code during a power failure.

Figure 1-7 shows the normal running display with *rru where rr is the rack address and ranges from 01 to 63 and u indicates which SPCN port the unit is connected to, and ranges from 1 to A (1 through 10).

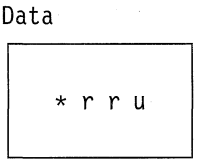

Figure 1-7. SPCN Address Display

When a power error occurs, the SPCN node displays an error code on the unit control panel and sends a message to the operating system. Figure 1-8 shows that this error code always starts with a 1 followed by the rr (rack address) and u (unit address) followed by the four digit reference code cccc.

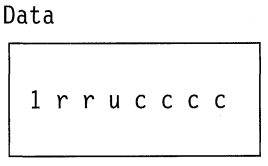

Figure 1-8. SPCN Fault Display

Use the message in the system operator's message queue (QSYSOPR) rather than the error code displayed on the unit control panel to solve the problem. For information on how to begin solving a system problem, see Chapter 13, "Handling and Reporting System Problems."

Battery Power Unit for the AS/400 9402, 9404, 9404 Server Series and 9406 System Units

A battery power unit is an optional feature for the AS/400 9402 and 9404 System Units. It is a standard feature for the AS/400 9404 Server Series Model 135 and 140 System Units and for the 9406 Model D, E, F, and G System Units. In order for the system unit to be protected against temporary power loss, each system unit must have a battery power unit. The battery feature on the AS/400 9402, 9404, or 9406 System Units supports the disk units installed in the system unit. The battery has sufficient power to keep the processing unit and the disk unit powered for a minimum of five minutes in the event of a loss of utility power. This provides enough time to copy the contents of main storage to the disk units.

Chapter 2. Starting and Stopping the System

To start the system, turn the system power on and do an initial program load (IPL). During an IPL, system programs are loaded from the system auxiliary storage and the system hardware is checked. When the IPL is finished, the Sign On display is shown on all available display stations.

You can stop the system (turn the power off) using the Power On and Off Tasks (POWER) menu. To get to the Power On and Off Tasks (POWER) menu, type `go power` on any command line and press the Enter key. You can also stop the system by moving the Power switch to the Delayed Off position, by pressing the Delayed Off switch, or using the Unit Emergency switch. However, using these switches is not recommended due to the errors that may occur with your data files.

You can set up a schedule that automatically powers your system on and off. You can determine the time of day you want the system powered on and off and specify special circumstances that change that normal daily schedule, such as a holiday or special closing.

This chapter is divided into two parts. Basic information about starting your system and setting up the power on and off schedule can be found in "Starting the System." Information on different ways to stop your system is included in "Stopping the System" on page 2-23.

Starting the System

When you start your system by turning the power on, an IPL is done for the system to reset storage and recognize changes to certain system characteristics.

There are four different situations that typically require an initial program load: starting normal operations, starting a remote system, changing configuration options, and recovering after a power failure. When your system is sent to you, it is set to do a normal or unattended IPL. An **unattended IPL** is done automatically by the system after the power is turned on, then the Sign On display is shown on all available display stations. An **attended IPL** shows displays on the display station you are using for a console, which allows you to change the configuration options such as how the system does an IPL and how the system runs.

Table 2-1 on page 2-2 shows a summary of how to do IPLs from the operator panel. The following sections explain these steps in more detail.

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Table 2-1. IPL Summary

System State	Unattended IPL	Attended IPL
Running	1. Move keylock switch to **Normal**. 2. Type `PWRDWNSYS *IMMED RESTART(*YES)` on any command line and press the Enter key.	1. Move keylock switch to **Manual**. 2. Type `PWRDWNSYS *IMMED RESTART(*YES)` on any command line and press the Enter key. 3. Follow the displays on the console to complete the IPL. 4. Move keylock switch to **Normal**.
Not Running	1. Move keylock switch to **Normal**. 2. Power on all devices. 3. Move Unit Emergency switch to **On**. 4. Move Power switch to **Power On**.	1. Move keylock switch to **Manual**. 2. Power on all devices. 3. Move Unit Emergency switch to **On**. 4. Move Power switch to **Power On**. 5. Follow the displays on the console to complete the IPL. 6. Move keylock switch to **Normal**.

Note: Always move the keylock switch to **Normal** after the IPL is finished.

Normal Operations (Unattended IPL)

Before You Start

- The keylock switch must be set to the Normal (unattended IPL) position.
- The QIPLTYPE system value must be set to 0 (unattended IPL). See "System Values that Control IPL" on page 2-13 for information on how to set this system value. If this is the first time you are doing an IPL, the QIPLTYPE system value is already set to 0.

  Note: The system must be powered on and the IPL complete before you can display or change the QIPLTYPE system value.
- An unattended IPL usually takes 15 to 20 minutes to complete.

To do an unattended IPL:

1. Turn on the power of any display stations, printers, tape devices, diskette devices, and controllers you or others may want to use.
2. Move the Unit Emergency switch upward to the On position. The Unit Emergency switch is located in the upper right corner on each 9406 System Unit rack, and on the middle right side on the 9404 and AS/400 9402 System Units.

Notes:

a. There is no Unit Emergency switch on the 9404 Server Series Model 135 and Model 140 System Units.

   - The plug on the power supply cord serves as the emergency disconnect and the service disconnect device. Because of this requirement, ensure that the power outlet is near the equipment and is easily accessible.

b. You only need to perform Steps 1 and 2 during the first IPL or after an emergency power off.

Figure 2-1 shows the control panels for the 9406, 9404, 9404 Server Series, and AS/400 9402 System Units.

Note: Some 9406 Version 2 control panels may have more than two rows of Processor Activity lights.

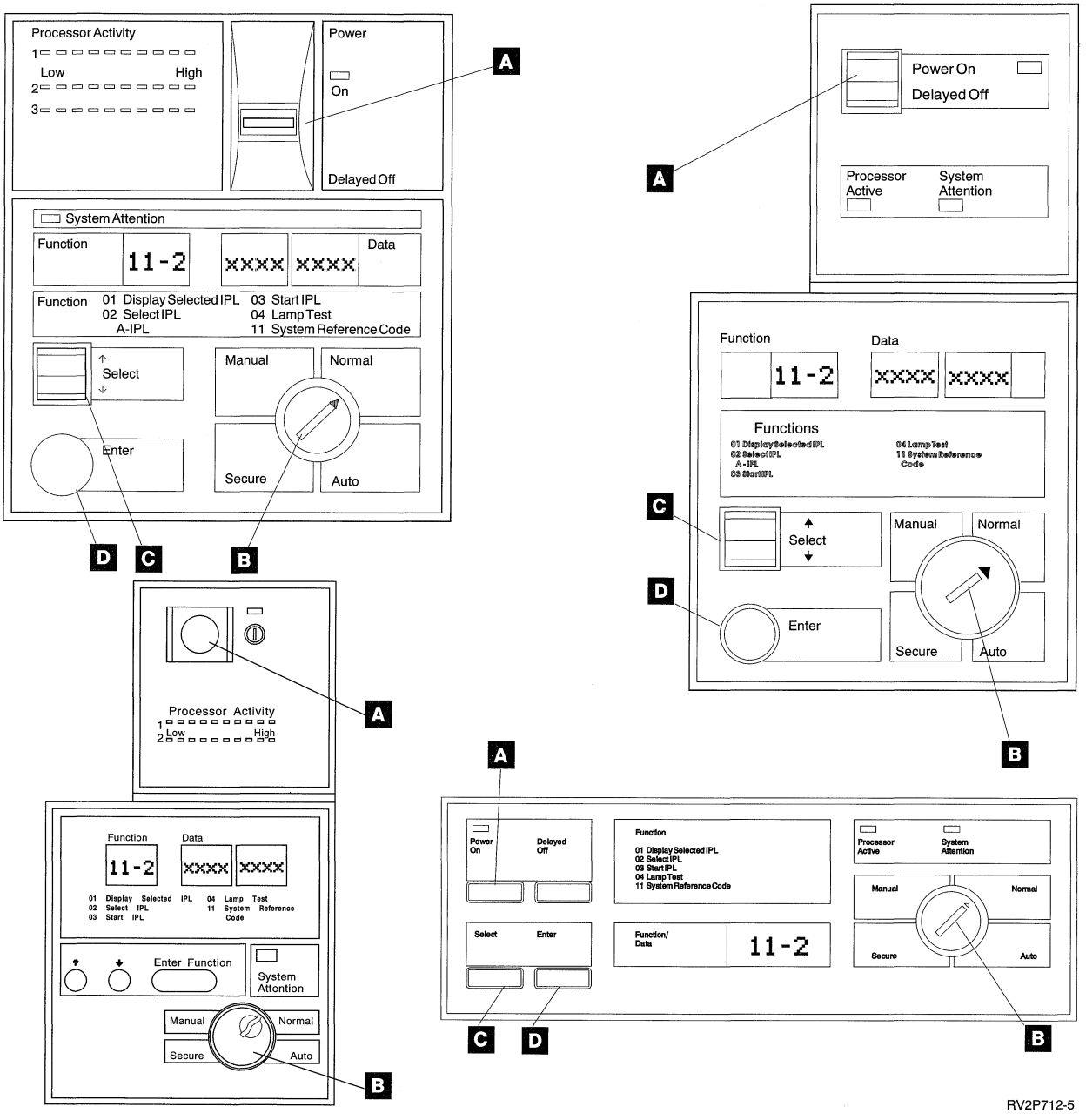

Figure 2-1. System Unit Operator Panels. 9406 System Unit (Upper Left), 9404 System Unit (Upper Right), AS/400 9402 System Unit (Lower Right), and 9404 Server Series System Unit (Lower Left).

3. Make sure the keylock switch **B** is in the Normal position. Use the Power switch **A** to turn on the system.
4. When the unattended IPL is done, Figure 2-2 on page 2-5 shows the Sign On display that appears on any available display station.

Signing On the System

To sign on the system:

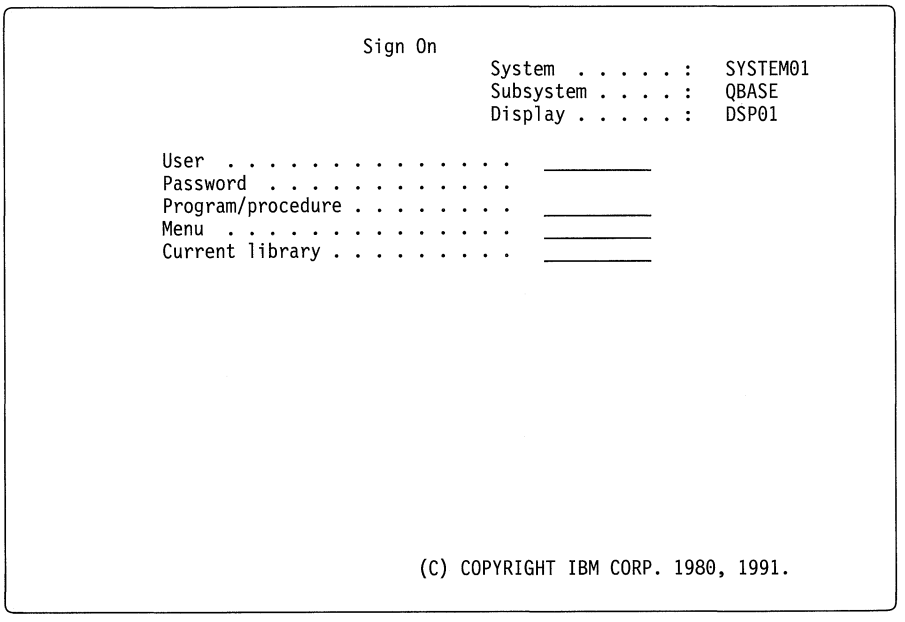

Figure 2-2. Sign On Display

1. Type your user ID, your password (if security is active), and fill in any of the optional entry fields you want to use. Use the Tab key to move the cursor from field to field on the display.

   Notes:

   a. The *Password* field is displayed only if password security is active on the system.

   b. In the top right corner of the Sign On display, the name of the system you are using, the subsystem the system is using, and the display station identifier (ID) are shown.

2. Press the Enter key.

   If this is an unattended IPL, (depending on what options you select on this display or what is defined in your user profile), one or more of the following occurs:

   - The AS/400 Main Menu is displayed.
   - Another menu is displayed.
   - A program or procedure is run.
   - A current library is inserted into your library list.

If you specify a program or procedure to run and a menu to be displayed, the program or procedure is run first and then the menu is shown.

Now that your system is up and running be aware that:

- The Operational Assistant* displays are now the default.
- The system cleanup functions are automatically started with default values. See "Setting Up Automatic Cleanup" on page 11-34 to customize the cleanup function.
- The Attention key program defaults to display the Operational Assistant (ASSIST) menu.

Note: If this is an attended IPL, the IPL Options display is shown. Go to step 6 on page 2-11.

Setting Up Your Automatic Power On and Off Schedule

You can plan when you want to power on and off the system by setting the power on and off schedule. To work with the power on and off schedule, go to the Power On and Off Tasks (POWER) menu.

Note: You can also display this menu from the Customize your system, users, and devices (SETUP) menu by selecting option 3 (Power on and off tasks).

Displaying the Power On and Off Schedule

The power on and off schedule ensures that the system is powered on and off at specific times during the day or night. To view this schedule, type `go power` on any command line, press the Enter key, and select option 1 (Display power on and off schedule) on the Power On and Off Tasks menu.

The power on and off schedule shows the date, day, and time (using the 24-hour clock) that the system will be powered on and off. The *Description* column includes comments about those days that have been changed from the system's regular schedule. Any user can display this schedule.

Changing Power On and Off Schedule Defaults

To set up your own power on and off schedule, select option 2 (Change power on and off schedule) on the Power On and Off Tasks (POWER) menu. On the Change Power On/Off Schedule display, press F10 (Change power on/off defaults). Figure 2-3 shows the Change Power On/Off Defaults display.

```
                        Change Power On/Off Defaults
                                                          System:   SYSTEM01
Type choices below, then press Enter.

First day of week . . . . . .  1    1=Sunday, 2=Monday, 3=Tuesday,
                                     4=Wednesday, 5=Thursday, 6=Friday,
                                     7=Saturday

Minutes before power off to send
  message . . . . . .  20   0-60

                      Default      Default
Week                  Power        Power
Day                   On           Off
Sunday                07:30:00     20:00:00
Monday                05:30:00     ________
Tuesday               ________     ________
Wednesday             ________     ________
Thursday              ________     ________
Friday                ________     23:00:00
Saturday              07:30:00     20:00:00

F1=Help   F3=Exit   F12=Cancel
```

Figure 2-3. Change Power On and Off Defaults Display

On this display, you can change the first day of the week by typing a number in the *First day of week* field. Also, the system automatically sends users a message telling them when the system will be powered off. You can indicate how many

minutes before power off you want the system to send this message in the *Minutes before power off to send* field.

When the system sends the power off message, you can delay the scheduled time for powering off from 30 minutes to 3 hours when you reply to the message. Then the system will wait the time specified before powering off. You do not have another chance to delay the time.

For example, as shown in Figure 2-3 on page 2-6, on Mondays you want the system powered on at 5:30 a.m. and off on Fridays at 11:00 p.m. On Saturdays and Sundays you want the system powered on at 7:30 a.m. and off at 8:00 p.m. Type the new times in the *Default Power On* and *Default Power Off* columns next to Saturday and Sunday. When you press the Enter key, your changes are shown on the Display Power On/Off Schedule and the Change Power On/Off Schedule displays.

Remember...

To make sure the system powers on completely after being powered off, check to see if the keylock switch is in the Normal position.

Changing a Day in the Power On and Off Schedule

Figure 2-4 shows the Change Power On/Off Schedule display where you can change the power on and off schedule for a single day.

```
                    Change Power On/Off Schedule                SYSTEM01
                                                          3/13/90  20:17:05
Start list at . . . . . . . . 04/29/90       Date

Change times and descriptions below, then press Enter.  To change defaults,
  press F10.

                    Power     Power
Date      Day       On        Off       Description
04/29/90  Sun       07:30:00  20:00:00  _____________________________
04/30/90  Mon       05:30:00  _______   _____________________________
05/01/90  Tue       _______   _______   _____________________________
05/02/90  Wed       _______   14:30:00  Closing - company picnic
05/03/90  Thu       05:30:00  _______   _____________________________
05/04/90  Fri       _______   23:00:00  _____________________________
05/06/90  Sat       06:40:00  20:00:00  _____________________________

05/07/90  Sun       07:30:00  20:00:00  _____________________________
05/08/90  Mon       05:30:00  _______   _____________________________
05/09/90  Tue       _______   _______   _____________________________
05/10/90  Wed       _______   _______   _____________________________
                                                                 More...
F1=Help   F3=Exit   F10=Change power on/off defaults   F12=Cancel
```

Figure 2-4. Change Power On and Off Schedule Display

For example, to change the power on and off time for the plant's company picnic on Wednesday, May 2:

1. Type `14:30` in the *Power Off* column to power the system off at 2:30 p.m. so the employees can attend the picnic.
2. Type the reason for the change, `Closing - Company picnic`, in the *Description* column across from the date and time and press the Enter key.

3. Type the start time `5:30` in the *Power On* column to power the system back on Thursday, May 3.

To display the schedule starting on a different date, type the date you want to start with in the *Start list at* field and press the Enter key. The information displayed begins with the date you specify.

Solving Problems with the Automatic Power Schedule

If the power schedule is not working:

- Make sure the Start Cleanup (STRCLNUP) command is part of your startup program.

  The automatic power scheduler uses a job called QSYSSCD to process the requests for schedule changes. The Start Cleanup (STRCLNUP) command must be run to start the QSYSSCD job. The IBM*-supplied startup program includes the Start Cleanup (STRCLNUP) command. If you have your own startup program from a previous release, it may not contain the Start Cleanup (STRCLNUP) command.

- Make sure that the Change Cleanup (CHGCLNUP) command specifies

  `Y`

  for allow automatic cleanup. The QSYSSCD job will not start if you do not allow automatic cleanup.

- Make sure the Start Cleanup Command (STRCLNUP) command submits the QSYSSCD job to the job queue specified in the Change Cleanup (CHGCLNUP) command.
- Check to see if the QSYSSCD job is running; it could be on a held job queue.
- Check to see that the job queue that the Start Cleanup (STRCLNUP) command is submitted to does not have the maximum jobs set to 1. Because the QSYSSCD job runs forever, the other jobs that perform automatic cleanup and power off functions cannot start. to run forever, clogging up that job queue so other jobs cannot start.
- Make sure the keylock switch is in the Normal or Automatic position.

Starting a Remote System

To start the remote system automatically using a telephone and modem, you need to set system value QRMTIPL to 1 (see "System Values that Control IPL" on page 2-13).

Before You Start

- Set the keylock switch on the control panel to Normal or Auto and turn the system power off.
- After the system is turned off and is made ready for remote IPL, do not turn the modem on or off. Otherwise, the system may start unexpectedly, although it will turn itself off in a few minutes.

To start the remote system:

1. Dial the telephone number of the remote system.

   Warning: If you hang up before the silence, the IPL may not complete.

2. Wait about 20 to 40 seconds while the telephone rings; you will hear a modem tone and then silence.
3. Hang up the telephone. The system does an IPL and the Sign On display is shown.
4. Go to "Signing On the System" on page 2-4.

Note: A 9406 System Unit may also start a remote power on from any rack in the system power control network (SPCN). Switching pin 1 of the J11 connector on the power control compartment (PCC) to ground, or pin 9 to +5 volts will cause the system to do an IPL if a remote IPL has been enabled as described in the previous steps.

Changing Your System during IPL (Attended IPL)

To change IPL options, install the operating system, use dedicated service tools, or recover from a system failure, do an attended IPL.

Before You Start

- Set the keylock switch in the Manual position, or
- Set the QIPLTYPE system value to 1. For information on how to set this system value, see "System Values that Control IPL" on page 2-13.

  Note: The system must be on before you can display or change the QIPLTYPE system value.

Doing an Attended IPL when the Power Is Off

1. Make sure the power for the display station you are using as the console is turned on. The power should be turned on for display stations, printers, tape devices, diskette devices, and controllers you or others may want to use.
2. Use the control panel to do the following (see Figure 2-1 on page 2-4).
   a. Make sure the keylock switch **B** is in the Manual position.
   b. Move the Unit Emergency switch upward to the On position. The Unit Emergency switch is located in the upper right corner on the 9406 System Unit, and on the middle right side on the 9402 and 9404 System Units.

      Notes:

      1) There is no Unit Emergency switch on the 9404 Server Series Model 135 and 140 System Units.
      2) The plug on the power supply cord serves as the emergency disconnect and the service disconnect device. Because of this requirement, ensure that the power outlet is near the equipment and is easily accessible.

   c. Use the Power switch **A** to turn on the power.

      Note: When you have completed the attended IPL, you may want to move the keylock switch to the Normal position.

Doing an Attended IPL when the Power Is On

If the system is running and you are able to enter commands, move the keylock switch **B** to the Manual position. Type the following on any command line and press the Enter key:

```
PWRDWNSYS OPTION(*IMMED) RESTART(*YES)
```

If you cannot enter commands, start the IPL from the operator panel (see Figure 2-1 on page 2-4).

1. Use the Select switch **C** to display function 03.
2. Push the Enter pushbutton **D** to start an IPL.

   Warning: Using the control panel function 3 procedure to IPL the system may cause unpredictable results in your data files, and the next IPL will take longer to complete.

   During the attended IPL, the IPL or Install the System display is shown on the console.
3. On the IPL or Install the System display, select option 1 (Perform an IPL) and press the Enter key.

   The IPL Sign On display is shown. You may have to wait 30 or more minutes for this display to appear.
4. Sign on to the system using the Sign On display (see "Signing On the System" on page 2-4).

   The Select Products to Work with PTFs display is shown.
5. On the Select Products to Work with PTFs display, select the product for which you want to apply the PTF and continue with the attended IPL.

   If you do not want to apply a PTF, press F3 (Exit) on the Select Products to Work with PTFs display and continue with the IPL.

```
                    Select Products to Work with PTFs
                                                          System:   RCHAS377
Position to . . . . . .            Product

Type options, press Enter. Press F21 to select All.
  1=Select


Opt  Product   Option  Release
     5738999   *BASE   V2R3M0
     5738SS1   *BASE   V2R3M0
     0TSTPRD   *BASE   V1R1M0
     0TSTPRD   *BASE   V2R1M0
     0TSTPRD   *BASE   V2R3M0
     1DEVEXC   *BASE   V2R2M0
     1DEVEXC   *BASE   V2R3M0
     2DEVEXC   *BASE   V2R2M0
     3PRD001   *BASE   V2R3M0
     3PRD001   *BASE   V2R3M0
     5738PC1   *BASE   V2R3M0
                                                                    More...
F3=Exit   F5=Refresh   F11=Display descriptions   F12=Cancel   F21=Select all

(C) COPYRIGHT IBM CORP.
```

Figure 2-5. Select Products to Work with PTFs Display

6. The IPL Options display is shown next. See "Changing IPL Options" on page 2-11 to select options to change system attributes.

Changing IPL Options

To change IPL options, you need to do an attended IPL. See "Changing Your System during IPL (Attended IPL)" on page 2-9 for information on how to do an attended IPL.

When you select option 1 (Perform an IPL) on the IPL or Install the System display, the IPL Options display is shown as in Figure 2-6.

```
                                IPL Options

Type choices, press the Enter key.

  System date  . . . . . . . . . . . . . .   07 / 26 / 88   MM / DD / YY
  System time  . . . . . . . . . . . . . .   12 : 00 : 00   HH : MM : SS
  Clear job queues . . . . . . . . . . . .   N              Y=Yes,  N=No
  Clear output queues  . . . . . . . . . .   N              Y=Yes,  N=No
  Clear incomplete job logs  . . . . . . .   N              Y=Yes,  N=No
  Start print writers  . . . . . . . . . .   Y              Y=Yes,  N=No
  Start this device only . . . . . . . . .   N              Y=Yes,  N=No
  Run #STRTUP1 procedure . . . . . . . . .   Y              Y=Yes,  N=No
  Run #STRTUP2 procedure . . . . . . . . .   Y              Y=Yes,  N=No
  Set major system options . . . . . . . .   N              Y=Yes,  N=No
  Define or change system at IPL . . . . .   N              Y=Yes,  N=No









Last power-down operation was normal
                                (C) COPYRIGHT IBM CORP 1980, 1991
```

Figure 2-6. IPL Options Display

To change an IPL option, type the new option over the existing information and press the Enter key.

Depending on what you selected, one of the following displays is shown next:

- If you typed Y (Yes) in the *Set major system options* field, the Set Major System Options display is shown. See "Setting Major System Options" on page 2-12.

  Note: If you also typed Y (Yes) in the *Define or change system at IPL* field, the Define or Change the System at IPL menu is shown after the Set Major Options display.

- If you typed Y (Yes) in the *Define or change system at IPL* field and N (No) in the *Set major system options* field, the Define or Change System at IPL menu is shown. See "Defining or Changing the System at IPL" on page 2-13.

- If you typed N (No) for both the *Set major system options* field and the *Define or change system at IPL* field, the menu, program, or procedure you defined on the Sign On display or in your user profile is shown.

Setting Major System Options

Figure 2-7 shows the Set Major System Options display where you can select automatic configuration, the type of device configuration naming, and the special environment in which you want to run. This display is shown when you type a Y (Yes) in the *Set major system options* field on the IPL Options display.

```
                          Set Major System Options

Type choices, press the Enter key.

  Enable automatic configuration . . . . . .  Y          Y=Yes, N=No
  Device configuration naming  . . . . . . .  *NORMAL    *NORMAL, *S36,*DEVAD
  Default special environment  . . . . . . .  *NONE      *NONE, *S36
```

Figure 2-7. Set Major System Options Display

Using the following information, type the new values over the existing values in the following fields:

Enable automatic configuration:

Y (Yes) automatically configures local devices.

N (No) indicates no automatic configuration.

Device configuration naming:

*NORMAL uses a naming convention unique to the AS/400 system, for example, DSP01 and PRT01 for displays and printers, TAP01 and DKT01 for tape and diskette devices.

*S36 uses a naming convention similar to System/36, for example, W1 and P1 for printers, T1 and I1 for tape and diskette devices.

*DEVADR uses a naming convention which is obtained from the device resource name, for example, DSP010203 for a display station, PRT010203 for a printer, TAP01 and DKT01 for tape and diskette devices.

Default special environment:

*NONE indicates there is no special environment.

*S36 sets up the System/36 environment that is used if you are migrating from the System/36.

Press the Enter key. Depending on what you selected on the IPL Options display, the following is shown next:

- If you typed an N (No) in the *Define or change the system at IPL* field, the menu, program, or procedure you defined on the Sign On display is shown next.
- If you typed a Y (Yes) in the *Define or change system at IPL* field, the Define or Change System at IPL menu is displayed. See "Defining or Changing the System at IPL."

Defining or Changing the System at IPL

On the Define or Change the System at IPL display, you can change the configuration of the system, change system values, network attributes, user profiles, and object or file attributes. This display is shown when you type a Y (Yes) in the *Define or change the system at IPL* field on the IPL Options display.

1. Do one of the following:
   - To change the way the system starts, select option 3 (System value commands) and go to "Changing System Values during IPL."
   - If you selected option 1, 2, 4, 5, or 6, continue to select options and use the displays until you are finished.
2. When you are finished using the options on this display, press F3 (Exit and continue IPL) to continue the IPL.

Changing System Values during IPL

System values control information that affects the operation of certain parts of the system. Some system values that you change do not take effect until the next IPL; other system values take effect immediately.

On the System Value Commands display, you can change system values that affect IPL or other areas of the system. This display is shown when you type a Y (Yes) in the *Define or change the system at IPL* field on the IPL Options display (see step 6 on page 2-11).

To change system values during an IPL:

1. Select option 3 (System value commands) on the Define or Change System at IPL display (see "Defining or Changing the System at IPL").
2. Select option 3 (Work with system values).
3. Select option 2 (Change) on the Work with System Values display.
4. Type the new system value over the current value and press the Enter key.
5. Press F3 (Exit) to return to the Define or Change the System at IPL display.
6. Press F3 (Exit) twice to continue the IPL.

Security Considerations

To change system values, you must be signed on as QPGMR, QSYSOPR, or QSRV, or have all object (*ALLOBJ) authority. Certain system values can be changed only by a security officer (someone with all object (*ALLOBJ) and security administrator (*SECADM) special authorities).

System Values that Control IPL

The system values listed below let you control the type of IPL and the way the system does an IPL. Change these system values using option 2 (Change) on the Work with System Values (WRKSYSVAL) display.

QIPLDATTIM

The IPL date and time system value lets you specify the IPL date and time for starting the system automatically. The default value *NONE indicates that no timed automatic IPL is desired.

The date format used by your system for date and time is defined in the system value QDATFMT. You need to know your system date format for step 1 on page 2-14. Use option 5 (Display) to determine the format.

To specify the IPL date and time:

1. Type the new date over the current date as follows:
   - MM/DD/YY where MM is the month, DD is the day, and YY is the year.

     For example, to start the system on June 26, 1992, type 06/26/92.
   - YY/MM/DD where YY is the year, MM is the month, and DD is the day.

     For example, to start the system on June 26, 1992, type 92/06/26.
   - DD/MM/YY where DD is the day, MM is the month, and YY is the year.

     For example, to start the system on June 26, 1992, type 26/06/92.
   - YY/DDD where YY is the year and DDD is the Julian date.

     For example, to start the system on June 26, 1992, type 92/178. June 26 is the 178th day of the year.

     Note: The format is set with the system value QDATFMT. The separator is set with the system value QDATSEP. The separator is optional.
2. Type the time in the format HH:MM:SS where HH is the hour, MM is the minute, and SS is the second. Use the 24-hour clock.

   For example, if you want to start the system at 8:16 a.m., type `08:16:00`, or if you want to start the system at 8:16 p.m., type `20:16:00`.

Notes:

1. The time separator format is set with the system value QTIMSEP. The separator is optional.
2. If you are using the automatic power schedule, you can force the power schedule to update the QIPLDATTIM system value by entering the following command on any command line.

   ```
   CHGPWRSCDE DAY(*TODAY) PWRONTIME(*SAME) PWROFFTIME(*SAME)
   ```

QIPLSTS

The IPL status system value displays the way the system did the last IPL. You cannot change this system value. Use option 5 (Display) on the Work with System Values display to display it.

0 An IPL from the control panel of the system unit.

1 An unattended IPL automatically after a power failure (QPWRRSTIPL set to 1).

2 An unattended IPL after using the Power Down System (PWRDWNSYS) command with the Restart after power down (RESTART) parameter set to *YES.

3 An unattended IPL at a specific time and date (QIPLDATTIM set to the date and time for the IPL to occur).

4 An unattended IPL from another location using a telephone and a modem (QRMTIPL set to 1).

QIPLTYPE

The IPL type system value defines the type of IPL the system does from the control panel.

0 An unattended IPL. Start the system without an operator (see "Normal Operations (Unattended IPL)" on page 2-2). If the keylock switch is in the Manual position, an attended IPL is done instead.

1 An attended IPL from the control panel. Start the system with an operator (see "Changing Your System during IPL (Attended IPL)" on page 2-9.) An unattended IPL is done if it is done remotely, by date and time, or after power failure.

2 An attended IPL in debug mode. Start the system with an operator. The console description, QCONSOLE, is left varied on. You should only use this for problem analysis because it prevents other devices on the work station controller from being used.

QPWRRSTIPL

The automatic IPL after power is restored system value allows the system to start automatically when power is restored after a power failure.

0 Does not do an automatic IPL after a power failure.

1 Does an automatic IPL after a power failure.

QRMTIPL

The remote IPL system value allows you to start the remote system by using your telephone and a modem or the SPCN signal.

0 Does not allow a remote IPL.

1 Allows a remote IPL.

QUPSDLYTIM

The uninterruptible power supply delay time system value allows you to specify how long the system operates using the battery power unit when power to the system is interrupted. If you do not power down the system normally by the delay time specified in this system value, the system powers down immediately. When you do an IPL again, the last power-off operation appears as an abnormal power off on the IPL Options display.

***BASIC** Powers only the system unit, input/output processor cards, and load source storage. The appropriate wait time, in seconds, is calculated. This should be used only when you have the battery power unit or an uninterruptible power supply without every system unit or rack being connected.

***CALC** During each IPL, the system calculates the appropriate wait time, in seconds, that is used when power is interrupted to the system. This should only be used if you have the battery power unit.

Notes:

1. The calculated value is appropriate only for the 9404 System Unit, although there is no restriction on its use by the AS/400 9402 or 9406 System Units.
2. The calculated value is based on the number of devices and the number of changed pages in main storage.
3. The calculated value may have to be adjusted by the user if there has been a series of power outages, or if the batteries are not fully charged.

***NOMAX** Indicates that the system continues to run on the uninterruptible power supply battery until the system is normally powered down or the battery power becomes too low to operate the system.

0 Automatic system power down when the system utility power fails.

1 – 99999 Specifies delay time in seconds before the system powers down.

Note: See the *Advanced Backup and Recovery Guide*, SC41-8079, for more detailed information about QUPSDLYTIM.

QUPSMSGQ

The uninterruptible power supply message queue system value allows you to specify where you want your messages sent when the power to the system is interrupted.

QSYSOPR QSYS
Sends the messages to the system operator's message queue when power to the system is interrupted.

message queue
Specifies another message queue (in addition to the system operator's message queue) where messages are sent when power to the system is interrupted.

library
Specifies the library where the other message queue is located.

Editing Access Paths During Attended IPL

You can have the system turn the power on and restart an IPL automatically after a power failure. The system value QPWRRSTIPL should be set to 1 (see "System Values that Control IPL" on page 2-13).

Note: The keylock switch on the control panel must be set to Normal or Auto for the system to do an IPL automatically.

When power is restored, there may be access paths to rebuild. **Access paths** define the order that records in a database file are organized for processing by a

program. If there are access paths to rebuild, the Edit Rebuild of Access Paths display is shown as in Figure 2-8 after the IPL Options display (Figure 2-6 on page 2-11).

```
                  Edit Rebuild of Access Paths                SYSTEM01
                                                        05/12/90  13:49:34

IPL threshold . . . . . . . . . . . . . 88_  0-99

Type sequence, press Enter.
Sequence:  1-99, *OPN, *HLD

                  ------------Access Paths----------  Unique  Rebuild
Seq   Status      File        Library     Member      Keyed   Time
25    IPL         FILE234512  LIBRARY111  MBR1234567  No      00:00:56
25    IPL         FILE234513  LIBRARY111  MBR1234567  No      00:00:56
75    IPL         FILE234514  LIBRARY111  MBR1234567  Yes     00:00:56
75    IPL         FILE234515  LIBRARY111  MBR1234567  Yes     00:00:56
88    IPL         FILE234516  LIBRARY111  MBR1234567  No      00:00:56
99    AFTIPL      FILE234517  LIBRARY111  MBR1234567  Yes     00:00:56
*OPN  OPEN        FILE126789  L123456789  MBR4567890  Yes     12:34:56
*OPN  OPEN        FILE346789  L123456789  MBR4567890  No      12:34:56
*HLD  HELD        F123336789  L123456789  MBR4567890  No      10:30:06
*HLD  HELD        F123456789  L123456789  MBR4567890  Yes     99:56:01
                                                                More...

F5=Refresh   F11=Display member text   F13=Repeat all   F15=Sort by
F16=Repeat position to   F17=Position to
```

Figure 2-8. Edit Rebuild of Access Paths Display

Note: Use the online help information on this display to learn more about each column and field.

A message is sent notifying you that there is access path recovery to be performed by a **journal**. Any access path which can be recovered because it was recorded will not be shown on this display. A journal is a system object used to record entries in a journal receiver when a change is made to the database files associated with the journal. The **IPL threshold** is a value from 1 through 99 that can be set (default is 50), which indicates that access paths with a sequence less than or equal to the number specified will be rebuilt at IPL time. If the IPL threshold changes, all access paths with a status of `IPL` and `AFTIPL` will be changed to reflect the new status of the IPL threshold.

To change the sequence of access paths that will be rebuilt, make any changes to the *Seq* column and press the Enter key.

If you do not want to change the sequence, press the Enter key and the Display Access Path Status display is shown (Figure 2-9 on page 2-18) if there are access paths left to be rebuilt.

Note: The Enter key must be pressed to continue with the IPL from the Edit Rebuild of Access Paths display.

If no access paths need to be rebuilt, the IPL continues.

```
                    Display Access Path Status

IPL Threshold . . . . . . : 88

          ----------Access Paths----------   Rebuild     Current
Status    File        Library    Member      Build Time  Run Time
RUN       F123456789  L123456789 MBR4567890              00:00:01
JRN       F123456789  L123456789 MBR4567890
JRN       F123456789  L123456789 MBR4567890
JRN       F123456789  L123456789 MBR4567890
JRN       F123456789  L123456789 MBR4567890
JRN       F123456789  L123456789 MBR4567890
JRN       F123456789  L123456789 MBR4567890
SYS       F123456789  L123456789 MBR4567890  12:34:56
SYS       F123456789  L123456789 MBR4567890  12:34:56
IPL       F123456789  L123456789 MBR4567890  12:34:56
                                                        More...



F3=Exit and continue IPL   F12=Cancel
```

Figure 2-9. Display Access Path Status Display

If you press F3 (Exit and continue IPL) the access paths will be rebuilt while the IPL continues. If you press F12 (Cancel), you return to the Edit Rebuild of Access Paths display.

Every 5 seconds, the display is updated with the current run time.

After all the access paths have been rebuilt (access paths with a sequence less than or equal to the IPL threshold), the IPL continues.

System Password

When you install Version 2 Release 3 of the OS/400 licensed program, the licensed program runs a check to detect system model changes, certain service conditions, and ownership changes. If the licensed program detects these changes or conditions, you are prompted to enter the system password before the IPL can continue. If no changes or conditions are recognized, the IPL continues without a request for the system password.

You must enter the correct system password to complete the IPL. If the system password is not available, you or your service representative temporarily bypass entering the system password for a limited time. When the bypass period starts, immediately contact your marketing representative, who will have IBM send you the correct system password. To order the system password, ask your marketing representative to order nonstandard RPQ S40345 if you are in the United States, Asia Pacific, Canada, Latin America, or Japan. If you are in Europe, Middle East, or Asia, request nonstandard RPQ S40346. For more information, see "Bypassing the System Password" on page 2-19.

Changing the System Password

If you have just installed new hardware, you may need to change the system password during the first IPL. To do this:

1. Select option 1 (Change the system password) on the Verification of System Password Failed display.
2. The following system information on the Change the System Password display is shown:
   - System serial number
   - System type number
   - System model number
   - System password version
   - Processor card serial number

   If you do not know the system password, use F12 (Cancel) and select option 2 (Bypass the system password) on the Verification of System Password Failed display. See "Bypassing the System Password" for information on how to do this.
3. Type the password in the blank field and press the Enter key.

To change the system password when your system is operational:

1. Perform an attended IPL.
2. Select option 1 (Change the system password) on the Verification of System Password Failed display.
3. Type the password in the blank field and press the Enter key.

Bypassing the System Password

Use the Verification of System Password Failed display to bypass the system password when:

- You do not know or cannot find the system password.
- You guess the system password and get a message telling you the password you entered is incorrect.

  Note: If you type the password incorrectly five times, you must do the IPL again.

  To bypass the system password during the first IPL:

  1. Select option 2 (Bypass the system password) on the Verification of System Password Failed display.
  2. Read the information on the Bypass the System Password display. Remember to contact your marketing representative immediately to obtain the system password before the bypass period runs out.
  3. Press F9 (Bypass) to continue the IPL.

  When the IPL has finished, you will receive daily messages telling you how much time is left in the bypass period.

  When you receive the password, you can enter it by:

  – Doing an attended IPL and selecting option 1 (Change the system password) on the Verification of System Password Failed display.

- Doing an attended IPL and selecting option 1 (Change the system password) on the Bypass Period has Ended display.

IPL Overview

Figure 2-10 on page 2-21 shows the system reference codes that are displayed and how long they remain displayed while the IPL is progressing. If you notice a code being displayed longer than it should or a code not listed, see Chapter 13, "Handling and Reporting System Problems."

Note: In the diagram, x can be any number 0 through 9 or letter A through F.

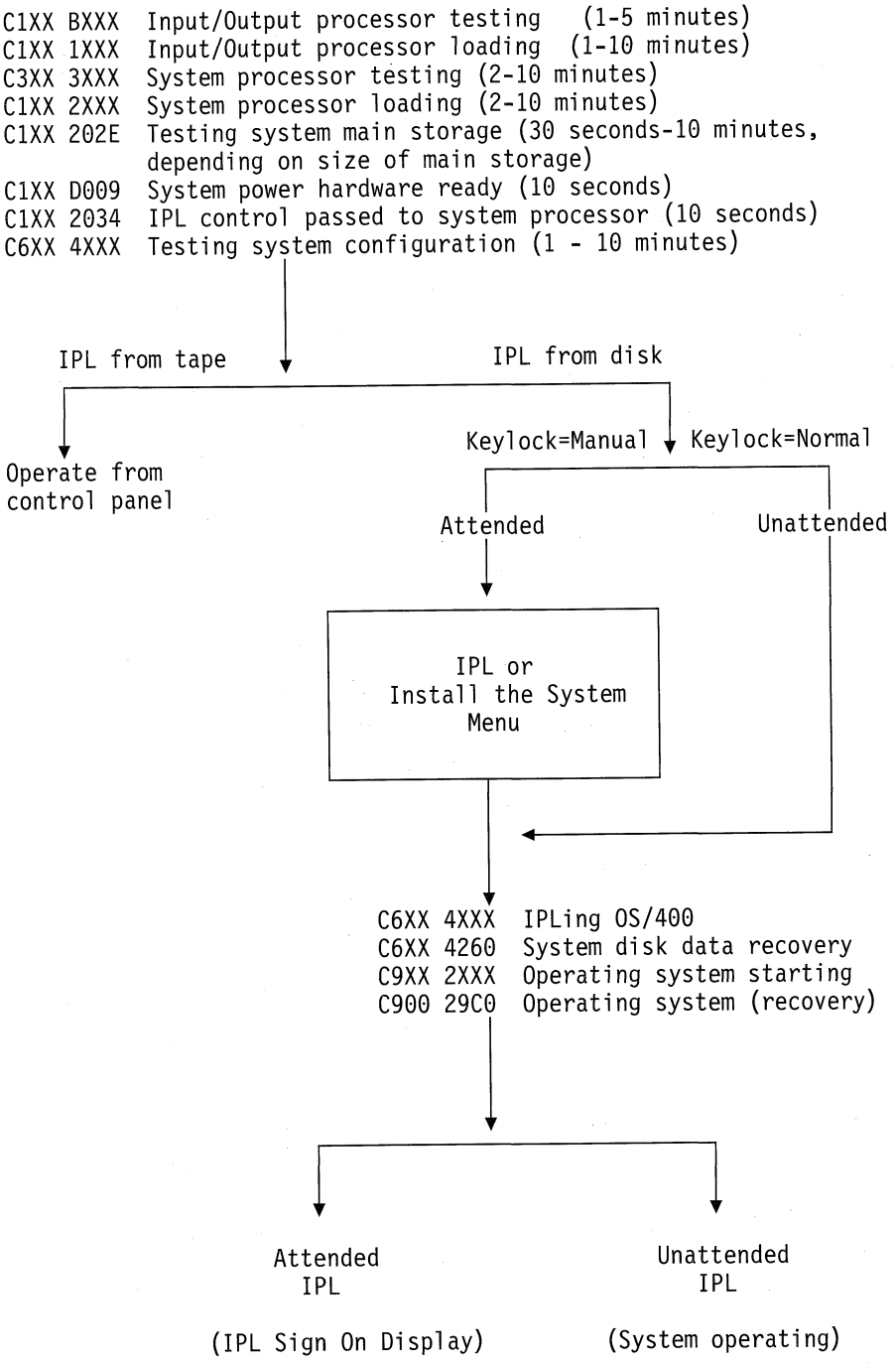

Figure 2-10. Overview of IPL System Reference Codes and Time Displayed

Note: You are allowed to signon to the system before an IPL has finished, but certain functions may not be available until the IPL has completed. For example, use of the reclaim storage (RCLSTG) function, the save library (SAVLIB) function, the save system (SAVSYS) function, and attempting to power down the system immediately following an IPL fail.

You should allow sufficient time for an IPL to complete before attempting such functions. The time of completion for an IPL depends on such factors as your system model and configuration.

What Causes an Abnormal IPL?

An abnormal IPL can be caused by any of the following:

- Using the End Job Abnormal (ENDJOBABN) command. To see if this command has been used, look for message CPC1124 in the job log.
- Using option 8 (Perform automatic installation of the operating system) on the Dedicated Service Tools (DST) menu or using the Delayed Power Off switch instead of doing an IPL.
- A power failure occurring before all data is written from main storage to disk.
- Any B900 xxxx system reference code (where xxxx is any number or letter) during the start of the operating system phase of the IPL.
- A Power Down System (PWRDWNSYS) command that did not complete, ending with a system reference code of B900 3F10.
- Any function check in the controlling subsystem causing the system to end.
- The system going down when database recovery has not completed during the IPL.

Working with Subsystems

A **subsystem** is an operating environment where the system coordinates processing of jobs and resources for the jobs. If you use one of the default subsystem configurations supplied by IBM, all of your subsystems are automatically started when you do an IPL.

Once your system is successfully powered on, you may need to start additional subsystems to make your system ready to use if:

- You created a subsystem which is not automatically started, such as a subsystem which runs only at night.
- You ended all but the controlling subsystem to bring your system to a restricted state to back it up.

To start or end subsystems or display subsystem descriptions, use the Work with Subsystem Descriptions (WRKSBSD) command.

Starting Subsystems

To start a subsystem on the Work with Subsystem Descriptions display, use option 9 (Start subsystem). A message is displayed telling you the subsystem has started.

Ending Subsystems

To end a subsystem, on the Work with Subsystem Descriptions display, use option 10 (End subsystem). On the End Subsystem (ENDSBS) display, in the *How to end* field, type one of the following:

***CNTRLD** Jobs are ended in a controlled manner. This allows programs that are running to perform cleanup and finish completely, which may take 30 seconds or more. This is the default.

***IMMED** Jobs are ended immediately. This can cause problems if data has been partially updated. Use this option only if you have attempted a controlled end unsuccessfully.

Press the Enter key. A message is displayed indicating that the system has started to end the subsystem. Another message is sent when the subsystem has ended.

Displaying Subsystem Descriptions

To display a subsystem description, on the Work with Subsystem Descriptions display, use option 5 (Display). The Display Subsystem Description menu is shown on which you can select options that give you more information about that subsystem.

Stopping the System

Before you stop the system:

- Make sure all batch jobs are finished and users are signed off the system:
  1. Send a message that interrupts all users signed on the system telling them to sign off.
     a. Type `go managesys` and press the Enter key.
     b. Select option 12 (Work with signed-on users) on the Manage Your System, Users, and Devices (MANAGESYS) menu.

        Note: If the Work with User Jobs display is shown, you need to switch to basic assistance level using F21 (Select assistance level).

     c. Press F10 (Send message to all) on the Work with Signed-On Users display.
     d. Type the message in the *Message text* field on the Send a Message display and press F10 (Send).
  2. Wait for the users to sign off.
  3. Check to make sure all users have signed off by pressing F5 (Refresh) on the Work with Signed-On Users display. When everyone is signed off the system, the display will show only your job. To sign someone off the system, use option 4 (Sign off).

     Note: If you have separate interactive subsystems, other than the controlling subsystem, you may want to stop the interactive subsystems once the users have signed off. This prevents them from signing on again before you have stopped the system. See "Ending Subsystems" on page 2-22 for information on how to end a subsystem.
- Check the status of any batch jobs that might be affected if the system is powered down:
  1. Type `go managesys` on any command line and press the Enter key.
  2. Select option 11 (Work with jobs) on the Manage Your System, Users, and Devices (MANAGESYS) menu.

     Note: If the Work with User Jobs display is shown, you need to switch to basic assistance level using F21 (Select assistance level).

  3. Press F14 (Select other jobs) on the Work with Jobs display.
  4. Type `*all` in the *User* field.

5. Type an N in every field except the *Message waiting*, *Running*, and *Running job held* fields. The Work with Jobs display is shown again with the batch jobs listed.
6. If any job queues have jobs waiting to run, press F22 (Work with job queues) to see the Work with Job Queues display.
7. Hold any job queues that have jobs waiting to run on the Work with Job Queues display.

   Note: Do not forget to release these job queues when you start the system again.
8. Press F12 (Cancel) to return to the Work with Jobs display.
9. Press F5 (Refresh) every few minutes until all batch jobs have completed processing.

- Make sure there are no tapes in any of the tape units and no diskettes in any of the diskette units.

To stop the system:

1. Type `go power` on any command line and press the Enter key.
2. Select option 3 (Power off the system immediately) or option 4 (Power off the system immediately and then power on) on the Power On and Off Tasks (POWER) menu.

You can also use the Power Down System (PWRDWNSYS) command.

Another way to stop the system is to move the Power switch or the Delayed Off switch on the system unit operator panel to the Delayed Off position or move the Unit Emergency switch to the Off position.

Warning: Using the Power switch, Delayed Off switch, or Unit Emergency switch to turn off the system may cause damage to your data files, and the next IPL will take longer to complete.

Powering Off the System Immediately

- To power off the system immediately:
  1. Type `go power` on any command line to display the Power on and Off Tasks (POWER) menu.
  2. Select option 3 (Power off the system immediately) if you want to keep the power off until the next time the system is scheduled to power on. Figure 2-11 shows the Confirm Power Off of System display.

```
                        Confirm Power Off of System
                                                          System:   SYSTEM01
Next scheduled power on:
  Date . . . . . . . . . . . :   11/19/90
  Time . . . . . . . . . . . :   05:40:00


To confirm immediate power off, press F16.
To cancel, press F12.
```

Figure 2-11. Confirm Power Off of System Display for Immediate Power Down

When you press F16 (Confirm), an immediate power down occurs that causes the subsystems to end all active jobs.

- To power off the system and restart immediately:

  To restart the system right after the power is turned off, select option 4 (Power off the system immediately and then power on) on the Power On and Off Tasks (POWER) menu. Figure 2-12 shows the Confirm Power Off of System display.

```
                    Confirm Power Off of System

To confirm immediate power off and then immediate power on, press F16.
To cancel, press F12.
```

Figure 2-12. Confirm Power Off of System Display for Immediate Power On

When you press F16 (Confirm), the system stops running and then starts again automatically.

Note: Do not turn the modem on or off when the system is turned off and is made ready for remote IPL. Otherwise, the system may start unexpectedly, although it turns itself off in a few minutes.

Important Note

If you stop the system using the automatic power schedule or one of the options on the Power On and Off Tasks (POWER) menu, the IPL date and time system value (QIPLDATTIM) is checked and, if necessary, reset to the next scheduled power-on time. This checking does not occur if you power off in another way, so the system may not power on automatically. To force the power schedule to update the QIPLDATTIM system value, enter the following command on any command line.

```
CHGPWRSCDE DAY(*TODAY) PWRONTIME(*SAME) PWROFFTIME(*SAME)
```

Using the Power Switch

If you cannot use option 3 (Power off the system immediately) or option 4 (Power off the system immediately and then power on) on the Power On and Off Tasks (POWER) menu to stop the system, you can turn the power off using the Power switch or Delayed Off switch on the control panel when the keylock switch is set to Manual.

Warning: Using the Power switch or Delayed Off switch to turn off the system may cause results that cannot be predicted in your data files, and the next IPL will take longer to complete.

Figure 2-13 on page 2-26 shows the control panels for the 9406, 9404, 9404 Server Series, and AS/400 9402 System Units.

Note: Some 9406 Version 2 control panels may have more than two rows of Processor Activity lights.

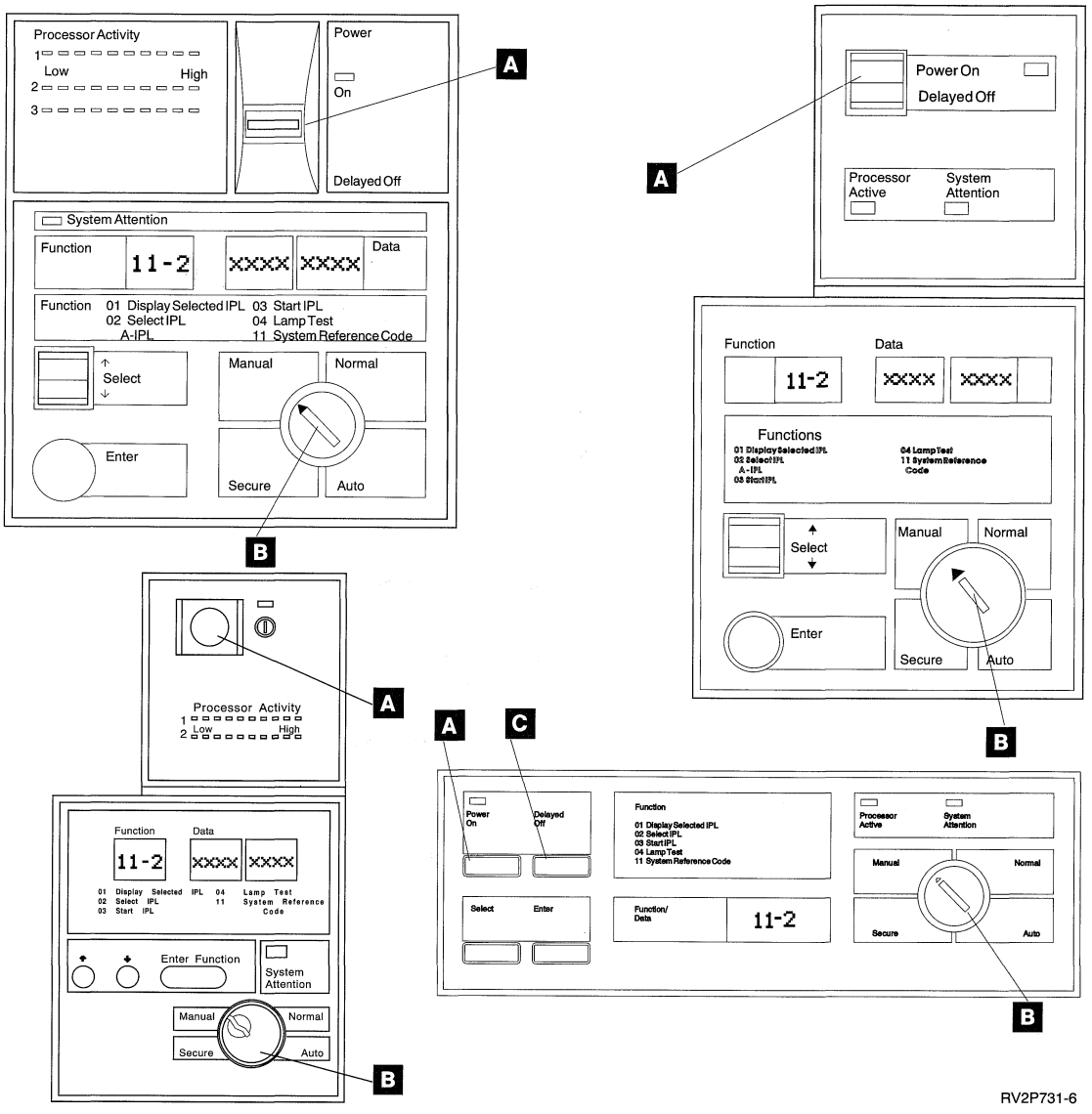

Figure 2-13. System Unit Operator Panels. 9406 System Unit (Upper Left), 9404 System Unit (Upper Right), AS/400 9402 System Unit (Lower Right), and 9404 Server Series System Unit (Lower Left).

To turn the power off using the Power switch or Delayed Off switch on the operator panel:

1. Make sure there are no tapes in the tape units or diskettes in the diskette units.
2. Make sure the keylock switch **B** is in the Manual position.

   Note: Do not turn the modem on or off when the system is turned off and is made ready for remote IPL. Otherwise, the system may start unexpectedly, although it turns itself off in a few minutes.

3. Press the Power switch **A** (on the 9404 System Unit and 9406 System Unit), or press the Delayed Off switch **C** (on the AS/400 9402 System Unit). The system turns the power off.

   Note: The Power switch on the 9406 and 9404 System Units returns to the center position when you remove your hand from it.

If the system does not turn the power off within 30 minutes, wait for the System Attention light to come on. When the System Attention light comes on, do the following:

a. Go to Chapter 13, "Handling and Reporting System Problems" and follow the steps necessary to start solving the problem.

b. When you have solved the problem, move the Unit Emergency switch to the Off position. For information on how to do this, see "Using the Unit Emergency Switch."

c. When the system power turns off, move the Unit Emergency switch to the On position. The system is ready for you to start an IPL.

Using the Unit Emergency Switch

If an emergency occurs where you must turn the system power off immediately without using the power down options on the Power On and Off Tasks (POWER) menu or the Power Down System (PWRDWNSYS) command, move the Unit Emergency switch down to the Off position. For a 9406 System Unit, the Unit Emergency switch only controls its own rack power.

Warning: Using the Unit Emergency switch may cause unpredictable results in your data files, and the next IPL will take longer to complete.

Figure 2-14 on page 2-28 shows the Unit Emergency switch for an 9406 System Unit which is located in the upper right part of the 9309 Rack Enclosure.

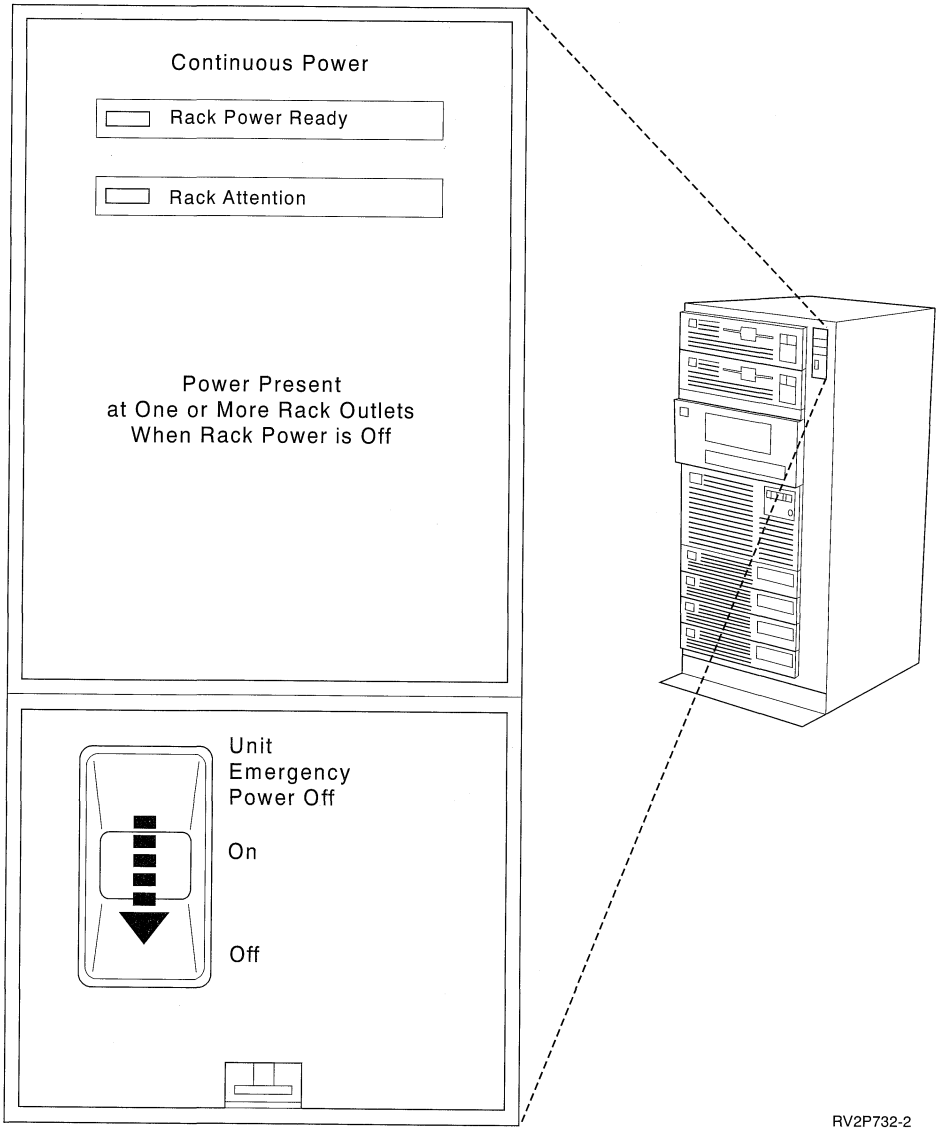

Figure 2-14. Unit Emergency Switch on the 9406 System Unit

Figure 2-15 on page 2-29 shows the Unit Emergency switch for the 9404 System Unit which is located below the operator panel on the front of the system unit.

Note: This switch controls the power to the expansion unit also, if one is attached.

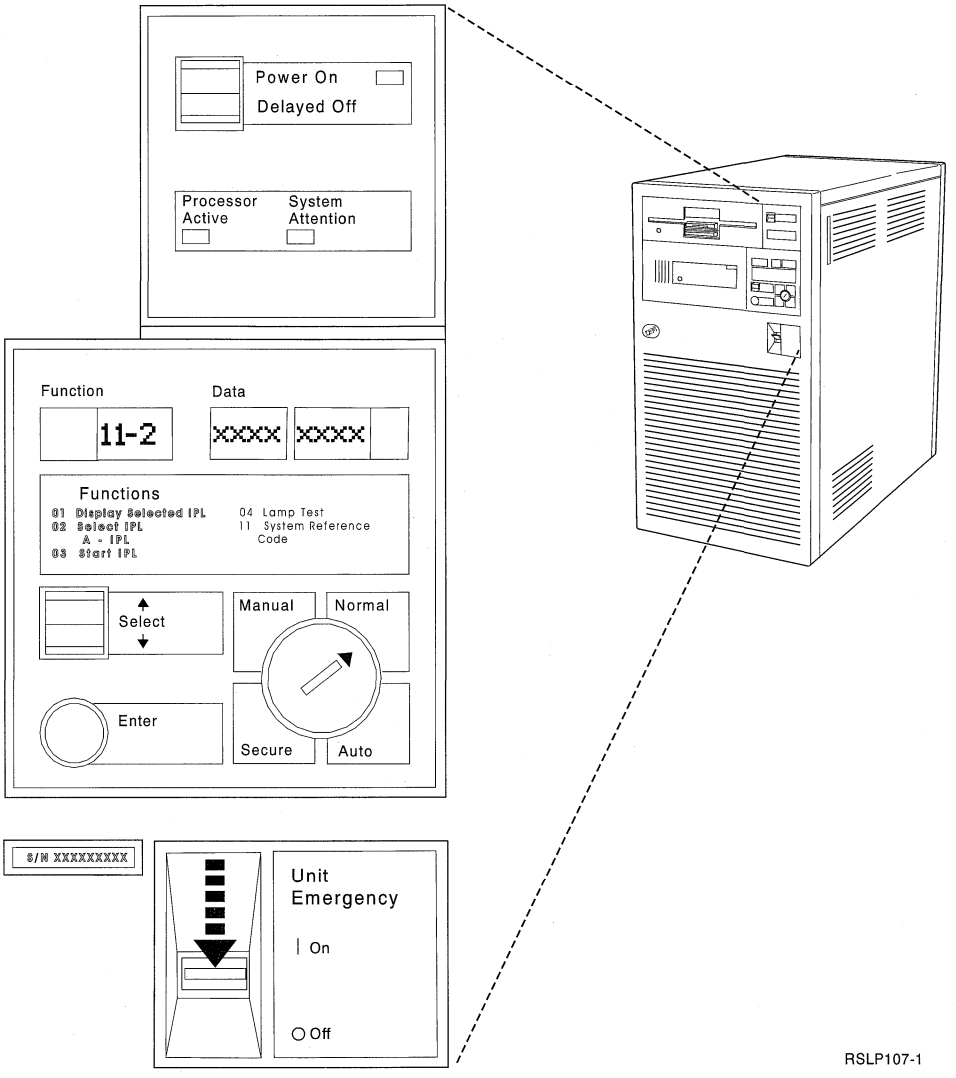

Figure 2-15. Unit Emergency Switch on the 9404 System Unit

If you have an expansion unit attached to your AS/400 9402 System Unit or 9404 System Unit, the Unit Emergency switch for the expansion unit is located in the same general location as the switch on the system unit. However, this switch controls the power to the expansion unit only.

Notes:

1. There is no Unit Emergency switch on the 9404 Server Series Model 135 and Model 140 System Units.
2. The plug on the power supply cord serves as the emergency disconnect and the service disconnect device. Because of this requirement, ensure that the power outlet is near the equipment and is easily accessible.

Figure 2-16 on page 2-30 shows the Unit Emergency switch for an AS/400 9402 System Unit which is located below the operator panel on the front of the system.

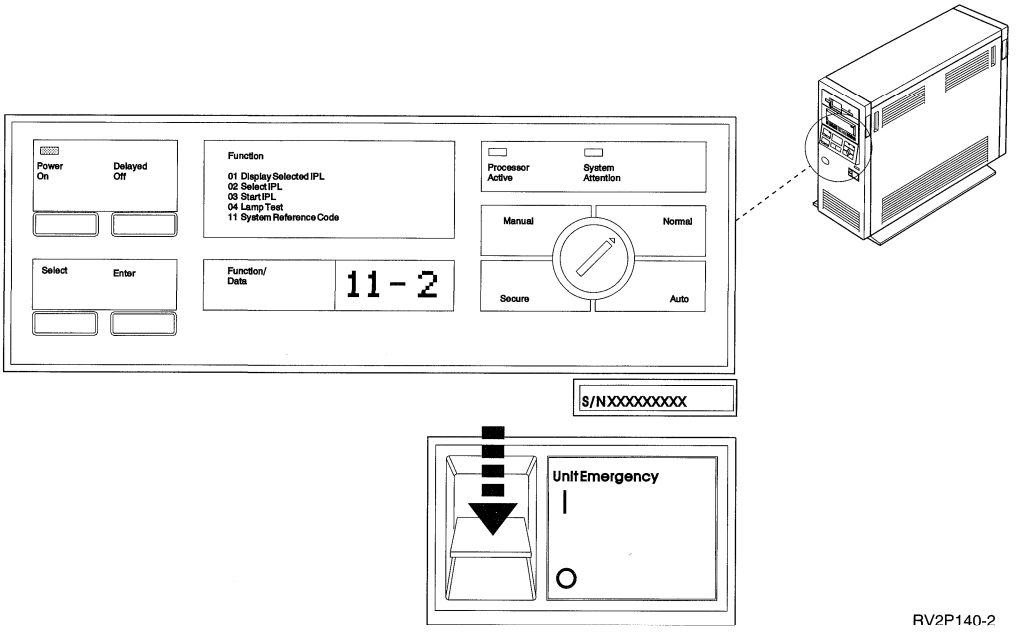

Figure 2-16. Unit Emergency Switch on the AS/400 9402 System Unit

Chapter 3. What are the Operational Assistant Displays?

The Operational Assistant displays are a menu-driven interface that allows you to do commonly performed system tasks quickly and easily. The value of the Operational Assistant displays extends to the system user, operator, and administrator by:

- Simplifying everyday tasks, such as controlling printer output, controlling jobs, and handling messages.
- Setting up a schedule for automatic power on and off, automatic cleanup, and backup.
- Managing your system backup, the devices attached to your system, users enrolled on the system, signed-on users, and disk space storage.

All of these tasks can be done by selecting options from the Operational Assistant menus. To display the Operational Assistant menu, type `go assist` on any command line and press the Enter key. Figure 3-1 shows the Operational Assistant menu.

Security Consideration

You must have at least a user class of system operator (*SYSOPR) to see all of the options on this menu.

```
ASSIST              AS/400 Operational Assistant (TM) Menu
                                                      System:   SYSTEM01
To select one of the following, type its number below and press Enter:

     1. Work with printer output
     2. Work with jobs
     3. Work with messages
     4. Send messages
     5. Change your password

    10. Manage your system, users, and devices
    11. Customize your system, users, and devices

    75. Information and problem handling

    80. Temporary sign-off


Type a menu option below
     —

F1=Help   F3=Exit   F9=Command line   F12=Cancel
```

Figure 3-1. Operational Assistant (ASSIST) Menu

When you install the current release of the OS/400 licensed program, the Operational Assistant function is ready to use.

You can display the Operational Assistant menu by typing `go assist` on any command line and pressing the Enter key (unless you are unable to display a command line). You can also enable users to access the Operational Assistant displays by:

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- Pressing the Attention (Attn) key.
- Selecting option 50 on the OfficeVision/400* menu.
- Selecting an option on your application menus.

For information on how to set up the Operational Assistant display, see the *Basic Security Guide*.

Using Assistance Levels

With the Operational Assistant display, you can choose the level of information you want when you interact with the system. There are three levels of information called assistance levels:

1=Basic

Shows the displays that provide the most assistance. Basic assistance level supports the more common operator and user tasks and does not use computer terminology.

2=Intermediate

Shows the displays that support all system tasks and uses computer terminology. Complicated tasks can be done using this level.

3=Advanced

Shows the displays that provide the same functions as the intermediate assistance level. However, the displays contain as much information as possible by not displaying the allowed function keys and options.

Note: The advanced assistance level is only available for some displays.

You can change from one assistance level to another on most Operational Assistant displays. For example, to change assistance levels on the Work with Messages (WRKMSG) display:

1. Press F21 (Select assistance level). Figure 3-2 on page 3-3 shows the Select Assistance Level window.

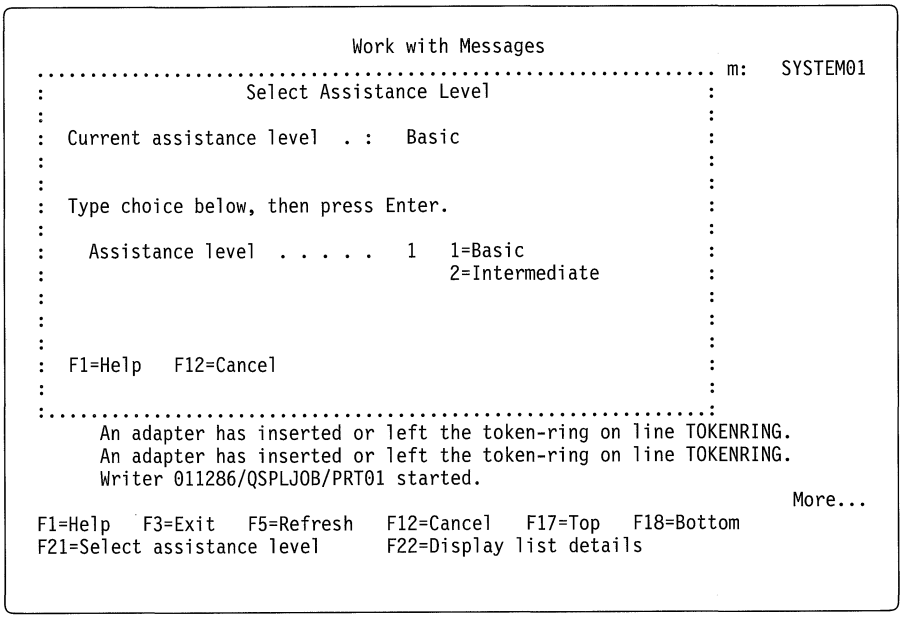

Figure 3-2. Select Assistance Level Window

2. The value in the *Assistance level* field shows the assistance level you are currently using and what assistance levels are available.
3. Type a 1 (Basic) to select the basic assistance level, a 2 (Intermediate) to select the intermediate assistance level, or a 3 (Advanced) to select the advanced assistance level (if available) and press the Enter key.
4. The display you see on your system is the version that corresponds to the assistance level you selected.

You can also change the assistance level by typing the command you want run followed by `astlvl(*xxxxx)` where `*xxxxx` is `*basic` for basic assistance level, `*intermed` for intermediate assistance level, and `*advanced` for advanced assistance level. You can designate the assistance level for the following CL commands:

- Display Messages (DSPMSG)
- Display System Status (DSPSYSSTS)
- Work with Configuration Status (WRKCFGSTS)
- Work with Messages (WRKMSG)
- Work with Spooled Files (WRKSPLF)
- Work with System Status (WRKSYSSTS)
- Work with User Jobs (WRKUSRJOB)

Note: To change the assistance level for the Work with User Jobs (WRKUSRJOB) command and reach the Work with Signed-On Users display, type

```
WRKUSRJOB USER(*ALL) STATUS(ACTIVE) JOBTYPE(*INTERACT) ASTLVL(*BASIC)
```

To change the assistance level for the Work with Users Jobs (WRKUSRJOB) command and reach the Work with Jobs display, type

```
WRKUSRJOB USER(*ALL) STATUS(ACTIVE) JOBTYPE(*BATCH) ASTLVL(*BASIC)
```

These commands only change the assistance level for one use of the command. If you issue another command and then issue the

WRKUSRJOB command again, you return to the intermediate assistance level.

- Work with User Profiles (WRKUSRPRF)
- Work with Writers (WRKWTR)

Figure 3-3 and Figure 3-4 on page 3-5 illustrate displays you see when you switch from the basic to the intermediate assistance level while you are displaying messages. To see Figure 3-3, type the following on any command line and press the Enter key:

```
DSPMSG ASTLVL(*BASIC) MSGQ(QSYSOPR)
```

or use F21 (Select assistance level) and select 1 (Basic).

```
                              Work with Messages
                                                              System:   SYSTEM01
Messages in:   QSYSOPR

Type options below, then press Enter.
  4=Remove   5=Display details and reply

Opt   Message
                            Messages needing a reply
 _    Device RMTPRT0013 not available. (C R)
 _    Device RMTPRT0012 not available. (C R)
 _    Device RMTPRT0009 not available. (C R)
 _    Device RMTPRT0000 not available. (C R)
 _    Load form type '*STD' device PRT01 writer PRT01.  (H C G I R)
 _    Device KOLUMDEV not available. (C R)

                           Messages not needing a reply
 _    An adapter has inserted or left the token-ring on line TRNLINE.
 _    Controller KK33 contacted on line TRNLINE.
 _    Device K33SS3 no longer communicating.
                                                                        More...
F1=Help   F3=Exit      F5=Refresh   F16=Remove messages not needing a reply
F17=Top   F18=Bottom   F24=More keys
```

Figure 3-3. Work with Messages Display—Basic Assistance Level

To see Figure 3-4 on page 3-5, type the following on any command line and press the Enter key:

```
DSPMSG ASTLVL(*INTERMED) MSGQ(QSYSOPR)
```

or use F21 (Select assistance level) and select 2 (Intermediate).

```
                              Display Messages
                                                        System:   SYSTEM01
Queue . . . . . :   QSYSOPR                Program . . . . :   *DSPMSG
  Library . . . :     QSYS                   Library . . . :
Severity  . . . :   70                     Delivery  . . . :   *HOLD

Type reply (if required), press Enter.
  All sessions ended for device BIGELOW.
  Controller BIGELOW has disconnected.
  Controller BIGELOW contacted on line TRNLINE.
  All sessions ended for device BIGELOW.
  Writer 011921/QSPLJOB/BIGELOWS5 started.
  An adapter has inserted or left the token-ring on line TRNLINE.
  An adapter has inserted or left the token-ring on line TRNLINE.
  An adapter has inserted or left the token-ring on line TRNLINE.
  Controller KODO failed. Automatic recovery started.
  Device KODOS4 no longer communicating.
  Device KODOS3 no longer communicating.
  Controller KODO contacted on line TRNLINE.
  An adapter has inserted or left the token-ring on line TRNLINE.
                                                                      Bottom
F3=Exit             F11=Remove a message                F12=Cancel
F13=Remove all      F16=Remove all except unanswered    F24=More keys
```

Figure 3-4. Display Messages Display—Intermediate Assistance Level

You can also change your default assistance level in your user profile. To do this, change the *Assistance level* field using the Change User Profile (CHGUSRPRF) command.

The Operational Assistant function keeps track of what assistance level you have requested for each of the following groups of displays:

- Printer output
- Printers
- Jobs
- Handling messages
- Device status
- User enrollment
- System status

The assistance level is set for each command, so you can use the basic assistance level for some displays and the intermediate assistance level for other displays. For each command, select the assistance level you feel most comfortable working with and that allows you to get your work done the easiest way.

Note: Your current assistance level for each command is stored so when you sign on again, your assistance level remains the same.

Using CL Commands with the Operational Assistant Displays

As you become an experienced AS/400 system user, you may prefer to do some tasks using commands rather than menus. When you are using the intermediate or the advanced assistance level you usually have a command line at the bottom of your display. You can type any control language (CL) command on this command line.

Note: To control whether or not a user has use of a command line, type N (No) in the *Restrict command line use* field on the Add User or Change User display. You can add or change a user on the Work with User Enrollment

display. To find this display, type `go setup` and select option 10 (Work with user enrollment) or use the command WRKUSRPRF *ALL ASTLVL(*BASIC).

To display a command line when you are using the basic assistance level, press F9 (Command line). Figure 3-5 shows the command window that appears at the bottom of your display.

```
ASSIST              AS/400 Operational Assistant (TM) Menu
                                                          System:   SYSTEM01
To select one of the following, type its number below and press Enter:

     1. Work with printer output
     2. Work with jobs
     3. Work with messages
     4. Send messages
     5. Change your password

    10. Manage your system, users, and devices
    11. Customize your system, users, and devices

    75. Information and problem handling

    80. Temporary sign-off

:.....................................................................:
:                                 Command                             :
:                                                                     :
:  ===> go disktasks_____________________________________________     :
:  F4=Prompt   F9=Retrieve   F12=Cancel                                :
:                                                                     :
:.....................................................................:
```

Figure 3-5. Operational Assistant Command Window

If you know the name of the command, you can type the name of the command on the command line and press F4 (Prompt). A display is shown with all of the fields you need to fill in for that command. Press the Help key or F1 (Help) while your cursor is on any field to get an explanation of its function and a list of the possible values you can type in the field.

If you do not know the name of the command you want, you can press F4 (Prompt) without typing anything while your cursor is on the command line. The Major Command Groups menu is shown where you can begin your search for the command you want.

Using the GO Command

To get to any menu on the AS/400 system quickly, type `go` plus the menu ID on any command line, then press the Enter key. For example, if you want to run your daily backup, you can get to the Run Backup menu by typing `go runbckup` on any command line and pressing the Enter key. The menu ID is shown in the top left corner of the display as in Figure 3-6.

```
RUNBCKUP
```

Figure 3-6. Example of a Menu ID

To find a list of all of the menus on the system, type the following on any command line and press the Enter key:

```
WRKMNU *ALL
```

or

```
GO *ALL
```

When a menu name is mentioned, the menu ID is shown in parentheses next to the menu name, for example, the Run Backup (RUNBCKUP) menu.

Menus for System Operations

The following is a list of menus that are particularly useful in controlling and operating the system. You can get to any of these menus directly from any display having a command line. Just type GO plus a menu ID from the following list:

ASSIST The Operational Assistant (ASSIST) menu simplifies some of the common user tasks, such as working with printer output, jobs, messages, and changing your password.

In addition, users with proper authority can select options to manage or customize the system, check the system status, clean up objects, power the system on and off, enroll users, change some system options, and collect disk space information.

BACKUP The Backup Tasks (BACKUP) menu allows you to back up (save) the system and initialize the tapes used during backup.

CLEANUP The Cleanup (CLEANUP) menu allows you to start, end, or change automatic cleanup. The cleanup function deletes old job logs, history logs, messages, office calendar items, and journal receivers that take up storage space.

CMNCFG The Communications Configuration (CMNCFG) menu can be used to configure communications to other AS/400 systems, System/36s, or to remote work station controllers and attached devices.

DEVICESTS The Device Status (DEVICESTS) menu allows you to choose options for working with system devices, such as display stations, printers, tape drives, and diskette drives.

DISKETTE The Diskette (DISKETTE) menu allows you to work with diskettes.

DISKTASKS The Disk Space Tasks (DISKTASKS) menu provides the option for collecting disk space information to help show how storage is being used on your system. After collecting the information, you can specify what information to include in a report and then print the report.

FILE The Files (FILE) menu allows you to work with files on the system.

FOLDER	The Folders (FOLDER) menu allows you to manage folders. Folders can be used to store other folders and documents.
INFO	The Information Assistant Options (INFO) menu allows you to find out where to look for information about your AS/400 system and how to comment on that information. You can also use this menu to find out what is new in this release of the AS/400 system and what new enhancements and functions will be available in the next release.
LIBRARY	The Libraries (LIBRARY) menu allows you to work with libraries.
MANAGESYS	The Manage Your System, Users, and Devices (MANAGESYS) menu allows you to display what activity is going on in the system, run backup, and work with the devices on the system.
POWER	The Power On and Off Tasks (POWER) menu allows you to display the power-on and off schedule. If you have the correct authority, you can also change the schedule or power off the system and then power it on again.
PROBLEM	The Problem Handling (PROBLEM) menu allows you to work with problems, ask questions, and receive answers using the question and answer database, display system operator messages, display the history log, and start system service tools (SST).
RESTORE	The Restore (RESTORE) menu allows you to restore saved information from tape, or save file (SAVF) on the system.
RUNBCKUP	On the Run a Backup (RUNBCKUP) menu you can select a menu option to specify the type of backup you want to run.
SETUP	The Customize Your System, Users, and Devices (SETUP) menu lets you customize automatic cleanup, schedule when your system will power on and off, and enroll users.
SETUPBCKUP	The Set Up Backup (SETUPBCKUP) menu allows you to change backup options, lists, and schedules.
STATUS	The Status (STATUS) menu allows you to display the status of jobs, devices, and system activities.
SYSTEM	The General System Tasks (SYSTEM) menu allows you to control system operations, devices, and all jobs on the system.
TAPE	The Tape (TAPE) menu allows you to use and control tape devices.
TECHHELP	The Technical Support Tasks (TECHHELP) menu provides options to help resolve problems on the system.

USERHELP

The Information and Problem Handling (USERHELP) menu provides additional information about the system and is useful in attempting to resolve problems.

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Chapter 4. Controlling Jobs

The key element used by the AS/400 system to organize and manage work is the **job**. A job usually includes all necessary programs, files, connections and instructions to the Operating System/400 licensed program.

A job can be one very short and simple task such as printing a report or it can be a series of tasks, such as:

- Calculating total sales by product
- Calculating total sales by area
- Calculating total sales by sales person
- Printing sales reports

Figure 4-1 provides an overview of how jobs are run.

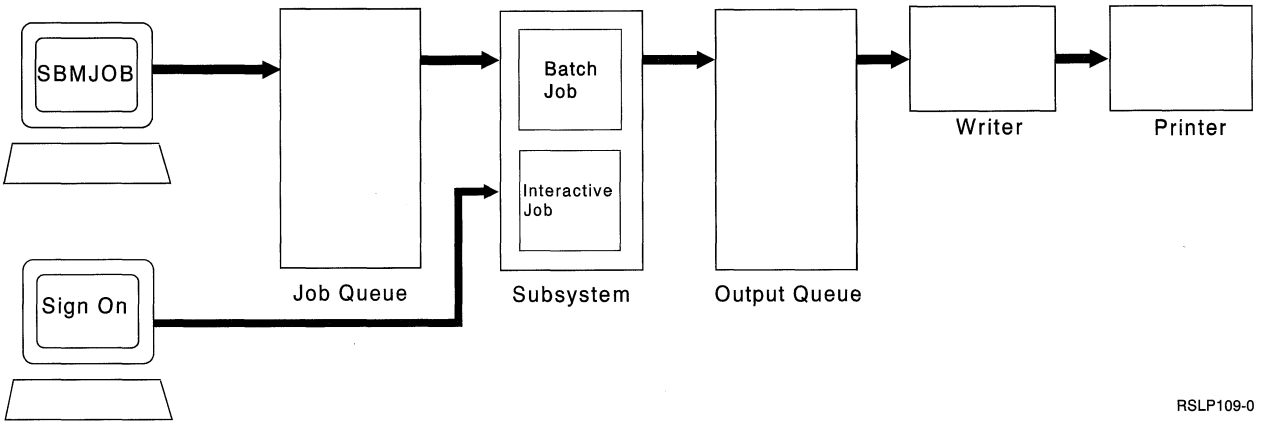

Figure 4-1. Overview of Job Processing

There are two basic types of jobs: batch jobs and interactive jobs. "Working with Batch Jobs" gives you information about how to display, end, hold, release and schedule batch jobs as well as work with job queues. "Working with Signed-On Users" on page 4-11 gives information on how to display and end interactive jobs. Also included in this chapter is information on how to display detailed information about your job, changing how a job is run, and working with job logs.

Additional Reading: For more detailed information about jobs, job logs, job queues, and output queues and how to manage these, see the *Work Management Guide*.

Working with Batch Jobs

A **batch job** does not require constant interaction with the computer. Once you have submitted a batch job, you are free to do other work at your work station without waiting for the job to run. Two examples of jobs that are commonly run in batch are printing reports and doing month-end data summaries.

When you submit a batch job, it is placed on a job queue. Then, the subsystem to which the job queue is assigned takes the jobs off the job queue in order and runs them. For more information on subsystems, see "Working with Subsystems" on page 2-22.

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Submitting a Batch Job

There are two ways you can submit a batch job: you can submit it immediately or schedule it to run later.

Submitting a Batch Job Immediately

To submit a job that runs immediately, enter the Submit Job (SBMJOB) command and press F4 (Prompt).

On the Submit Job (SBMJOB) display, in the *Command to run* field, type the command you want to run in a batch job.

- If the job you want to submit is a program, type `call` and the name of the program; for example, CALL PAYROLL. If the job you want to run is a REXX procedure, use the Start REXX Procedure (STRREXPRC) command.
- If the job you want to run is a CL command, type the name of the command. You can use prompting to assist you with the parameters for the command. Type the name of the command and then press F4 (Prompt) while your cursor is positioned in the *Command to run* field.
- If you want, you can also change the value already specified for any of the other entry fields.
- Press the Enter key. The job is submitted. A message is shown at the bottom of your display that tells you the qualified job name that the system has assigned to your job and the name of the job queue to which it has been submitted.

The **qualified job name** is used by the system and by system users to locate jobs. It consists of three parts:

Job number
: Assigned by the system to make sure every qualified job name is unique.

User ID
: The user profile under which the job is running, usually the profile of the submitter.

Job name
: A short descriptive title of the job, such as PRTINV for "print invoices."

Scheduling a Batch Job

To schedule a batch job using the Submit Job (SBMJOB) command, use the Schedule date (SCDDATE) and Schedule time (SCDTIME) parameters on the Submit Job (SBMJOB) display.

Schedule date (SCDDATE) parameter: Specifies the day the job is released on the job queue. The possible values are:

*CURRENT	Today's date
*MONTHSTR	First day of the month
*MONTHEND	Last day of the month
*MON – *SUN	The next occurrence of the specified day of the week
11/26/91	A specific day (job date format is defined in the system value QDATFMT)

Schedule time (SCDTIME) parameter: Specifies the time on the scheduled date when the job will be marked released on the job queue. The actual time may vary depending on the activity involved in releasing the job and the load on the system when the job is scheduled to be started.

*CURRENT The current time

17:00:00 A specific time (job time separator may vary)

Note: If the schedule date is the current date and the schedule time is the current time the job will be placed on the job queue with a status of `*Released (Use F5)`.

At the time indicated, the job's status changes from `*Scheduled` to `*Released` and it is processed as a normal job on the job queue. If a scheduled job is held on the job queue, the job's status changes from `*Scheduled` to `*Held` at the time indicated. As with other batch jobs, the job queue must be allocated to an active subsystem, not be held, and the maximum number of jobs must not already be active in the subsystem.

Scheduling a Job Using Job Schedule Entries

A **job schedule entry** contains the information needed to submit a batch job once or at regular intervals. The Work with Job Schedule Entries (WRKJOBSCDE) command allows you to perform time-dependent scheduling for AS/400 batch jobs. You schedule the time at which a job is released in the job queue or submitted to the job queue.

When you add a job schedule entry, a job will be submitted at the specified time. When you remove a job schedule entry, the job will not be submitted. You can also change the information in the job schedule entries, or hold and release a job schedule entry. Each entry has a unique job name and entry number.

This section contains an overview of the job scheduling function. See the *Programming: Work Management Guide*, SC41-8078 for complete and detailed information about the job scheduling function and working with the job schedule entries.

Figure 4-2 shows the Work with Job Schedule Entries display.

```
                        Work with Job Schedule Entries              RCH38360
                                                          03/25/91  08:15:04

Type options, press Enter.
  2=Change   3=Hold     4=Remove   5=Display details   6=Release
  8=Work with last submission   10=Submit immediately

                                                                      Next
                          -----Schedule------             Recovery  Submit
Opt  Job         Status   Date       Time      Frequency    Action   Date
__   _________
__   DAILYJOB    SCD      USER DEF   17:00:00  *WEEKLY     *NOSBM    03/25/91
__   PRTREPORT   HLD      03/28/91   23:00:00  *ONCE       *SBMRLS   03/28/91



                                                                      Bottom
Parameters or command
===> ____________________________________________________________________________
F3=Exit   F4=Prompt    F5=Refresh   F6=Add    F9=Retrieve
F11=Display job queue data   F12=Cancel   F17=Top   F18=Bottom
```

Figure 4-2. Work with Job Schedule Entries Display

Adding a Job Schedule Entry

To schedule a job once, weekly, or monthly, use F6 (Add) on the Work with Job Schedule Entries display, or the Add Job Schedule Entry (ADDJOBSCDE) command. The job is submitted at the specified time by the Submit Job (SBMJOB) command. For the job to start running, make sure:

- The job queue is allocated to an active subsystem.
- The job queue is not held.
- Maximum jobs are not already active.

Saving a Job Schedule Entry

If you want to prevent the entry from being automatically deleted after a job is submitted from a job schedule entry that is used only once to submit a job, type *yes for the Save (SAVE) parameter on the Add Job Schedule Entry (ADDJOBSCDE) command.

Removing a Job Schedule Entry

To remove a job schedule entry so that it is not used to submit a job, use option 4 (Remove) on the Work with Job Schedule Entries display or the Remove Job Schedule Entry (RMVJOBSCDE) command. If a job from this entry has already been submitted to the job queue, you can end it using the Work with User Jobs (WRKUSRJOB) command.

Changing a Job Schedule Entry

To change a job schedule entry, use option 2 (Change) on the Work with Job Schedule Entries display or the Change Job Schedule Entry (CHGJOBSCDE) command. This changes the entry in the job schedule but does not affect any jobs already submitted for this entry.

Holding and Releasing a Job Schedule Entry

To hold a job schedule entry, use option 3 (Hold) on the Work with Job Schedule Entries display or the Hold Job Schedule Entry (HLDJOBSCDE) command. When the time occurs for the job to be submitted, the entry is ignored.

To release a job schedule entry, use option 6 (Release) on the Work with Job Schedule Entries display or the Release Job Schedule Entry (RLSJOBSCDE) command. If the time has not passed, the job is submitted as scheduled. If the scheduled time has passed, a warning message is displayed indicating that jobs were missed.

Scheduling a Job

To change the date and time for a scheduled job or to change a non-scheduled job to be scheduled, use the Schedule date (SCDDATE) and Schedule time (SCDTIME) parameters on the Change Job (CHGJOB) command.

To submit a job to a job queue and to hold it in a scheduled state for a specified period of time, use the Schedule date (SCDDATE) and Schedule time (SCDTIME) parameters on the Submit Job (SBMJOB) command.

Working with Batch Jobs

You can hold, release, end, and check the status of batch jobs on the Work with Jobs display. To find the Work with Jobs display:

1. Type `go assist` on any command line and press the Enter key to display the Operational Assistant menu.
2. Select option 2 (Work with jobs).

You can also use the following command:

```
WRKUSRJOB JOBTYPE(*BATCH) ASTLVL(*BASIC)
```

Figure 4-3 shows the Work with Jobs display.

```
                              Work with Jobs
                                                          System:  SYSTEM01
User . . . . . .   SMITH_____  Name, *ALL, F4 for list

Type options below, then press Enter.
  3=Hold   4=Delete (End)   6=Release   7=Display message
  8=Work with printer output

     Job Queue/
Opt    Job          Status
     QBATCH
 _     BONUS2       Message waiting (use opt 7)
 _     BONUS        Running
 _     NOBONUS      Running job held (use opt 6)
 _     PAYCODE      Ending
 _     PAYROLL      Waiting to run (2 of 4)
 _     OVERTIME     Scheduled 11/30/91 12:00:00
 _     TIMECARD     Held (use opt 6)
 _     HOLIDAY      Held (use opt 6)
                                                                      Bottom
F1=Help      F3=Exit    F5=Refresh    F9=Command line    F11=Display dates/times
F12=Cancel   F14=Select other jobs    F22=Work with job queues    F24=More keys
```

Figure 4-3. Work with Jobs Display for the Status of a Single User

Note: Jobs resulting from job schedule entries do not appear on this display until the time they are scheduled to be submitted.

Displaying Batch Jobs of Other Users

You can select whose jobs to view on the Work with Jobs display.

Security Consideration

To view and manage the jobs of other users, you must have job control (*JOBCTL) authority in your user profile.

If you want to see all of the jobs for a user, type the user ID of the person whose jobs you want to see in the *User* field and press the Enter key. The Work with Jobs display is shown for the user you selected.

Displaying All Batch Jobs

To see all batch jobs, on the Work with Jobs display, type `*all` in the *User* field and press the Enter key. You can enter a generic name, for example `A*` shows you all of the jobs for all users whose names start with an **A**. You can enter a generic name on the Select Other Jobs display also.

The Work with Jobs display is shown with a new column called *User*. Figure 4-4 shows all of the batch jobs on the system.

```
                              Work with Jobs
                                                          System:  SYSTEM01
User . . . . . .   *ALL_____   Name, *ALL, F4 for list

Type options below, then press Enter.
  3=Hold   4=Delete (End)   6=Release   7=Display message
  8=Work with printer output

     Job Queue/
Opt    Job          User         Status
     QBATCH
_      BONUS        SMITH         Message waiting (use opt 7)
_      MYJOB        HARRY         Running
_      BONUS2       SHEMP         Ending
     QS36EVOKE
_      PAYROLL      DUNNJ2        Waiting to run (1 of 4)
_      INVOICES     MAHONEY       Waiting to run (2 of 4)
_      INVOICES2    MONTEY        Waiting to run (3 of 4)
_      INVOICES3    GEORGE        Scheduled 12/15/91 22:00:00

                                                                    Bottom
F1=Help      F3=Exit   F5=Refresh    F9=Command line    F11=Display dates/times
F12=Cancel   F14=Select other jobs    F22=Work with job queues    F24=More keys
```

Figure 4-4. Work with Jobs Display for the Status of Multiple Users

The jobs on this display are sorted by job queue. Within each job queue, the jobs are grouped by status.

Performance Note

Whenever possible, select a user ID instead of typing `*all` in the *User* field of the Work with Jobs display. If there are many jobs on the system, the performance of other jobs is affected when you use *ALL.

Displaying Batch Jobs by Status

To find jobs based on status:

1. On the Work with Jobs display, press F14 (Select other jobs). Figure 4-5 shows the Select Other Jobs window.

```
                              Work with Jobs
.....................................................................
:                          Select Other Jobs                        :
:                                                                   :
:  Select the following jobs for the list.                          :
:                                                                   :
:  Type choices below, then press Enter.                            :
:                                                                   :
:    User . . . . . . . . . . . . .   *ALL_____   Name, *ALL, F4 for list  :
:    Status:                                                        :
:      Message waiting  . . . . . .   Y           Y=Yes, N=No       :
:      Running  . . . . . . . . . .   Y           Y=Yes, N=No       :
:      Running job held . . . . . .   Y           Y=Yes, N=No       :
:      Ending . . . . . . . . . . .   Y           Y=Yes, N=No       :
:      Waiting to run/Scheduled . .   Y           Y=Yes, N=No       :
:      Held . . . . . . . . . . . .   Y           Y=Yes, N=No       :
:      Job queue held . . . . . . .   Y           Y=Yes, N=No       :
:      Queue not assigned . . . . .   Y           Y=Yes, N=No       :
:      Printer output . . . . . . .   N           Y=Yes, N=No       :
:                                                                   :
:                                                                   :
:  F1=Help   F5=Refresh   F12=Cancel                                :
:                                                                   :
:...................................................................:
```

Figure 4-5. Select Other Jobs Window

2. Leave the `Y` (Yes) next to each status whose jobs you want included on your display in the Select Other Jobs window.
3. Type an `N` (No) next to each status you do not want included.
4. Press the Enter key. The Work with Jobs display is shown again, including only those jobs that have the statuses you selected.

You can also see when jobs were started by pressing F11 (Display dates/times) on the Work with Jobs display. To return to the status version of this display, press F11 (Display statuses).

Holding a Batch Job

To hold a batch job on the Work with Jobs display:

1. Select option 3 (Hold) for the job or jobs you want held.

   The status of the job changes to `*Held (use F5)`.

2. Press F5 (Refresh).

   The status of the job changes to either `Running job held (use Opt 6)` or `Held (use Opt 6)`.

Holding Printer Output from a Batch Job: Once a job has a status of `Printer output`, it has finished running. Any reports it has created are waiting to print or are printing. If you do not want these reports to print, use option 8 (Work with printer output) on the Work with Jobs display. On the Work with Job Printer Output display, use option 3 (Hold).

Note: Printer output is not included unless you type a `Y` in the *Printer output* field in the Select Other Jobs window.

Releasing a Batch Job

To release a batch job on the Work with Jobs display:

1. Select option 6 (Release) for the job or jobs you want released.

   The status of the job changes to `*Released (use F5)`.

2. Press F5 (Refresh).

   The status of the job changes to either `Running`, `Waiting to run`, or `Scheduled`.

Ending a Batch Job

Warning: Use caution when ending a job. Ending a job may interrupt job or file updates.

To end a batch job, on the Work with Jobs display:

1. Select option 4 (Delete (End)) for the job or jobs you want ended.

   The Confirm Delete (End) of Jobs display is shown. Press the Enter key to end the jobs or F12 (Cancel) to keep the jobs.

2. The Work with Jobs display is shown, the job you ended no longer appears on the display unless it has a status of `Printer output`. This status does not appear unless `Y` is specified in the *Printer output* field on the Select Other Jobs display.

Deleting Batch Job Printer Output: Once a job has a status of `Printer output`, it has finished running. Any reports that it created are either printing or waiting to print. To cancel a report, use option 8 (Work with printer output). On the Work with Job Printer Output display, select option 4 (Delete) for the printer output you want to delete.

Working with Job Queues

Before a batch job is run, it waits in line on the job queue of the subsystem that will run it. The job can be waiting because other jobs are in front of it on the queue, the job is held, the job queue is held, or the job queue is not allocated to an active subsystem. A waiting job also has a **priority** (its place in the queue).

Figure 4-6 on page 4-9 shows an overview of a subsystem processing jobs from a job queue.

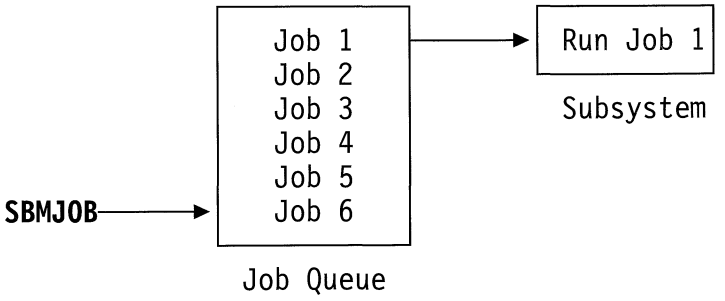

Figure 4-6. Overview of Job Queue Processing

Looking at Job Queues

If you have submitted batch jobs, the Work with Jobs display tells you the status of those jobs, including where they are on the job queue if they are waiting to run.

However, you may want to know which jobs are scheduled to run ahead of your job. Or, as the system operator, you may want to monitor the activity on the job queues. You can view this information on the Work with Job Queues display. To find this display:

1. On the Operational Assistant (ASSIST) menu, select option 2 (Work with jobs).
2. On the Work with Jobs display, press F22 (Work with job queues). Figure 4-7 shows the Work with Job Queues display.

```
                          Work with Job Queues
                                                          System:   SYSTEM01
User . . . . . :   *ALL

Type options below, then press Enter.
  3=Hold   6=Release

     Job Queue/
Opt    Job          Status
 _   HILGEREL       Job queue not assigned
 _   MHJOBQ         Job queue not assigned
 _   NORBERT        Held (use Opt 6)
 _   NORBERT2       Ready
 _   NOBELL         Job queue not assigned
 _   QBATCH         Ready
 _   QCTL           Ready
 _   QSNADS         Ready
 _   QXFPCS         Ready
 _   SCHMALL        Job queue not assigned
 _   TLMJOBQ        Job queue not assigned
                                                                      More...
F1=Help      F3=Exit   F5=Refresh   F11=Display libraries/descriptions
F12=Cancel   F14=Include jobs on job queue
```

Figure 4-7. Work with Job Queues Display - Summary

To see the individual jobs on the queues, press F14 (Include jobs on job queue). The Work with Job Queues display is shown again with the jobs included. From either of these displays, press F11 (Display libraries/descriptions) to see another version that shows descriptive information about the job queues.

Working with an Empty Job Queue and Displaying Job Priority: To view an empty job queue or job priority within the queue, use the Work with Job Queue (WRKJOBQ) command to display the Work with All Job Queues display.

On the Work with All Job Queues display, you can hold or release any job queue. This holds all jobs already on the job queue as well as any jobs that are submitted to that job queue.

To find priorities of jobs on a job queue use option 5 (Work with). When you press the Enter key, the Work with Job Queue display is shown for the queue you selected. The *Priority* column contains the priority of each job in the job queue.

Holding a Job Queue

To hold a job queue on the Work with Job Queues display:

1. Use option 3 (Hold) for the job queue or queues you want to hold.

   The status of the queue is changed to `*Job queue held (use F5)`.

2. Press F5 (Refresh).

   The status of the queue is changed to `Held (use Opt 6)`.

Note: The Work with Job Queues display shows only job queues that have waiting or running jobs. If no jobs are associated with a job queue, the Work with Job Queues display appears empty. An empty job queue is held when you may not know the job queue is empty or when you know that the job queue is empty and choose to hold it so you can stop all future jobs from coming into the system. To hold a job queue that has no jobs, see "Working with an Empty Job Queue and Displaying Job Priority."

Releasing a Job Queue

To release a job queue on the Work with Job Queues display:

1. Use option 6 (Release) for the job queue or queues you want to release.

   The status of the job queue changes to `*Job queue released (use F5)`.

2. Press F5 (Refresh).

   The status changes to `Ready`.

Working with Unassigned Job Queues

Jobs waiting on the job queue are never selected to run if the job queue is not assigned. To run these jobs, do one of the following:

- Move the jobs on the unassigned queue to a different job queue:
  1. On either the Work with Jobs or the Work with Job Queues display, find the job queues that are ready to run jobs.
  2. If you need additional information about which job queues are assigned to which subsystems, use the Work with Job Queues (WRKJOBQ) command.
  3. On the Work with All Job Queues display, look at the *Subsystem* column to tell which job queues are assigned to active subsystems.
  4. Move the jobs between job queues using the Change Job (CHGJOB) command. See "Moving a Job to a Different Job Queue" on page 4-16 for instructions on how to do this.

- Start the subsystem to which the job queue is assigned. See "Starting Subsystems" on page 2-22 for information on how to start a subsystem.

  Note: To determine which subsystem uses the job queue, display the subsystem description. See "Displaying Subsystem Descriptions" on page 2-23 for information on how to display a subsystem description.

  On the Display Subsystem Description menu, select option 6 (Job queue entries). The Display Job Queue Entries display is shown with all of the job queues assigned to the subsystem.

- Assign the job queue to a subsystem. If you have determined that none of the subsystems have a job queue entry for this job queue, you can assign it to a subsystem using the Add Job Queue Entry (ADDJOBQE) command. The subsystem must be ended before you can add a job queue entry to it.

Working with Signed-On Users

When you are signed on the system, you type one request at a time (such as selecting an option or typing a command) and the system responds to each request as it is typed.

This session, sometimes called an **interactive job**, begins when you sign on a display station and ends when you sign off. During the session, your interaction with the system is similar to a conversation. The AS/400 system links together all of the tasks you do from the time you sign on until you sign off. This makes it easier for you to manage your work environment, find your output, and keep track of what you have done.

Displaying Signed-On Users

To display all users signed on the system, select option 12 (Work with signed-on users) on the Manage Your System, Users, and Devices (MANAGESYS) menu or use the Work with User Jobs command as follows:

```
WRKUSRJOB USER(*ALL) STATUS(*ACTIVE) JOBTYPE(*INTERACT) ASTLVL(*BASIC)
```

If you do not want to type the Work with User Jobs (WRKUSRJOB) command with all the parameters to get to the Work with Signed-On Users display, you can create your own copy of the Work with User Jobs (WRKUSRJOB) command in your library, changing the defaults to display the Work with Signed-On Users display. To do this:

1. Enter the Create Duplicate Object (CRTDUPOBJ) command and press F4 (Prompt).
2. Type the following values for the parameters listed and press the Enter key:

From object (OBJ)	WRKUSRJOB
From library (FROMLIB)	QSYS
Object type (OBJTYPE)	*CMD
To library (TOLIB)	Your library name
New object (NEWOBJ)	Name of the new command (for example, WRKSGNON)

3. Enter the Change Command Default (CHGCMDDFT) command and press F4 (Prompt).

4. Type the following values for the parameters and press the Enter key:

Command (CMD)	WRKSGNON (or the name of the new command)
Library	Your library name
New default (NEWDFT)	USER(*ALL) STATUS(*ACTIVE) JOBTYPE(*INTERACT) ASTLVL(*BASIC)

Figure 4-8 shows the Work with Signed-On Users display.

```
                        Work with Signed-On Users
                                                          System:   SYSTEM01
Find user . . . . . . . . . . . . .  _______   Starting characters

Type options below, then press Enter.
  3=Send message   4=Sign off   5=Display details   7=Display message

                 Display
Opt  User        Station     Activity
 _   BRUNS       BRUNSS3     ASSIST menu
 _   EVERLY      EVERLYS2    INVENTORY program
 _   GOETZ       QPADEV0004  Command entry
 _   JACK        JACKS4      Message waiting (use Opt 7)
 _   SMITH       SMITHS1     WRKUSRJOB command
 _   TELLY       QPADEV0008  MAIN menu
 _   TUBER       QPADEV0002  WRKSPLF command




                                                                      Bottom
F1=Help   F3=Exit   F5=Refresh       F10=Send message to all
F11=Display additional information   F13=Sort list   F24=More keys
```

Figure 4-8. Work with Signed-On Users Display

Signing Users Off the System

Signing a user off interrupts their interactive job in the middle of processing, removes it from the system, and signs the user off.

Warning: Use caution when signing a user off the system. Ending a user's interactive job may interrupt job or file updates.

To sign a user off the system:

1. Use option 4 (Sign off), on the Work with Signed-On Users display, for the user or users you want to sign off the system.
2. Press the Enter key. On the Confirm Sign Off display, press the Enter key to sign users off the system or F12 (Cancel) to leave the users signed on to the system.

   The Work with Signed-On Users display is shown without the user(s) you signed off the system.

Finding Signed-On Users and Sorting the User List

To find a specific user signed on to the system, type the first few characters of the user's name in the *Find user* field and press the Enter key. The list is positioned at the first user matching the characters you typed.

The list is initially sorted by user name and shows the activities of each user. To sort the list by user name or display station name, press F13 (Sort list). To select other users and display stations, use F14 (Select other users and display stations). Users who are temporarily signed off are not included in this list. To include them, type a `Y` in the *Include temporarily signed-off users and suspended group jobs* field in the Select Other Users and Display Stations window.

Finding Additional Information about Signed-On Users

There are two ways you can display additional information about the users currently signed on to the system. For a single user listed on the Work with Signed-On Users display, select option 5 (Display details). This shows the Display Details display, which shows the user, display station description, and the current activity of the user.

To get additional information for all users shown on the Work with Signed-On Users display, press F11 (Display additional information). This displays a pop-up window where you can select which type of information you want to see in the third column on the display: activities, display station descriptions, or user descriptions.

For additional information about all aspects of every job on the system, see "Displaying Detailed Job Information."

Sending Messages to Signed-On Users

From the Work with Signed-On Users display, you can send messages to one, several, or all users signed on the system.

- To send a message to one or several signed-on users, use option 3 for each user. To send a message to all signed-on users, press F10 (Send message to all).
- Type your message in the *Message text* field on the Send a Message display and press F10 (Send).

  Note: The Send a Message display is set up to interrupt the users signed on the system. If you do not want to interrupt them, change the value in the *Interrupt user* field to an `N`.

Displaying Detailed Job Information

The system keeps a comprehensive record of all aspects of every job. This information is available to you through the Work with Job menu.

To find this information for your own interactive job, use the Work with Job (WRKJOB) command. This displays the Work with Job menu.

To display the Work with Job menu for any other job on the system:

1. Use the Work with User Jobs (WRKUSRJOB) command selecting all jobs (or the job name if you know it) with the intermediate assistance level.

2. Use option 5 (Work with) for the job you want more information about on the Work with User Jobs display.

   The Work with Job menu for the job you selected is shown.

To help you monitor jobs and find out why problems with jobs occur, do the following tasks from the Work with Job menu.

Displaying Job Status Attributes

To display the identifying characteristics and the status of the job, select option 1 (Display job status attributes) on the Work with Job menu. For example, you can see when the job entered the system and when it started running. For a batch job, this information can help you determine whether or not the job has been running too long and might be in a loop.

Displaying Job Definition Attributes

To display the current job definition attributes, select option 2 (Display job definition attributes) on the Work with Jobs display. This displays information such as job queue assignment and priority, output queue assignment and priority, message queue assignment, and logging level.

Many of these definition attributes can be changed using the Change Job (CHGJOB) command or F9 (Change job) on the Display Job Definition Attributes display. See "Changing How a Job Is Run" on page 4-15 for information on how to change a job.

Displaying Job Run Attributes

To display the current job run attributes, select option 3 (Display job run attributes, if active) on the Work with Jobs display. You can find out what a job's run priority is on this display.

Displaying the Call Stack

If an active job has stopped or seems to be in a loop, the call stack can help to determine where the problem is. It shows what program line numbers the job is currently trying to run. To display the call stack, select option 11 (Display call stack, if active) on the Work with Job menu.

Displaying Open Files

You can see information about all of the files that the job is currently using by selecting option 14 (Display open files, if active) on the Work with Job menu.

The Display Open Files display is useful in detecting a program loop. Press F5 (Refresh) continually and look at the data in the *Relative Record* column to see if the job is repeating the same relative record number.

You can also use this option to monitor the progress of a long-running batch job. For example, if you know that the job updates 15,000 records in a file, you can check the *I/O Count* field for the input/output count in that file to find out how the job is progressing.

Changing How a Job Is Run

Once you have used the options on the Work with Job menu to do research, you might want to change some of the attributes of a job that is running or waiting to run. You can change a number of job attributes. For example, you can:

- Change the job queue priority
- Change the run priority
- Change the output priority
- Move a job to a different job queue or output queue

Note: Display the current value of any job attributes before changing them.

You can change attributes of a job with the Change Job (CHGJOB) command. Select option 40 (Change job) on the Work with Job menu.

The following are tasks that can be done on the Change Job (CHGJOB) prompt display. You can do any of the following by changing the value for the specified parameter.

Changing a Job's Priority on a Job Queue

Each job on a job queue has an assigned priority (position on the queue). To change a job's position on the queue, type a number (0 to 9) in the *Job priority (on JOBQ)* field on the Change Job (CHGJOB) display. Raising a job's priority (changing the priority to a number closer to 0) can move it closer to the top of the queue. Then the job begins running sooner than jobs with lower priority on that queue.

The highest priority is 0. The lowest priority is 9. Jobs with a higher priority are run before jobs with a lower priority. There may be a limit on how high you can set the priority, depending on the number specified in the Priority limit (PTYLMT) parameter of your user profile.

Note: When you submit a job, the highest priority allowed is 1. Priority 0 is reserved for changing a job to move it to the very top of the queue.

Figure 4-9 shows how job priorities work when selecting jobs to run:

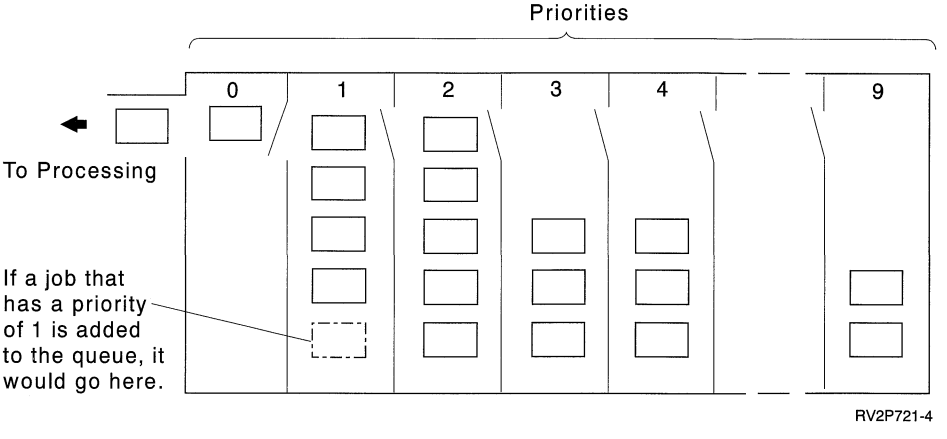

Figure 4-9. Job Queue Priority

This change only affects the job once. If the same job is submitted to the job queue again, it has its original priority. If you want to make a permanent change to

the job's priority on the job queue, you need to change either the job description it uses or the procedure that submits the job.

Moving a Job to a Different Job Queue

You may have more than one job queue on your AS/400 system. Sometimes certain job queues are set aside for work that does not require immediate running. These job queues can be released and held depending on how busy your system is. Or, your system may have a job queue assigned to a subsystem that has less system resources than the interactive subsystem.

If you have more than one job queue on your system, you can move a job from one queue to another by typing the new job queue in the *Job queue* field. This change only affects the job once. If the same job is submitted again in the same way, it goes to the original job queue. If you want to make a permanent change to the queue this job uses, you need to change either the job description it uses or the procedure that submits the job.

Changing How an Active Job Is Run

To change how a job is run, change either the *Run priority* or *Time slice* fields on the Change Job (CHGJOB) display. The control program decides which jobs to run in what order and for how long. Here's how it happens:

- Every job has a **time slice** and a **run priority**. The time slice sets a limit on how long the processor works on one job before switching to another job. Time slices are measured in milliseconds. The run priority determines which job the processor selects next.
- Once the processor has started processing the instructions for a job, it continues with that job until one of the following happens:
  - The job reaches time slice end.
  - The job needs to wait for something. For example, an interactive job might send a new display to your screen. Then the system has to wait for you to type another request and press the Enter key. This is known as a **long wait**.
- When one of the previous events occurs, the system has to decide which job to run next.
- It looks at a list of jobs that are ready to be run and chooses the highest priority job.

You can see that both run priority and time slice can affect how a job is run. You should use great care in changing either of these. If you give any job too high a priority or too long a time slice, it can negatively affect everything else running on the system.

When you use the Change Job (CHGJOB) command, it only affects the job once. If the same job runs again, it returns to the original priority and time slice. If you want to make a permanent change to how the job runs, you need to change either the characteristics of the class it uses or have it run using a different class.

Changing a Job's Print Priority

Each printer output on an output queue has an assigned priority (position on the queue that was obtained from the job's print priority). To change this priority, type a number from 1 to 9 in the *Output priority (on OUTQ)* field. Raising a job's priority (changing the priority to a number closer to 1) can move the job's printer output closer to the top of the output queue. Then it begins printing sooner than printer output with lower priority on that output queue. Output queue priorities work in the same way as job queue priorities (see Figure 4-9 on page 4-15).

Changing print priority using the Change Job (CHGJOB) command only affects the job once. If the same job runs again, it returns to the original output priority. If you want to make a permanent change to the job's output priority, you need to change either the job description it uses or change the procedure for submitting the job.

Assigning a Job to a Different Output Queue

When a batch job that creates printed output is waiting to run, you can change the output queue to which it is assigned by changing the *Output queue* field on the Change Job (CHGJOB) display. Once the batch job starts to run, it begins creating its spooled file in its assigned output queue. At that point, you would need to move the spooled file to a different output queue.

See Chapter 5, "Working with Printer Output" for information on moving output while the job is running or after it has finished.

For an interactive job, you may want to change the assigned output queue before you use the Print key or run a program that creates a report.

Using the Change Job (CHGJOB) command only affects the job once. If the same job runs again, it is assigned to the original output queue. If you want to make a permanent change to a batch job's output queue, you need to change either the job description it uses or change the procedure for submitting the job. If you want to make a permanent change to an interactive job's output queue, you need to change either the job description it uses, the user profile, or the work station device description.

Working with Job Logs

A **job log** is a system record of what happened when the job was processed. Each job has an associated job log that may contain the following information:

- The commands in the job
- The commands in any programs that were run as part of the job
- Any messages that were issued when the job ran, as well as the message online help information

When a job is finished, a job log output file called QPJOBLOG is created. Usually, when a batch job ends, the job log remains on the output queue and can be viewed or printed. When an interactive job ends normally, the job log is usually not sent to an output queue. When an interactive job ends abnormally, the job log output file is sent to an output queue.

The job log is a useful tool in diagnosing problems with a job. However, when the system creates and prints detailed job logs, it can slow the system down. It is a good idea to balance how much information you need in your job logs against how their creation affects system performance.

Displaying a Job Log

You can display a job log several different ways:

- For a job that has ended, on the Work with User Jobs display:
  1. Use option 8 (Work with spooled files) for the job whose log you want to see.
  2. On the Work with Job Spooled Files display, find the file called QPJOBLOG.
  3. Use option 5 (Display) to view it.
- For a job that is still running, on the Work with User Jobs display:
  1. Use option 5 (Work with) for the job whose log you want to see.
  2. On the Work with Job display, select option 10 (Display job log, if active or on job queue)
- To display the job log for your own work station session, use the Display Job Log (DSPJOBLOG) command.

Printing a Job Log

When an interactive job is running, a job log is being created. If the interactive job ends normally, for example, when you sign off without problems, this job log is not sent to the output queue.

To print a log for your interactive job, during sign-off type `signoff *list` on any command line and press the Enter key. To print the job log for another job, type `dspjoblog job(job number/user/name) output(*print)`.

Your job log output file is printed or placed in an output queue, depending on how your system is set up.

Changing the Logging Level for a Job

To minimize the size of job logs on your system, use the log level to limit how much information about a job is written to the job log.

To change the logging level for an active job:

1. Enter the Change Job (CHGJOB) command and press F4 (Prompt).
2. Press F10 (Additional parameters).
3. Press the Page Down key to find the *Message logging* and *Log CL program command* fields.
4. Type in the changes and press the Enter key.

Note: If you change the logging level to 0, F9 (Retrieve) does not work for command displays.

Using the Change Job (CHGJOB) command changes the logging level temporarily. If the same batch job runs again, it runs with its original log level. If you sign on again later, your interactive job has the original log level also.

To make a permanent change to the log level for a job, change the job description under which the job runs, using the Change Job Description (CHGJOBD) command.

Note: The same job description may be used by many jobs on the system. Investigate the possible effect before making this type of global change.

Filtering Messages from the Job Log

Filtering is the process of removing messages from the job log based on the message logging level set for the job. Filtering occurs before each new request is received by a request processing program. If you run a CL program interactively or in batch and fill in the *Message logging* fields (on the Change Job command) as shown:

Level	0
Severity	00
Text	*NOLIST

filtering would be run only once after the program ends. Filtering does not occur after every CL command is run within the program. After the program ends, all messages are removed from the job log because the message level is 0. A job log is not spooled if the job ended normally because *NOLIST is specified for the message text level.

Note: When the job log is not spooled, system resource to remove messages from the job log is wasted.

Sending Job Log Output Files to a Separate Output Queue

The Operational Assistant automatic cleanup function deletes old job logs by assigning them to the QEZJOBLOG output queue in the QUSRSYS library. See "Cleaning Up Your System" on page 11-34 for more information about automatic cleanup.

All of the job logs are conveniently stored for you in one output queue. You can view them when you need to. If you need a printed copy of a log, you can move it to an active output queue and print it.

To send your job logs to a separate output queue if you are not using the Operational Assistant cleanup function, change the description for the job log printer file to use the shipped output queue for job logs using the Change Printer File (CHGPRTF) command as follows:

```
CHGPRTF FILE(QPJOBLOG) OUTQ(QEZJOBLOG)
```

Chapter 5. Working with Printer Output

Many jobs that run on your AS/400 system create printer output. Several components work together to get output to an printer. Dividing the printing into several different pieces allows you to share printers among multiple users and to take advantage of the many types of printers available on the AS/400 system.

This chapter explains how to work with printers and printer output on your system.

Figure 5-1 shows the basic pieces required to create and print a report:

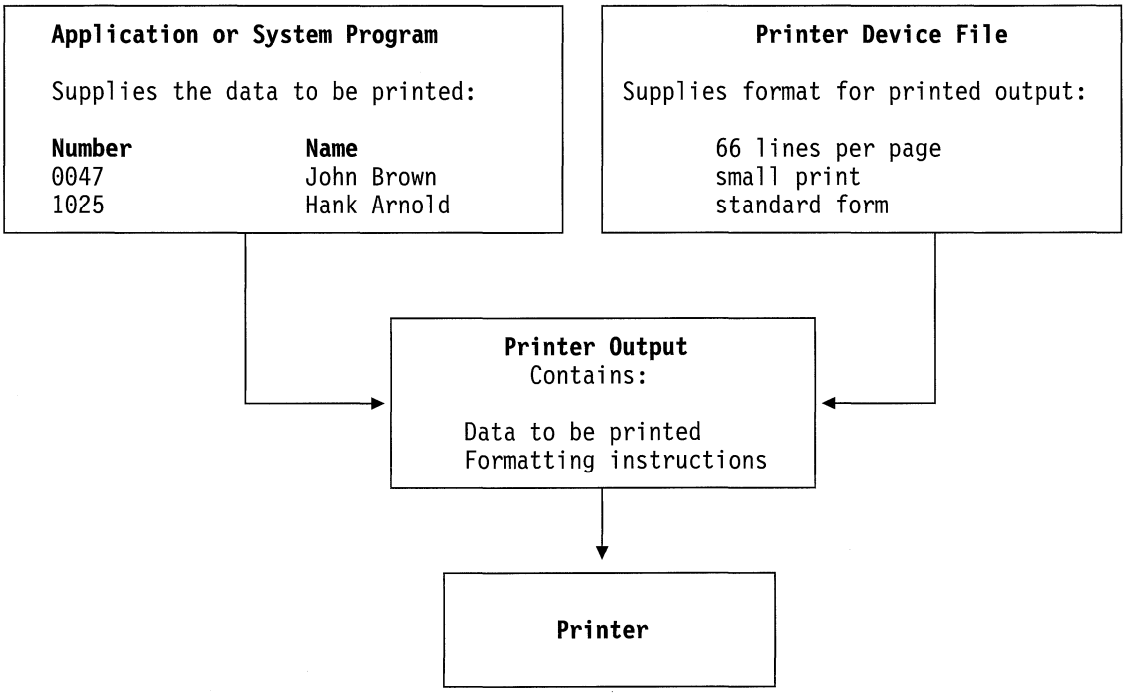

Figure 5-1. How a Report Is Created

An **application program** or a system-supplied program provides the data to be printed on the report. Some information about how the report should be formatted, such as the number of lines to be printed on a page, what form type to use, and whether to use large or small type, are supplied by a **printer device file**. Because format information is stored separately from the program that creates the report, you can often change some aspects of a report format without changing the program.

Usually, programs do not send data directly to printers. Data from the program and format information from the printer device file are combined to create **printer output**. Printer output is stored on the AS/400 system until a printer is available.

Note: Printer output, such as a reports or display images, created using the Print key, is stored as a separate file. These files are called **spooled files**. For a more detailed explanation of spooling and spooled files, see "Working with Spooled Files, Output Queues, and Printers" on page 5-12.

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Additional reading: For detailed information about printing elements, printer device support, printer spooling support, and Advanced Function Printing* (AFP*), see *Guide to Programming for Printing*.

Finding Printer Output

You can view information about the printer output waiting to print on your system in several different ways. You can view the information sorted by:

- User
- Printer
- Job
- Status
- Output name

You can also view information about printer output that has completed printing.

Notes:

1. For optimal performance, whenever possible, do not display all of the printer output.
2. See "Where Is My Output and Why Won't It Print?" on page 5-6 for additional suggestions for locating printer output and for solving problems when output does not print.

Security Consideration

To view or change printer output created by other users, you need either spool control (*SPLCTL) or job control (*JOBCTL) special authority in your user profile. If your user class is system operator (*SYSOPR) or security officer (*SECOFR), you should have this special authority.

Displaying Printer Output for a User

To view all of the printer output for one or more users:

1. Type `go assist` on any command line to display the Operational Assistant menu.
2. Select option 1 (Work with printer output).

   You can also type the following command on any command line:

   ```
   WRKSPLF ASTLVL(*BASIC)
   ```

   Figure 5-2 on page 5-3 shows the Work with Printer Output display.

```
                          Work with Printer Output
                                                              System:  SYSTEM01
User . . . . . :   SMITH       Name, *ALL, F4 for list

Type options below, then press Enter.  To work with printers, press F22.
  2=Change   3=Hold   4=Delete   5=Display   6=Release   7=Message
  9=Work with printing status   10=Start printing   11=Restart printing

     Printer/
Opt    Output      Status
     PRT01
__     INVENTORY   Printer stopped (use opt 10)
__     ORDENTRY    Printer stopped (use opt 10)
     PRT02
__     PAYROLL     Printing page 3 of 10000
     Not Assigned
__     TIMECRD     Not assigned to a printer (use opt 10)



                                                                      Bottom
F1=Help   F3=Exit       F5=Refresh   F6=Completed printer output
F11=Dates/pages/forms   F20=Include system output   F24=More keys
```

Figure 5-2. Work with Printer Output Display

Initially, only your own printer output is displayed.

3. To see the printer output for a different user, type the user ID in the *User* field and press the Enter key.

   Note: If you do not know the user ID, press F4 (for list) to select a user ID from a list of all users on the system on the Select a User display.

   You can also use a generic name in the *User* field. For example, if you want to see output for all the user IDs that start with "AR," type AR* in the *User* field.

4. If you want to see the printer output for all users, type *ALL in the *User* field.

The printer output on this display is sorted by printer. Some printer output may have a status of `Not assigned to a printer`. This printer output appears last in the list on your display.

Press F11 (Dates/pages/forms) to see another view of this display that shows when printer output was created, the number of pages, what forms types are used, and how many copies print.

Displaying Printer Output by Printer

To see only the printer output that is scheduled to print on a particular printer:

1. On the Work with Printer Output display, press F14 (Select other printer output). Figure 5-3 on page 5-4 shows the Select Other Printer Output window.

```
                          Work with Printer Output
                                                              System:  SYSTEM01
.....................................................................................
:                        Select Other Printer Output                                :
:                                                                                   :
:  Type choices below, then press Enter.                                            :
:                                                                                   :
:  Select the following printer output for the list:                                :
:                                                                                   :
:    User    . . . . . .  SMITH_____   Name, *ALL, F4 for list                      :
:                                                                                   :
:    Printer . . . . . .  *ALL______   Name, *ALL, F4 for list                      :
:                                                                                   :
:    Status  . . . . . .  1            1=All statuses                               :
:                                      2=Statuses requiring action                  :
:                                                                                   :
:    Output  . . . . . .  *ALL______   Name, *ALL                                   :
:                                                                                   :
:  F1= Help   F5=Refresh   F12=Cancel                                               :
:                                                                                   :
:...................................................................................:
```

Figure 5-3. Select Other Printer Output Window

2. Type the name of the printer whose output you want to see in the *Printer* field.

   You can also use a generic name in the *Printer* field. For example, if you want to see printer output for all the printers that start with "PR," type `PR*` in the *Printer* field. If you do not know the name of the printer, press F4 (for list) to select a printer on the Select Printer display.

3. Press the Enter key.

When you press the Enter key, the Work with Printer Output display now includes only the printers you selected.

Displaying Printer Output by Job

To see the output for a specific job on the system:

1. Select option 2 (Work with jobs) on the Operational Assistant menu or use the Work with User Jobs (WRKUSRJOB) command with basic assistance level. The Work with Jobs display is shown.
2. Use option 8 (Work with printer output).
3. Use the available options to work with the printer output for a specific job on the Work with Job Printer Output display.

Displaying Printer Output by Status

To see only printer output that has a status requiring action, such as `Message waiting`, `Printer not started`, or `Printer output not assigned to a printer`:

1. On the Work with Printer Output display, press F14 (Select other printer output).
2. On the Select Other Printer Output display, type a `2` in the status field and press the Enter key.

The Work with Printer Output display is shown again with only the printer output requiring action.

Displaying Printer Output by Name

The printer output name comes from one of these two sources:

- The *User Data* field of the printer device file. See "Using the User Data Field with Printer Output" for more information about using this field.
- The name of the printer device file, if the *User data* field is blank.

To see all the printer output with a particular name:

1. On the Work with Printer Output display, press F14 (Select other printer output).
2. On the Select Other Printer Output display, type the name of the printer output you want to see in the *Output* field and press the Enter key.

   The Work with Printer Output display is shown again with only the printer output that has the name you selected.

Using the User Data Field with Printer Output

On Operational Assistant displays (such as the Work with Printer Output display), the *Printer Output* column is derived from either the *User Data* field or the printer file name. These both can be seen on the Work with All Spooled Files display.

If a particular printer output file has a blank in the *User Data* column, the printer file name is used to identify the printer output on the Work with Printer Output display. Application modifications can be made to fill in the *User Data* column so that the user can identify the output more accurately.

For example, when a payroll application generates a summary report, the Override Printer File (OVRPRTF) command could be used to cause the user data to be more descriptive. To do this, type the following on any command line:

```
OVRPRTF FILE(PRINT FILE NAME) USRDTA('PAYSUMMARY')
```

This causes future payroll summaries to be listed as PAYSUMMARY on the Work with Printer Output display (in the *Printer/Output* column).

Displaying Completed Printer Output

To display completed printer output, you need to set the system up so it saves information about completed printer output.

To save information about completed printer output:

1. Type `go setup` to display the Customize Your System, Users, and Devices menu.
2. Select option 1 (Change system options).
3. Press the Page Down key until you find the *Save job accounting information about completed printer output* field.
4. Type a `Y` (Yes) in the *Save job accounting information about completed printer output* field on the Change System Options display.

To display completed printer output on the Work with Printer Output display, press F6 (Completed printer output). On the Display Completed Printer Output display, you can sort the information using F10 (Sort list).

For information on how to control how long this record is kept, see Chapter 11, "Managing Your AS/400 System Operations."

Displaying the Contents of Printer Output

To view printer output, on the Work with Printer Output display, use option 5 (Display). Figure 5-4 shows the Display Spooled File display.

Note: *Spooled File* is another name for printer output.

```
                          Display Spooled File
File  . . . . . :   QPDSPJOB                        Page/Line   1/1
Control . . . . .                                   Columns     1 - 78
Find  . . . . . .
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...
 5738SS1 V2R1M0                          Work with Job
 Job . . . :   SMITHS1     User . . . :   SMITH       Number . . . . :   00
                                      Job Status Attributes
   Status of job  . . . . . . . . . . . . . :   ACTIVE
   Entered system:
     Date . . . . . . . . . . . . . . . . . :   10/09/90
     Time . . . . . . . . . . . . . . . . . :   08:20:37
   Started:
     Date . . . . . . . . . . . . . . . . . :   10/09/90
     Time . . . . . . . . . . . . . . . . . :   08:20:38
   Subsystem  . . . . . . . . . . . . . . . :   QINTER
     Subsystem pool ID  . . . . . . . . . . :   2
   Type of job  . . . . . . . . . . . . . . :   INTER
   Special environment  . . . . . . . . . . :   *NONE
   Program return code  . . . . . . . . . . :   0
   Controlled end requested . . . . . . . . :   NO
                                                                    More...
F3=Exit    F12=Cancel    F19=Left    F20=Right    F24=More keys
```

Figure 5-4. Display Spooled File Display

The ruled line marks the beginning of the actual data in the printer output. You can also use the *Control* and *Find* fields at the top of the display to locate information in the printer output.

Where Is My Output and Why Won't It Print?

To find out where your printer output is, use one or more of the methods described in "Finding Printer Output" on page 5-2. Also, look at the Display Completed Printer Output display.

Once you have found the printer output on one of the displays, you need to determine why it is not printing. The *Status* column on the Work with Printer Output display can usually tell you. If you need more information, use option 9 (Work with printing status). The Work with Printing Status display provides more detailed status descriptions than you see on the other displays. It might also have more than one status message for the printer output.

Use option 5 (Detailed description) on the Work with Printing Status display for an explanation of the status and a list of alternative actions. This information can be helpful in solving any printer problems you might encounter.

To further investigate why your printer output won't print, you need to gather information about the job and the output, such as:

- What is the job name?
  - If the output was created interactively, the job name is the name of the work station the person was using.
  - If the output was created by a batch job, the job name is assigned on the Submit Job (SBMJOB) command.
- What user ID was used to create the output?
- Where does it usually print (which printer)?
- Does it print on special forms?
- How many pages is it?
- What is the output name?
- When was the job run?

You probably do not know the answers to all of these questions, but the more information you can get, the easier it is to locate the printer output.

Table 5-1 lists some of the most common problems that prevent or delay output from printing and some suggested solutions:

Table 5-1. Common Printer Problems and Solutions

Problem	Suggested solution
Unanswered printer messages.	Use option 7 (Message) on the Work with Printer Output display to respond to the message.
Printer is not started.	Use option 1 (Start) on Work with Printers display or option 10 (Start printing) on Work with Printer Output display.
Printer output is not assigned to a printer.	Use option 10 (Start printing) on the Work with Printer Output display
Printer output has a form type that has not been started for the printer.	Stop the printer and start it for the desired forms type.
Printer output has a value of *JOBEND in the *Schedule* field and the job has not finished.	Use the Change Spooled File Attributes (CHGSPLFA) command to change this field to *FILEEND.
Printer output is held.	Release the printer output using option 6 (Release) on the Work with Printer Output display.
Nothing is printing on the system.	Check to see if the QSPL subsystem is started. If not, start it either by starting a printer using the Operational Assistant function or by using the Start Subsystem (STRSBS) command. Check to see if there are messages for the QSPL subsystem. Respond to them.
Printer status says `Message waiting` or MSGW but you can not find the message.	Check to see if the printer's message queue is too full to receive new messages. If so, remove some messages from the message queue.

If you have followed all of these suggestions and still have printing problems, see "Getting Help with Problems" on page 13-8.

Managing Printer Output

To manage printer output, use the Work with Printer Output display.

Holding Printer Output

To hold printer output on the Work with Printer Output display:

1. Select option 3 (Hold) for the printer output you want held.

   The status of the printer output changes to `*Held (use F5)`.

2. Press F5 (Refresh).

   The status of the job changes to `Held (use Opt 6)`.

Releasing Printer Output

To release printer output on the Work with Printer Output display:

1. Select option 6 (Release) for the printer output you want released.

   The status of the printer output changes to `*Released (use F5)`.

2. Press F5 (Refresh).

   The status of the printer output changes.

Deleting Printer Output

Security Consideration

To delete printer output created by other users, you need either spool control (*SPLCTL) or job control (*JOBCTL) special authority in your user profile. If your user class is system operator (*SYSOPR) or security officer (*SECOFR) you should have this special authority.

To delete printer output on the Work with Printer Output display:

1. Use option 4 (Delete).
2. Press the Enter key to delete the selected output on the Confirm Delete of Printer Output display, or press F12 (Cancel) if you do not want to delete the selected output.

   The printer output you deleted no longer appears on the Work with Printer Output display.

Changing Printer Output

To change the attributes of printer output, on the Work with Printer Output display, use option 2 (Change). Figure 5-5 on page 5-9 shows the Change Printer Output display.

```
                          Change Printer Output

User . . . . . :   SMITH          Date . . . . . :   10/21/90
Printer output . . . :   ACCTPAY  Time . . . . . :   13:40:01
Pages  . . . . . :   10
Status . . . . . :   Waiting to print

Type choices below, then press Enter.

  Printer to use . . . .       PRT01_____    Name, F4 for list

  Copies and pages:
    Number of copies . . . .   1             1-255
    First page to print  . .   1             Number
    Last page to print . . .   *LAST         Number, *LAST

  Type of forms  . . . .      *STD_____      Form type, *STD

  Print this output next       N             Y=Yes, N=No

  Save printer output  . . .   N             Y=Yes, N=No

F1=Help   F3=Exit   F5=Refresh   F12=Cancel
```

Figure 5-5. Change Printer Output Display

On the Change Printer Output display, you can do the following:

Assign Printer Output to a Different Printer: To assign this printer output to a different printer, type the printer's name in the *Printer to use* field.

Note: If you do not know which printer to use, press F4 to display the Select Printer display where you can select a printer.

Change the Number of Copies to Print: To change the number of copies to print, type the new number in the *Number of copies* field.

Specify the Page to Start On: To specify the page that this printer output should begin printing on, type the page number in the *First page to print* field.

If you do not want the entire report to print, type the page number in the *Last page to print* field. The *First page to print* and *Last page to print* fields can be used together if part of your report was damaged by a paper jam or if you only want to print part of a report.

Change the Form Type: To change the form type for a report, type the name of the form in the *Type of forms* field. This can be useful during application testing. For example, you may want to test programs, such as check or invoice printing on ordinary paper.

Change when Printer Output Prints: To move printer output to the front of the line for printing, type a `Y` in the *Print this output next* field.

Your user profile controls the highest priority you can use when changing printer output. The printer output you select only prints next if your user profile has higher priority than the printer output next in line.

Save Your Printer Output after It Prints: To save your printer output after it is printed, type a `Y` in the *Save printer output* field. Normally, you would want printer output deleted to avoid cluttering up your system. However, for output that prints on special forms, you may want to save your printer output. If you discover an alignment problem after the output has printed, you can reprint without having to rerun the program.

Note: If the printer output you want to change is currently printing, you can only change the *Number of copies* and *Save printer output* fields. If you want to change the other fields, hold the printer output, make your change, and then release the printer output.

When you have made your choices, press the Enter key. The Work with Printer Output display is shown again. The status of printer output is `*Status changed`.

Assigning Printer Output to a Printer

To assign printer output to a printer:

1. Use option 10 (Start printing) on the Work with Printer Output display.
2. Type the name of the printer you want to use in the *Printer* field, or press F4 to select from a list of all the printers on the system on the Assign Output to a Printer display.
3. Press the Enter key.

   If the printer you select is not started, the Start Printing display is shown.
4. Type the name of the form type in the *Type of forms on printer* field and press the Enter key.

   The Work with Printer Output display is shown again.
5. Press F5 (Refresh).

   The printer output that you assigned now appears under the name of the printer.

Working with Printers

To work with printers, press F22 (Work with printers) on the Work with Printer Output display or use the following command:

```
WRKWTR ASTLVL(*BASIC)
```

Figure 5-6 shows the Work with Printers display.

```
                        Work with Printers

User . . . . . :   SMITH

Type options below, then press Enter.
  1=Start   4=Stop   7=Message   8=Display output for printer   11=Restart

Opt  Printer     Form Type   Status
  __ PRT01       *STD        Message waiting (use opt 7)
  __ PRT02       CHECKS      Stopped (use opt 1)
  __ PRT03       INVOICES    Printing
  __ PRT04       *STD        Held (use opt 6)
  __ PRT05       *STD        Printing
```

Figure 5-6. Work with Printers Display

To see all printers on the system, press F6 (Include all printers).

Starting a Printer

To start a printer, on the Work with Printers display:

1. Use option 1 (Start).
2. On the Start Printer display, use the *Type of forms on printer* field to specify the type of forms you want to print and press the Enter key.

   The Work with Printers display is shown. The printer's status is `*Attempting to start (use F5)` which means that the system has started finding the printer output assigned to this printer.
3. Press F5 (Refresh).

   The status usually changes to `Message waiting` which means there is a forms alignment message waiting. Use option 7 (Printer messages) to respond to the message. Once you respond to this message, printing begins. See Chapter 6, "Handling Messages" for more information about printer messages.

Note: You can also start a printer on the Work with Printer Output display by using option 10 (Start printing).

Stopping a Printer

To stop a printer:

1. On the Work with Printers display, use option 4 (Stop).
2. On the Confirm Stop of Printer display, press the Enter key to confirm your choices, or press F12 (Cancel) to return to the Work with Printers display without stopping the printer.

   If you pressed the Enter key, the printer's status is `*Stopped (use F5)`.

Restarting a Printer

To restart a printer, on the Work with Printers display:

1. Use option 11 (Restart).
2. On the Restart Printer display, type the page number of the first page you want to print in the *Restart on page* field and press the Enter key.

   The printer's status is `*Attempting to restart (use F5)`.
3. Press F5 (Refresh).

   A forms alignment message may appear when the printing restarts. Once you respond to the message, printing starts on the page you requested.

Note: You can also restart a printer on the Work with Printer Output display using option 11 (Restart printing).

Answering Printer Messages

To see what the message is and what action needs to be taken, use option 7 (Printer messages) on the Work with Printers display.

You can also respond to printer messages on the Work with Printer Output display by using option 7 (Message) for printer output with a `Message waiting (use Opt 7)` status.

For more information about responding to messages, see Chapter 6, "Handling Messages."

Changing Forms on a Printer

To change the form type for a printer:

1. Use option 4 (Stop) on the Work with Printers display.
2. Press the Enter key on the Confirm Stop of Printer display.
3. Use option 1 (Start).
4. Type the name of the form you want to use in the *Type of forms on printer* field and press the Enter key on the Start Printer display.

Working with Spooled Files, Output Queues, and Printers

Programs do not usually send data directly to printers. Programs create pieces of printer output, which are also called **spooled files**. Spooled files are placed on **output queues** until a printer is available to print them.

An **output queue** is a list of spooled files waiting to print. A single output queue may have spooled files from many different jobs and many different users. In some cases, a single job may place spooled files on more than one output queue.

The spooled files on an output queue remain there until a printer writer is started. The **printer writer** is a system program that sends spooled files from an output queue to a physical printer. Normally, you have an output queue for each printer on your system, and the printer and output queue have the same name. However, you can use the printer writer to assign any output queue to any printer on the system.

Figure 5-7 shows how a job moves through an output queue to a printer.

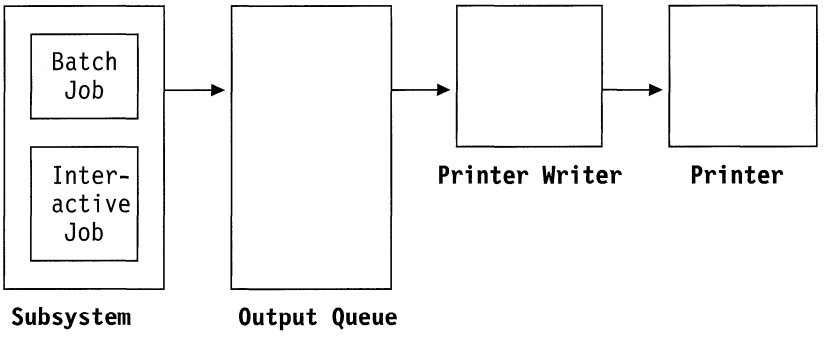

Figure 5-7. Overview of Output Queue Processing

Working with Spooled Files

There are other tasks you can do with spooled files using the Work with Spooled Files (WRKSPLF) display.

Sending a Spooled File

To send a spooled file:

1. Type the following command on any command line:

   ```
   WRKSPLF ASTLVL(*INTERMED)
   ```

   and press the Enter key.

2. Use option 1 (Send) on the Work with All Spooled Files display.
3. Type the user ID and address of the person to whom you want the file sent in the *User ID* and *Address* fields on the Send Network Spooled File (SNDNETSPLF) prompt display.

   Note: The users to whom you want to send the spooled file must be in the system directory. Also, if the user to whom you want to send the spooled file is a user on another system, the name of that system must be in the system directory. Use the Display Directory (DSPDIR) command to view the list of users and systems in your communications network.

4. To make sure that the attributes of the spooled file are sent, type *ALLDATA in the *Data format* field.
5. Press the Enter key. A message is displayed telling you the file was sent.

Scheduling, Holding, and Saving Spooled Files

You can change when a spooled file prints and what happens to it after it prints by changing the Spooled output schedule (SCHEDULE), Save spooled file (SAVE), or Hold spooled file (HOLD) parameters for the Change Printer File (CHGPRTF), Override Printer File (OVRPRTF), or the Change Spooled File Attributes (CHGSPLFA) commands.

Scheduling Spooled Files: The Spooled output schedule (SCHEDULE) field controls whether spooled file is available to print as soon as it is closed or whether it waits until the job that created it has finished. Specify *FILEEND for this parameter if you want a spooled file to print as soon as it is closed. Specify *JOBEND for this parameter if you want it to wait until the job has finished.

This parameter is particularly important for any spooled file that is created by an interactive job. An interactive job does not end until the user signs off. Any spooled file created with *JOBEND specified for the Spooled output schedule (SCHEDULE) parameter sits in an output queue until the user signs off.

Saving Spooled Files: The Save spooled file (SAVE) parameter controls whether or not spooled file is deleted from the output queue once it has printed. Normally, you would want a spooled file deleted to avoid cluttering up your system. However, for spooled files that print on special forms, you may want to specify *YES for this parameter. If you discover an alignment problem after the file has printed, you can reprint without having to rerun the program.

Holding a Spooled File: The Hold spooled file (HOLD) parameter field on the printer device file can be used so that the spooled file is put in the output queue with a status of `Held`. You might want to use this technique for spooled files that print on special forms or for very long reports, instead of directing it to a separate output queue. You can release the spooled file when it is convenient to print it.

Changing the Format of Spooled Files

If you want to make permanent changes to the format of printer output, use the Change Printer File (CHGPRTF) command. The changes you make might conflict with the program that creates the printer output.

"Sending Job Log Output Files to a Separate Output Queue" on page 4-19 describes how to direct all of your job logs to a special output queue. You may want to use this same technique for other system output.

If your installation uses 8 1/2 x 11" paper, you may want to change the Lines per inch (LPI) and Characters per inch (CPI) parameters for the system printer device files.

Note: System printer device files all begin with the letter Q and are in the library QSYS. To see a list of these files, use the Work with Files (WRKF) command. Specify the parameters as follows on the Work with Files (WRKF) display:

File (FILE)	Q*
Library	QSYS
File attributes (FILEATR)	PRTF

Press the Enter key. The Work with Files display is shown with a list of the files you requested.

Working with Output Queues

Many of the output queues on your system have the same names as the printers on your system. These are called **default output queues**.

However, you may have special output queues on your system that do not have printer names. For example, you may have an output queue set aside for all printer output requiring special forms. You might need to check this queue periodically to decide when to assign it to a printer and what forms you need. Or, you may have a separate output queue for job logs or for reports.

When you use basic assistance level, printer output that is assigned to these special output queues appears on your displays as `Not assigned`.

Note: If a printer has been started for a special output queue, then the printer output in its default output queue appears as `Not assigned to a printer`. See "Starting a Printer for a Specific Output Queue" on page 5-15 for information on how to start a printer for a specific output queue.

To work with output queues, use the Work with Spooled Files (WRKSPLF) command with the intermediate assistance level. On the Work with All Spooled Files display, additional information about your spooled files is displayed including the names of the output queues where they reside.

To see a list of spooled files on a particular output queue, use the Work with Output Queue (WRKOUTQ) command, specifying the name of output queue you want to see.

Note: If your output queue is not in the QGPL library or a library in your library list, type the name of the library your output queue is in before the name of the queue. For example, type `lib/xxxxxxxx` where `lib` is the name of your library.

Starting a Printer for a Specific Output Queue

When you start a printer from the Work with Printers display, the printer is assigned to the output queue with the same name (the default output queue). If you want to start a printer and assign it to a different output queue:

1. Enter the Start Printer Writer (STRPRTWTR) command and press F4 (Prompt).
2. Specify the name of the printer you want to start for the Printer (DEV) parameter on the Start Printer Writer (STRPRTWTR) display.
3. Specify the output queue name and library you want the printer to use for the Output queue (OUTQ) parameter.
4. Specify the form type for the Form type (FORMTYPE) parameter and press the Enter key.

Changing Characteristics of an Output Queue

To change the characteristics of an output queue, use the Change Output Queue (CHGOUTQ) command.

Two parameters on an output queue description can affect when and how your output prints:

- The Job separators (JOBSEP) parameter controls whether there are separator pages printed between spooled files. Job separator pages contain identifying information about a spooled file. They are useful when a printer is used by many different people and prints a large volume of output.
- The Order of files on queue (SEQ) parameter controls the sequence in which output prints. After spooled files in an output queue are sorted by priority, they may then be sorted either by when they became ready to print or by whichever file has been on the queue the longest. New spooled files are put after others on the queue or ordered by the time the job creating the output entered the system.

Working with Printers

You can hold and release printers, change where printer messages go, and change the printer assignment using system commands.

Holding a Printer

To hold a printer:

1. Type the following on any command line and press the Enter key.

   ```
   WRKWTR ASTLVL(*INTERMED)
   ```

2. On the Work with All Printers display, use option 3 (Hold). The status of the printer changes to *HLD.

Note: If you know the name of the printer you want to hold, use the Hold Writer (HLDWTR) command.

Releasing a Printer

To release a printer:

1. Type the following on any command line and press the Enter key.

   ```
   WRKWTR ASTLVL(*INTERMED)
   ```

2. Use option 6 (Release) on the Work with All Printers display.

   The status of the printer changes to *RLS.

3. Press F5 (Refresh), the status changes to STR.

Note: If a printer is held, you can also release it using option 10 (Start printing) on Work with Printer Output display or option 1 (Start) on the Work with Printers display.

Changing Where Printer Messages Go

To assign the messages for each printer to a different message queue temporarily, start the printer using the Start Printer Writer (STRPRTWTR) command and change the Queue for writer messages (MSGQ) parameter value.

To change where printer messages go permanently, use the Change Device Description (CHGDEVD) command, specifying the name of the printer whose message queue you want to change, and the new message queue and library values for the appropriate parameters. For more information about messages and message queues, see Chapter 6, "Handling Messages."

Changing a Printer Assignment before the Job Runs

This list of elements shows the order of precedence in determining where the printer output goes for a particular job.

1. Printer device file
2. Job description
3. User profile
4. Work station description
5. Printer device description system value (QPRTDEV)

Some values for devices and output queues create changes in this sequence. The *Guide to Programming for Printing* has more information on these exceptions.

Changing the Printer Device File: Change the Device (DEV) parameter value on the Change Printer File (CHGPRTF) or Override Printer File (OVRPRTF) command.

Changing the Job Description: Change the Print device (PRTDEV) and Output Queue (OUTQ) parameters on the Change Job Description (CHGJOBD) command.

Changing the Work Station Description: To change the work station description, use the Work with Device Description (WRKDEVD) command, then use option 2 (Change) for the device you want to change. Then, change the Print Device (PRTDEV) and Output Queue (OUTQ) fields.

Changing the User Profile: To change the user profile, use the Print Device (PRTDEV) and Output Queue (OUTQ) parameters on the Change User Profile (CHGUSRPRF) command.

Changing the Default Printer: To change the default printer for your entire system, use the *Default system printer* field on the Change System Options display. To find this display, type `go setup` on any command line and press the Enter key. Then select option 1 (Change system options).

Chapter 6. Handling Messages

Messages provide the means of communications between the system and users of the system, such as yourself. When you ask the system to do something, the system may respond with messages indicating the status of your request.

In addition, you can communicate with other users of the system through messages that are created at the same time they are sent.

As the system operator, you receive messages from system users and system programs that communicate conditions to you and indicate actions you need to take. As a system user, you receive messages in response to your actions at a work station. These messages are placed in message queues.

This chapter covers information on working with messages in message queues, finding additional information about your messages, displaying messages for the system operator, and displaying and changing message queues. Information on sending and receiving messages can be found in the *New User's Guide*.

Displaying Messages

The system sends informational or inquiry messages for certain system events. **Informational** messages are from the system and give you status on what the system is doing. **Inquiry** messages from the system also give you information about the system, but request a reply. These messages are sent to either the system operator message queue (QSYSOPR), a user message queue, or the work station message queue. Also, users may send you messages to your own user message queue.

A message sent to your message queue usually is not displayed automatically. A message interrupts you if your message queue is set to interrupt you (break mode) whenever a message is sent or the sender can decide to interrupt you by using the Send Break Message (SNDBRKMSG) command to send the message. If you are interrupted, a Display Messages display (Figure 6-1 on page 6-2) is shown automatically.

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```
                              Display Messages
                                                          System:   SYSTEM01
Queue . . . . . :   SMITHS1                 Program . . . . :   *DSPMSG
  Library . . . :     QSYS                    Library . . . :
Severity  . . . :   00                      Delivery  . . . :   *NOTIFY

Type reply (if required), press Enter.
  From  . . . :   QSYSOPR        01/10/91   13:31:33
  This system will go down in 10 mins









                                                                        Bottom
F3=Exit             F11=Remove a message                F12=Cancel
F13=Remove all      F16=Remove all except unanswered    F24=More keys
```

Figure 6-1. Display Messages Display

If your messages do not interrupt you whenever they are sent, you can display them by:

- Using the Display Messages (DSPMSG) command.
- Using the Work with Messages (WRKMSG) command.
- Selecting option 3 (Work with messages) on the Operational Assistant (ASSIST) menu.

Figure 6-2 shows the Work with Messages display.

```
                              Work with Messages
                                                          System:   SYSTEM01
Messages for:   SMITH

Type options below, then press Enter.
  4=Remove   5=Display details and reply

Opt   Message
                            Messages needing a reply
  _   Controller SYSTEM01 contact not successful.  Probable remote station
        problem (C R)

                          Messages not needing a reply
  _   System is scheduled to be powered off at 22:30:01 on 05/17/92.
        From  . . :   QPGMR          05/17/92   22:15:00
  _   System is scheduled to be powered off at 22:30:01 on 05/16/92.
        From  . . :   QPGMR          05/16/92   22:15:00
  _   System is scheduled to be powered off at 22:45:01 on 05/15/92.
        From  . . :   QPGMR          05/15/92   22:30:00
        From  . . :   QPGMR          05/14/92   22:30:00
                                                                        Bottom
F1=Help   F3=Exit   F5=Refresh   F6=Display system operator messages
F16=Remove messages not needing a reply   F17=Top   F24=More keys
```

Figure 6-2. Work with Messages Display

To print the messages in a message queue, use the Work with Messages (WRKMSG) command as follows:

```
WRKMSG MSGQ(msgqname) OUTPUT(*PRINT)
```

You can also print messages contained in a message file with the Display Message Description (DSPMSGD) command and F4 (Prompt). Specify a range of message identifiers and *PRINT for the Output (OUTPUT) parameter.

Finding Additional Information about Your Messages

To find out more information about messages on the Work with Messages display, use option 5 (Display details and reply). When you use option 5 for a message that does not need a reply, you only receive the additional information about that message. If the message requires a reply, you can type your reply in the field provided at the bottom of the Additional Message Information display with the basic assistance level.

For example, Figure 6-3 shows additional information about the first inquiry message in Figure 6-2 on page 6-2:

```
                        Additional Message Information

Message ID . . . . . :   CPA57EF
Date sent  . . . . . :   11/18/91      Time sent  . . . . . :   15:43:02

Message . . . . :   Controller SYSTEM01 contact not successful. Probable remote
  station problem. (C R)

Cause . . . . . :   The system was trying to exchange identifiers with the
  station when an error occurred.  The probable causes are:
  -- The controller description on the remote system is not varied on.
  -- A configuration problem.
  -- A remote hardware problem.
  -- A local hardware problem or network problem if on an Ethernet network.
  -- A timing or performance problem.
Recovery  . . . :   Do the following:
  -- Contact the remote operator to verify the remote system is not
                                                                        More...
Type reply below, then press Enter.
Reply  . . . .   _____________________________________________________

F1=Help   F3=Exit   F6=Print   F11=Display message details   F12=Cancel
F21=Select assistance level
```

Figure 6-3. Additional Message Information Display – Basic Assistance Level

Press the Page Down key to see the rest of the information about the message. When you have read the information, type a reply in the *Reply* field at the bottom of the display and press the Enter key.

To see more details about the message, press F11 (Display message details). Figure 6-4 on page 6-4 shows the Display Message Details display.

```
                          Display Message Details

Message ID . . . . . :   CPA57EF       Severity . . . . . :   99
Date sent  . . . . . :   11/18/91      Time sent  . . . . . :   15:43:02
Message type . . . . . :   Inquiry

From job . . . . . :   QSYSARB
  User . . . . . :     QSYS
  Number . . . . . :   009302

From program . . . . . :   QSWCDCR

To message queue . . . . . :   QSYSOPR
  Library  . . . . . :     QSYS




                                                                    Bottom
Press Enter to continue.

F1=Help   F3=Exit   F12=Cancel
```

Figure 6-4. Display Message Details Display

Note: To see all of the information about a message on one display, switch to intermediate assistance level using F21 (Select assistance level) while on the Additional Message Information display.

To print a single message, use F6 (Print) on the Additional Message Information display. This prints all the information about the message shown on the display.

Identifying Messages from the System

In some message displays, the message is accompanied by a letter and number code as shown in Figure 6-5.

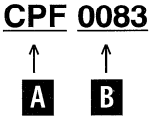

Figure 6-5. Example of a Message ID

This is the message identifier (ID) that is used to distinguish a message from others in the message file. The first three letters **A** indicate the message category. The following list shows some typical message categories:

CPA through CPZ	Messages from the operating system
CBE through CBX	COBOL messages
CSC	COBOL language syntax checker messages
LBE through LSC	COBOL messages
MCH	Licensed Internal Code messages
QRG	RPG language messages

RPG through RXT	RPG language messages
SBX through SSC	COBOL messages
SQL	Structured Query Language (SQL) messages

The remaining four digits **B** indicate the sequence number of the message. The example message ID shown indicates this is a message from the operating system, number 0083. A message ID is shown when you press the Help key for an error message and additional message information is shown.

Message Severity Codes

Table 6-1 shows the different severity codes of the messages and the types they are associated with.

Table 6-1. Message Severity Codes

Message Type	Severity Code
Informational messages. For informational purposes only; no reply is needed. The message can indicate that a function is in progress or that a function has completed successfully.	00
Warning. A potential error condition exists. The program may have taken a default, such as supplying missing data. The results of the operation are assumed to be successful.	10
Error. An error has been found, but it is one for which automatic recovery procedures probably were applied; processing has continued. A default may have been taken to replace the wrong data. The results of the operation may not be correct. The function may not have completed; for example, some items in a list ran correctly, while other items did not.	20
Severe error. The error found is too severe for automatic recovery procedures and no defaults are possible. If the error was in the source data, the entire data record was skipped. If the error occurred during a program, it leads to an abnormal end of program (severity 40). The results of the operation are not correct.	30
Severe error: abnormal end of program or function. The operation has ended, possibly because the program was not able to handle data that was not correct or because the user canceled it.	40
Abnormal end of job or program. The job was not started or failed to start, a job-level function may not have been done as required, or the job may have been canceled.	50
System status. Issued only to the system operator message queue. It gives either the status of or a warning about a device, a subsystem, or the system.	60
Device integrity. Issued only to the system operator message queue, indicating that a device is not working correctly or is in some way no longer operational.	70
System alert and user messages. A condition exists that, although not severe enough to stop the system now, could become more severe unless preventive measures are taken.	80
System integrity. Issued only to the system operator message queue. Describes a condition where either a subsystem or system cannot operate.	90
Action. Some manual action is required, such as entering a reply or changing printer forms.	99

Displaying System Operator Messages

To display messages in the system operator message queue (QSYSOPR), do one of the following:

- Press F6 (Display system operator messages) on the Work with Messages display using basic assistance level.
- Type `DSPMSG QSYSOPR ASTLVL(*BASIC)` on any command line.

- Select option 1 (Display messages for system operator) on the Technical Support Tasks (TECHHELP) menu.
- Select option 3 (Work with system operator messages) on the Manage Your System, Users, and Devices (MANAGESYS) menu.
- Select option 6 (Display system operator messages) on the System Request menu.

Figure 6-6 shows the Work with Messages display with system operator messages.

```
                              Work with Messages
                                                              System:   SYSTEM01
Messages for:   System Operator

Type options below, then press Enter.
  4=Remove   5=Display details and reply

Opt   Message
                            Messages needing a reply
 _    Device PRT01 not available (C R)

                          Messages not needing a reply
 _    An adapter has inserted or left the token-ring on line TOKENRING.
 _    An adapter has inserted or left the token-ring on line TOKENRING.
 _    An adapter has inserted or left the token-ring on line TOKENRING.
 _    An adapter has inserted or left the token-ring on line TOKENRING.
 _    An adapter has inserted or left the token-ring on line TOKENRING.
 _    Device ABRS2 no longer communicating.
 _    Device ABRS1 no longer communicating.
 _    Communications device ABR00 was allocated to subsystem QCMN.
                                                                        More...
F1=Help   F3=Exit   F5=Refresh   F6=Display your messages
F16=Remove messages not needing a reply   F17=Top   F24=More keys
```

Figure 6-6. System Operator Message Queue

You can work with the system operator messages exactly as you would any other messages. See "Displaying Messages" on page 6-1 for information on how to reply or get additional information about these messages.

Note: When signing on to the system, the message queue defined in your user profile is put into the delivery mode specified in your user profile. For the system operator (user profile QSYSOPR), this message queue is QSYSOPR, unless it has been changed.

Whenever you transfer to an alternative job, your user profile message queue is set to hold the messages. This allows your user profile message queue to move with you when you transfer back and forth between these two jobs.

However, if you transfer to an alternative job and then sign on as a different user, the user profile message queue defined in the other user's user profile will have its delivery mode set. At this time someone else can change the delivery mode of your user profile message queue, so when you transfer back, your user profile message queue will not be set back to the delivery mode it was set to when doing the first transfer.

Working with Message Queues

A message queue is like a mail box for messages sent to a user. Each work station has a message queue with the same name as the device description name. Each user has a message queue with the same name as the user profile name (or user ID), and the system operator has a message queue named QSYSOPR. When a user signs on the system for the first time, the system automatically creates a user message queue. When a work station is connected to the system for the first time, the system automatically creates a work station message queue. When the system is configured for the first time, the system operator queue is created.

You can see the messages from your work station and personal message queues together on the Work with Messages display. To see how your message queue is set up, press F24 (More keys) on the Work with Messages display and then press F22 (Display list details). Figure 6-7 shows the Display List Details display.

```
                          Display List Details

Message queue . . . . . :   SMITHS1
  Library . . . . . :         QSYS
Delivery  . . . . . :   *NOTIFY
Program . . . . . :   *DSPMSG
Severity  . . . . . :   0
Description . . . . . :   Work Station Message Queue

Message queue . . . . . :   SMITH
  Library . . . . . :         QUSRSYS
Delivery  . . . . . :   *NOTIFY
Program . . . . . :   *DSPMSG
Severity  . . . . . :   0
Description . . . . . :   Jim Smith




Press Enter to continue.

F1=Help   F3=Exit   F12=Cancel
```

Figure 6-7. Display List Details Display

This display shows the following information about your user and work station message queues:

Message Queue
This is the name of the message queue on which the messages are found.

Library
This is the library that contains the message queue.

Delivery
This is the method by which messages are delivered, whether they interrupt you, sound an alarm, hold until answered, or automatically send a default reply.

Program
This is the name of the program called when a message arrives in a queue that is set to interrupt and the severity of the message is equal to or greater than the queue severity value.

Severity
Messages sent to the message queue with a severity level equal to or greater than this severity level interrupt you or turn on the message waiting light depending on how your message delivery is set.

Description
This is the description of the message queue, usually the name and address of the message queue owner.

Changing a Message Queue

You can change the way a message queue notifies you of messages, change the message queue severity level, or the break-handling program. To change the information displayed on the Display List Details display:

1. Enter the Change Message Queue (CHGMSGQ) command and press F4 (Prompt).
2. On the Change Message Queue (CHGMSGQ) display, specify the name of the message queue you want to change for the Message queue (MSGQ) parameter and the name of the library containing the message queue you selected.

   Note: The following steps are optional.
3. Specify the delivery mode you want to use for the Delivery (DLVRY) parameter.
   - *SAME: The method of message delivery does not change. If this parameter has not been changed in a previous command, *SAME means that *HOLD is the method of delivery. However, if the specified message queue is a display station message queue, it is automatically changed to *NOTIFY by the system at sign-on.
   - *BREAK: When you receive a message, your work is interrupted, and a separate message display containing the message is shown (unless you have specified a program to handle the message).
   - *NOTIFY: When you receive a message, your work is not interrupted. You are notified that a message has arrived by the work station attention light and an alarm (if your work station has one) that sounds. You can use either the Display Messages (DSPMSG) command or Work with Messages (WRKMSG) command to see the message.
   - *HOLD: The message queue keeps or holds the messages until you request them using the Display Messages (DSPMSG) or Work with Messages (WRKMSG) command. You are not notified when a new message arrives.
   - *DFT: All messages are ignored, and any messages requiring a reply are sent the default reply. For the system operator message queue (QSYSOPR), the messages are kept in the queue and logged in the history log, QHST; this is known as unattended operation. For any other user or work station message queue, none of the messages are kept in the queue.
4. Specify the severity code you want to use for the Severity code filter (SEV) parameter. The severity code is used to filter messages that interrupt your work or turn on your Message Waiting light. For example, if you enter a message severity code of 59 and the message queue is in break mode, the system will display messages with codes of 59 or greater. After you make this change, any message with a severity code of 59 or greater sent to the same

message queue will cause the Display Message display to be shown (unless you have specified a different program to handle the message).

If you type a message severity code of 59, and the message queue is in notify mode, the system notifies the user of any messages in the message queue that have a severity code of 59 or greater. After you make this change, any message with a severity code of 59 or greater sent to the same message queue causes a light to turn on at the work station and the alarm (if your display station has one) to sound. See "Message Severity Codes" on page 6-5 for more information on the types of messages and what they mean.

5. Type the text that describes the purpose for the message queue.
6. Press F10 (Additional parameters) to display more parameters you can use.
7. Specify the name of the program (and library) to be called for the Break handling program (PGM) parameter if you specified *BREAK for the Delivery (DLVRY) parameter.
8. Specify *NO for the Reset old messages (RESET) parameter to prevent messages you have already displayed but not removed from your message queue from being reset to the same status as new messages. Specify *YES to reset messages you have displayed on the message queue to the same status as new messages. Resetting old messages to new allows you to receive them again.
9. For the Force to auxiliary storage (FORCE) parameter, specify:
   - *SAME to use the value specified in the identified message queue.
   - *NO to specify that changes made to the message queue, including its messages, are not immediately forced into auxiliary storage.
   - *YES to specify that all changes made to the message queue description and to the messages in the queue are immediately forced into auxiliary storage. If this field value is changed to *YES, the message queue is forced into auxiliary storage each time it is changed. This is an important recovery tool for message queues that provides communications between programs, but it may slow down system performance.
10. Press the Enter key and the message queue is changed.

Handling Error Messages

You will receive a variety of system messages that indicate conditions ranging from simple typing errors to problems with system devices or programs. The message may be one of the following:

- An error message on your current display.
- A message regarding a system problem that is sent to the system operator message queue and displayed on a separate Work with Messages display.
- A message regarding a system problem that is sent to the message queue specified in a device description.
- A message regarding a potential severe system condition that is sent to the QSYSMSG message queue and to the system operator message queue.

Handling Important System Messages in the QSYSMSG Message Queue

The QSYSMSG message queue is an optional message queue that you create in the QSYS library. The QSYSMSG message queue can be used to monitor specific system messages that indicate potentially severe system conditions. Only messages that require immediate action are sent to the QSYSMSG message queue. Monitor the QSYSMSG message queue to be aware of critical messages related to your system.

Creating the QSYSMSG Message Queue

To create the QSYSMSG message queue, enter the following command:

```
CRTMSGQ QSYS/QSYSMSG +
TEXT ('optional MSGQ to receive specific system messages')
```

Once the QSYSMSG message queue is created, certain specific system messages are directed to it. For example, the following message would be sent to the QSYSMSG message queue:

CPF0907 Serious storage condition may exist. Press HELP.

For a complete listing and description of these messages, see Chapter 8, "Working With Messages" in the *Programming: Control Language Programmer's Guide*, SC41-8077.

You can write a break-handling program that monitors messages sent to the QSYSMSG message queue and takes action on specific messages you identify. To set up a program to receive messages from the QSYSMSG message queue, see Chapter 8, "Working With Messages" in the *Programming: Control Language Programmer's Guide*, SC41-8077.

Error Messages on Menus and Displays

If you request a task the system cannot run because of an error, an error message appears at the bottom of the display. Depending on the display, the keyboard may also lock.

Note: Displays of some application programs may not have message lines.

To obtain additional information about the error:

1. Move the cursor to the same line as the message, if you can move the cursor.
2. Press the Help key. The Additional Message Information display is shown giving you more information about the error.

Some messages allow you to run problem analysis. These messages have an asterisk (*) in front of them (intermediate assistance level) or are highlighted (basic assistance level).

To run problem analysis for messages with an asterisk (*), move your cursor to the message with an asterisk and press F14 (Run problem analysis). To run the Work with Problems (WRKPRB) command, move your cursor to the message with an asterisk and press the Help key. The Additional Message Information display is shown. Press the F15 (Work with problem) key. From the Work with Problem (WRKPRB) display, you can display the details of the problem and work directly with the problem.

To run problem analysis for messages that are highlighted, select option 5 (Display details and reply) for that message and press F14 (Run problem analysis). To run the Work with Problem (WRKPRB) command for messages that are highlighted, select option 5 (Display details and reply) for that message and press F15 (Work with problem).

Problem analysis helps you resolve an error that you could not resolve from the message or the Additional Message Information display. For more information about handling problems, see Chapter 13, "Handling and Reporting System Problems."

Chapter 7. Working with Devices and Communications

In operating the system, you sometimes have to change device status (making devices available or unavailable for use). Each device (such as a diskette device, display station, printer, and tape device) has a status that determines if it is ready to use. A device is ready to use if its status is `Available to use` or `Varied on`. Display devices may also show a status of `Sign-on display` when waiting for a user to sign on. A device is not ready to use if its status is `Powered off or not yet available` or `Varied off`, `Session held`, or `Not assigned to active subsystem`.

Additional Reading: For conceptual information on configuration and how to do a local configuration, see the *Device Configuration Guide*. For information on how to do a remote configuration, see the *OS/400* Communications Configuration Reference*.

Note: With the following tasks, make sure you are using the basic assistance level of the Operational Assistant functions. Otherwise the displays you see will not match the displays shown in this manual. For more information on assistance levels, see "Using Assistance Levels" on page 3-2.

Displaying and Changing Device Status

To change the status of your devices, use the Device Status (DEVICESTS) menu.

To display this menu, select option 10 (Manage your system, users, and devices) on the Operational Assistant (ASSIST) menu. Then, select option 20 (Device status tasks). To display the Work with Devices display where you can see different kinds of devices at once, use the Work with Configuration Status (WRKCFGSTS) command specifying *BASIC for the Assistance level (ASTLVL) parameter and *DEV for the Type (CFGTYPE) parameter.

To display and change the status of a device on the Device Status Tasks (DEVICESTS) menu, select the option number that corresponds to the type of device (display, printer, tape, and diskette) whose status you want to see.

Security Consideration

Only the devices for which you have object operational authority are displayed.

On all of the device displays, the device status can be changed with option 1 (Make available) or 2 (Make unavailable) after selecting the corresponding option on the Device Status Tasks menu. The status for all of the devices is shown in the *Status* column.

Notes:

1. Making a diskette device, display station, or tape device ready for use may include answering messages sent to the system operator. To display system operator messages, press F6 (Display system operator messages) on the Work with Messages display.
2. Before a printer can print, the printer's power and ready lights must be on, and the error light must be off. If the printer's error light is on, you may need to

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answer messages sent to the system operator. To do this, make the printer available (vary it on), start it, then answer any printer messages.

3. Virtual devices, used by display station pass-through, are made available automatically by the pass-through function. This means that:
   - You never have to make a virtual device available.
   - A virtual device is always available by the pass-through function.

For information on activating communications lines and controllers, see "Activating Communications Lines and Controllers" on page 7-3.

Renaming a Device

To rename any device, on the Device Status Tasks menu:

1. Select the option that corresponds to the type of device you want to rename. For example, if you want to rename a display, select option 1 (Work with display devices).
2. Use option 9 (Rename).
3. On the Rename Device display, type the new name of the device in the *New name* field and press the Enter key. If necessary, the system tries to make the selected device unavailable so it can be renamed, and then makes it available again with the new name.

Considerations for Renaming Devices

If you rename a device, there are other places where you will need to change the name.

Display Device

- Subsystem description work station entries entered by name
- Display files
- CL programs referring to this device

Printer Device

- Printer files
- QPRTDEV system value
- User profiles that refer to this device
- CL programs referring to this device
- Job descriptions that refer to this device by name
- Display descriptions referring to this as an auxiliary printer

Tape device

- Tape files
- CL programs referring to this device

Diskette device

- Diskette files
- CL programs referring to this device

Displaying and Changing a Device Description

To see the text description (location and owner) of any device on the system, press F11 (Display descriptions) on any of the device displays. The display remains the same except the description is shown next to the device it describes. In addition to the name of the person who operates the device, it is helpful to include the physical location of the device in the *Description* column.

To return to the original display, just press F11 (Display types/statuses).

To change the device description, use option 13 (Change description). On the Change Description display, type the new description over the current description in the *New description* field and press the Enter key. The Work with Display Devices display is shown with the new description in the *Description* column.

Printing Local Device Addresses

You can print a diagram that shows the device location, by port number and switch setting, for the devices attached to all local work station controllers.

This printout can help you know where to attach new devices.

To print the addresses of your local devices:

1. Type `go devicests` to display the Device Status Tasks menu.
2. Select option 10 (Print local device addresses).

   A message is displayed when printer output is created.
3. Type `go assist` to display the Operational Assistant menu.
4. Select option 1 (Work with printer output).
5. Look for printer output called QPDCDEVA and following the instructions on the display to make sure it is printing.

Activating Communications Lines and Controllers

Figure 7-1 illustrates how communications lines and controllers are connected to enable the devices to communicate with each other.

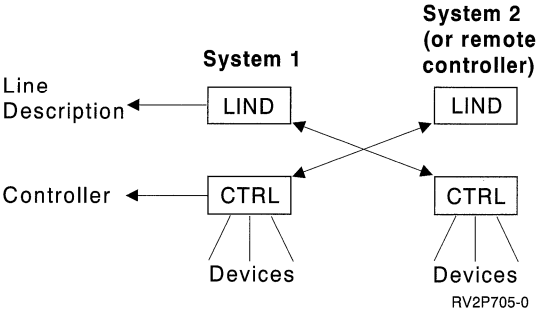

Figure 7-1. Relationship Between Controllers and Lines in Communications

To activate, change the text descriptions, or rename your communications lines and controllers, on the Device Status Tasks (DEVICESTS) menu:

1. Select the option that corresponds to the device that you want to work with. For example, to work with controllers and lines that connect display stations on the AS/400 system, select option 1 (Work with display devices).
2. On the Work with Display Devices display (shown in Figure 7-2) use option 8 (Work with controller and line) to show the controller and line to which the device is attached. For example, the following display shows the line and controller for RMTDEV1 which is a remote display station.

   Note: If you used option 8 (Work with controller and line) for a local display station, you would see the Work with Controller display because a local display does not have a communications line.

```
                    Work with Controller and Line
                                                              System:   SYSTEM01
Type options below, then press Enter.
  1=Make available     2=Make unavailable    5=Display details
  7=Display message    9=Rename             13=Change description

       Line/
         Controller/
Opt        Device          Type    Status
 __      LIN02               *SDLC   Active
 __        RMTCTL03          5394    Active
 __          RMTDEV1         3180    Sign-on display
 __          RMTDEV2         3180    Powered off or not yet available




F1=Help      F3=Exit      F5=Refresh   F9=Command line   F11=Display descriptions
F12=Cancel   F17=Top      F18=Bottom
```

Figure 7-2. Work with Controller and Line Display

3. The Work with Controller and Line display shows the controller and line to which the display is attached as well as the other local, remote, and virtual displays and printers that are attached to that specific controller and line. On this display, you can do the following:
   - To make a line, controller, or device available, use option 1 (Make available).
   - To make a line, controller, or device unavailable, use option 2 (Make unavailable).
   - To display a description of the line, controller, or device, use option 5 (Display details).
   - To rename the line, controller, or device, use option 9 (Rename) to see the Rename Controller display.

     On the Rename Controller display, you can change the name of the controller. If necessary, the system tries to make the selected controller unavailable so it can be renamed, and then makes it available again with the new name.

     Note: When you change the name of a line or controller, other objects on the system need to be updated with the new name. If you change

the name of a line or controller, check to ensure that any control language (CL) programs that refer to that line or controller are updated as well. Also, check the Alert Controller Description (ALRCTLD) network attribute on the Display Network Attribute (DSPNETA) command or Change Network Attribute (CHGNETA) command to see if it refers to the controller whose name was changed.

- To change the text description of the line, controller, or device type use option 13 (Change description). On the Change Description display, type the new description over the current description in the *New description* field. For example, if a new remote display station were added, RMTDEV3, you could change the description to include that display station.

Configuring Remote Communications

To configure remote communications, use option 20 (Communications configuration tasks) on the Customize Your System, Users, and Devices (SETUP) menu or type `go cmncfg` on any command line and press the Enter key.

With the Communications Configuration menu you can easily configure:

- 5250 remote work station controllers and devices
- 3270 remote attach controllers and devices
- AS/400 system to AS/400 system using advanced program-to-program communications (APPC) and Advanced peer-to-peer networking* (APPN)
- AS/400 system to System/36 using APPN* and APPC

For more information on remote communications, see the *OS/400* Communications Configuration Reference*.

Using a Switched Communications Line

You can establish a connection to a remote controller or another system by making a telephone call to the remote location or by answering a telephone call from the remote location. If you do not have an automatic dial modem, you must place the call manually, using manual dial. If you do not have an automatic answer modem, calls to you must be answered manually.

Using Manual Dial

Generally, a communications request is made to the system by an application program. When the request is made, you manually connect the line by doing the following:

1. A message is sent by the system to the system operator message queue. If you are authorized as the system operator, a message light comes on at your work station, and an alarm, if your work station has one, sounds to indicate that a message has arrived.
2. Display the messages sent to the system operator:
   a. On the Operational Assistant (ASSIST) menu, select option 3 (Work with messages). The Work with Messages display is shown.

b. Press F6 (Display system operator messages). A message similar to the following is displayed:

```
Manually dial 123-4567 for controller CTLU02 line LINE02. (C G)
```

3. Dial the indicated telephone number on the indicated line (in the example message shown, the number is 123-4567 and the line is LINE02).
4. When the call is answered, use option 5 (Display details and reply) for the message and press the Enter key to respond to the message. Type a `g` (Go) in the response area and press the Enter key.
5. Put the telephone or modem in data mode. For information about how to do this, see the appropriate modem instructions.

   When you complete this manual dial sequence, another message is sent to the system operator. Display the message using option 3 (Work with messages).

   The system operator message queue is shown with a message indicating whether the controller was contacted successfully or not. Sometimes the remote controller cannot be contacted or the line is busy.

Note: You have a limited amount of time to complete this manual dial sequence, or the communications program does not finish, therefore, you should monitor the messages at a work station near the phone or modem.

Using Manual Answer

Connect the line by doing the following:

1. When the telephone connected to the data line rings, answer it, and make sure the person calling is authorized, if possible. If it is a modem from another system calling your number, listen for a buzz.
2. Enter the Answer Line (ANSLIN) command and press F4 (Prompt).
3. On the Answer Line (ANSLIN) prompt display, type the line name in the *Line* field and press the Enter key.

   A message is sent by the system to the system operator message queue.
4. Type `dspmsg qsysopr` on any command line to display the messages sent to the system operator message queue. A message similar to the following should be displayed:

```
Type a g and place modem for line LINE02 in data mode. (C G)
```

5. Use option 5 (Display details and reply) to respond to the message. Then, do one of the following:
   - Type a `g` (Go) in the response area and press the Enter key. Put the telephone or modem in data mode. For information about how to do this, see the appropriate modem instructions.
   - Type a `c` (Cancel) to cancel the operation, and press the Enter key.
6. Press F12 (Cancel) to return to your previous display.

   When you complete this manual answer sequence, another message is sent to the system operator message queue.
7. Display the message as in step 4. The system operator message queue is shown with a message indicating that the controller was contacted successfully.

Using Manual Answer for Countries Other Than the United States

For countries other than the United States, the government-operated common carrier Post Telephone and Telegraph Administration (PTT) and your X.21bis modem allow you to contact remote systems using manual answer (a switched line network). The X.21bis modem you are using differs from the X.21 modem in that X.21bis converts analog signals used by older equipment to the digital signals used by newer equipment.

To start manual answer:

1. Enter the Answer Line (ANSLIN) command and press F4 (Prompt).
2. On the Answer Line display, type the line name in the *Line* field and press the Enter key. A message is sent by the system to the system operator.
3. Display the messages sent to the system operator:
   a. On the Operational Assistant (ASSIST) menu, select option 3 (Work with messages). The Work with Messages display is shown.
   b. Press F6 (Display system operator messages). A message similar to the following should be displayed:

      ```
      Enter G and place modem for line LINE02 in data mode. (C G)
      ```

4. Use option 5 (Display details and reply) for the message the message and press the Enter key to respond to the message.
5. Type a `g` (Go) in the response area and press the Enter key.

   Warning: Do not press the answer button on the modem at this time.
6. When an incoming call is indicated by a signal from the data communications equipment, press the answer button within 60 seconds.

   When you complete the manual answer sequence, another message is sent to the system operator. Display the message using the Work with Messages display. The system operator message queue is shown with a message indicating that the controller was contacted successfully.

Note: It is helpful to display the status of the line and controller when you are trying to make a dial connection. Press F5 (Refresh) to see what is currently happening on the line and controller.

Chapter 8. Using Tape Units, Tapes, Diskettes, and Optical Libraries

Tape units, tapes, and diskettes are used primarily for saving and restoring system data. A tape unit is the physical enclosure that holds the tape drive. The complete collection of tapes available for use on the system (including all new, scratch, or used tape cartridges) is a tape library.

To ensure a successful backup, it is important to maintain the tape library, properly handle the tapes, and clean the tape units. Without properly caring for your tape unit, your tape job may fail.

Establish a procedure for maintaining a tape library which includes:

- Assigning each tape a unique volume ID.

  Each tape must have a unique volume ID to maintain the accuracy of tape volume statistics as shown in "Monitoring Tape Volume Statistics" on page 8-12.
- Establishing a temperature and humidity controlled tape media storage area.
- Maintaining records for each tape volume including:
  - Date the tape was purchased
  - Problems encountered
  - Corrective action taken

For information on how to use diskettes, see "Using Diskettes" on page 8-25. For information on optical libraries, see "Using 3995 Optical Libraries" on page 8-29.

Using Tape Units

There are four kinds of tape units commonly used on the AS/400 system: 1/4-inch tape units, 8-mm tape units, 1/2-inch tape units, and 1/2-inch tape reel units.

Verifying that Your Tape Unit Works Correctly

To verify that your tape unit is working correctly, do the following:

1. Remove the reel or cartridge from the tape unit.
2. Type the WRKCFGSTS *DEV *TAP command on any command line and make the tape unit unavailable to the AS/400 (vary off).
3. Clean the tape unit. Refer to the cleaning instructions for the tape unit you are using.
4. Type the Verify Tape (VFYTAP) command on any command line and press the Enter key.

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Errors that Can Occur with Tape Units

When using tape units, some problems may be due to an operator error, and others may be caused by new or used tape cartridges prepared on another system.

Table 8-1 on page 8-3 lists common AS/400 system error messages or problems and how the operator may correct them.

Note: Each reason in the table describes a common cause. Reasons and causes that are not common are excluded from this table.

Table 8-1. Guidelines for Correcting Common Errors

	Error Message or Problem and Reason	Corrective Action
A	• **Problem:** The tape unit does not become ready to the AS/400 system. **Reason:** A tape cartridge is not loaded in the tape unit, or the system issued an unload command and the tape cartridge has not been removed.	See "Storage Device Ready Conditions" on page 8-28
B	• **Error Message:** `Storage device TAPxx removed or failed` (CPI0B32) appears in the system operator message queue. **Reason:** The tape unit power switch was Off at system IPL.	Ensure that auto-configuration is On and that the tape unit power is On. Remove any tape cartridge from the tape unit. Do one of the following: 1. Use the WRKCFGSTS *DEV *TAP command to make the tape unit unavailable (vary off). If other tape units are supported by the same I/O processor (IOP), these tape units must also be made unavailable. If necessary, use the WRKHDWRSC *STG command to determine if there are associated devices (other tape units or disk units) supported by the same IOP; this procedure *does not work if disk units are also supported by the same IOP*. Type RESET(*YES) on the command line of the WRKCFGSTS display screen to reset the IOP; select the option to make the tape unit available (vary on) and press the Enter key. Make other tape units supported by the IOP available (vary on); it is not necessary to reset the IOP again. 2. Use the PWRDWNSYS *IMMED command to power down the system. Perform an IPL on the system.
C	• **Error Message:** `Device TAPxx cannot process loaded volume` (CPA4060, CPA4282 CPF4119, CPF4588, or CPF5233). Or message, `Volume on device TAPxx cannot be processed` (CPF6772). **Reason:** The system is trying to read or initialize a new tape. • **Error Message:** `Equipment check on device TAPxx` (CPF4120, CPF4501, CPF5110, or CPF6787). **Reason:** You are using a tape recorded in a density not supported by the tape unit, or you are using a tape erased by an underpowered tape erasing device. • **Problem:** Processing time of INZTAP command is excessive. **Reason:** The `Check for active files` parameter is set to `*YES` and the tape has a large file or many files.	Initialize the tape by setting the `Check for active files` parameter to `*NO` (see "Initializing Tape" on page 8-10).
D	• **Error Message:** `Error on device TAPxx` (CPF4121, CPF4544, or CPF5101), `TAPxx is unavailable (varied off)`, or `TAPxx is in failed status`. **Reason:** The tape unit does not work because of a previous problem, or the tape unit was made unavailable (varied off).	Remove any tape cartridge from the tape unit. Use the WRKCFGSTS *DEV *TAP command to make the device unavailable (vary off) and then make it available (vary on), or perform the corrective action shown for **B** above.

Using 1/4-Inch Tape Units

Table 8-2 lists the feature codes of the 1/4-inch tape units for the 9402, 9404, and 9406 System Units.

Notes:

1. For restrictions regarding the 6367 tape unit, see note 4 in Table 8-2.
2. Tape unit 6368 is also available for the removable storage unit, 9406 feature code 5032.
3. Tape unit 9346 is not a 9406 feature code. 9346 is a machine type number supported only by Version 1 of the 9406 System Unit.
4. When writing in QIC-1000 format or QIC-525 format, the 1/4-inch tape units record an error correction code (ECC). The QIC-120 format does not have an ECC.

Table 8-2. AS/400 1/4-Inch Tape Units

Tape Unit[1]				
Identification Features	**QIC**[2] **Format** **Density (bpi)**[3]	**AS/400 System Units**		
		9402	**9404**	**9406**
QIC-1000 (1.2 GB) Tape Unit		**Feature Codes**		
Blue eject button and QIC-1000 on the cover door of the tape unit	1000 – 36,000 525 – 16,000 120 – 10,000	6343	6348	6368
QIC-525 (525 MB) Tape Unit		**Feature Codes**		
Blue eject button	525 – 16,000 120 – 10,000	6342	6347	6367[4]
QIC-120 (120 MB) Tape Unit		**Feature Codes**		
Gray eject button	120 – 10,000	6341	6346	6366[4], 9346[5]

1 The QIC-1000 and QIC-525 tape units are downward compatible.

- The QIC-1000 tape units read or write in the QIC-1000 format, the QIC-525 format, or in the QIC-120 format.
- The QIC-525 tape units read or write in the QIC-525 format or the QIC-120 format.

Note: 1/4-inch tape units record an error correction code (ECC) in the QIC-1000 format or the QIC-525 format. The QIC-120 format does not have an ECC. With an ECC, the read performance improvement is 10,000 times greater than in the QIC-120 format.

For information on QIC formats, tape cartridges, and tape unit compatibility, see Table 8-5 on page 8-16.

2 QIC: Quarter Inch Committee, an industry group that specifies 1/4-inch tape recording formats and device standards.

3 bpi: bits per inch, a density unit of measure (binary digits per inch recorded on a tape track).

4 Feature code 6367 support:

The AS/400 system provides continued support for the feature code 6367 tape unit previously installed with RPQ 841970. For 9406 system units that did not install the RPQ, the QIC-525 format is supported by the QIC-1000 tape unit (feature code 6368).

Note: When feature code 6367 is attached to the 9406 System Unit, it is presented to the OS/400 licensed program as feature code 6366. See note 5 in Table 8-5 on page 8-16 for more information.

5 9346 is a machine type number (not a feature code). The 9346 Tape Unit is available only on 9406 Version 1 systems.

Cleaning the 1/4-Inch Tape Unit

The 1/4-inch tape unit requires periodic head cleaning. When using IBM tape cartridges, the head should be cleaned after every 8 hours of use. Other tape media may require more frequent cleaning. For example, if you are doing daily backups to a single cartridge, cleaning should be scheduled every week. When using tapes that were not written by a tape unit attached to your system or are from other sources, the drive should be cleaned more frequently. It is better to clean the tape unit too often than not often enough.

Use the IBM Cleaning Cartridge Kits as recommended below:

- For all 1/4-inch tape units, use part 21F8570
- For the QIC-1000 tape unit, you can also use part 46G2675 in the United States and Canada. Outside of the United States and Canada, you can also use part 8191177. If the cleaning cartridge you are using did not come with the QIC-1000 tape unit, a PTF is required to use the cleaning cartridge.

Note: Parts 46G2675 and 819177 do not work in the IBM QIC-525 and QIC-120 tape units.

While cleaning the heads using part 21F8570, the status light on the 1/4-inch tape unit indicates the device is in use. Clean the heads for approximately 20 seconds. Open the tape unit door *even though the status light is still lit*. Remove the cleaning cartridge.

For the QIC-1000 tape unit, the cleaning cycle takes place automatically after the cleaning cartridge is inserted. The status light flashes at a rate of 1 cycle per second during the cleaning operation. After the flashing stops, remove the cleaning cartridge.

Note: See the cleaning kit instructions when using non-IBM cleaning cartridges.

Using 8-Millimeter Tape Units

The AS/400 system supports the 7208 Model 002 and the 7208 Model 012.

For the Model 002, refer to following publication:

- *IBM 7208 Model 002 2.3GB External 8mm Tape Operator Guide*, SA23-2675.

  Warning: Mark a box on the 8-mm Cleaning Cartridge (part 21F8593) after each cleaning. The Model 002 does not clean properly after 12 cleanings.

For the Model 012, refer to the following publication:

- *IBM 7208 5.0GB External 8mm Tape Unit Model 012 Operator Guide*, SA26-7036.
  - The AS/400 system supports the 5.0GB format only recorded by a Model 012 tape drive.
  - Prepare tapes on the Model 012 with the Initialize Tape (INZTAP) command.
  - It is not necessary to mark the boxes on a cleaning cartridge that is used only with Model 012 tape drives. You can use the 8-mm Cleaning Cartridge (part 21F8593) more than 12 times in a Model 012 (until the amber status light on the Model 012 does not turn off).

Using 1/2-Inch Tape Cartridge Units

The AS/400 9404 and 9406 System Units support the following models and types of 3480 or 3490 tape units:

- 3480 A11/A22 and up to 8 Model B11 or B22s
- 3490 and 3490E (all models)

1/2-Inch Tape Unit Automatic Cartridge Loader Operation

There are two ways that tape cartridges can be loaded into the 1/2-inch tape unit:

Manual Mode — You insert tape cartridges one at a time.

Auto Mode — You can preload up to six tape cartridges. The tape cartridges will automatically load when the previous cartridge is unloaded.

Sharing Systems with a 3480 or 3490 Tape Unit

The 3480 or 3490 tape units can be attached to:

- One or two input/output processors on the same AS/400 system.
- Two AS/400 systems.
- An AS/400 system and a System/390*.

You can choose whether or not you want your 3480 or 3490 tape unit assigned to an AS/400 system when the tape unit is varied on (made available for intended use). Assigning a tape unit reserves the tape unit specifically for one system.

To assign a 3480 or 3490 tape unit:

1. Use the Work with Device Description (WRKDEVD *TAP) command to work with a tape device description.
2. Type `*YES` in the *Assign device at vary on* field and press the Enter key to assign the tape unit to the system.

   Note: `*YES` is the default for Version 2 Release 3. For Version 2 Releases 1 and 2, the assign device at vary on parameter was not optional. For releases prior to Version 2 Release 1, the assign function did not exist.
3. Use the Vary Configuration (VRYCFG) command to vary off the tape unit.

   Note: The Vary Configuration (VRYCFG) command can be run by using the VRYCFG command or by using the Work with Configuration Status (WRKCFGSTS) command. To use the Work with Configuration Status command, type `WRKCFGSTS *DEV *TAP` and press the Enter key.
4. Use the VRYCFG command to vary on the tape unit and assign it to the system.

If the tape unit is being used by the other system, a message is displayed that indicates the tape unit is assigned elsewhere. The tape unit must be varied off (made unavailable) at the other system before it can be varied on (made available) to a new system.

To leave a 3480 or 3490 tape unit unassigned:

1. Use the Work with Device Description (WRKDEVD *TAP) command to work with a tape device description.

2. Type *NO in the *Assign device at vary on* field and press the Enter key to leave the tape unit unassigned.

   Warning

   A tape unit that is unassigned may be varied on to both systems. The operator must control the tape application programs so that the two systems do not interfere with each other. The results of failing to control the tape application programs may be unpredictable.

3. Use the Vary Configuration (VRYCFG) command to vary off the tape unit.
4. Use the VRYCFG command to vary on the tape unit.

Remember:

- When a 3480 or 3490 tape unit is being shared by two AS/400 systems and the tape unit that is allocated to the first AS/400 system is powered off, the tape unit will be allocated to the second system when an IPL is done on that system. Therefore, when sharing tape units between systems, make sure you vary the tape unit off before powering it off.
- If you do not want to vary on tape units during future IPLs, type the following on any command line and press the Enter key:

  ```
  CHGCTLTAP CTLD(TAPCTLxx) ONLINE(*NO)
  ```

  After doing an IPL, to vary on only the controller, type the following on any command line and press the Enter key:

  ```
  VRYCFG CFGOBJ(TAPCTLxx) CFGTYPE(*CTL) STATUS(*ON) RANGE(*OBJ)
  ```

  To use a drive, vary it on by typing the following on any command line and pressing the Enter key:

  ```
  VRYCFG CFGOBJ(TAPxx) CFGTYPE(*DEV) STATUS(*ON)
  ```

1/2-Inch Tape Cartridge Unit Addressing

The 370-attached tape units can be set at any controller and device address except when the 370-tape subsystem is used for initial program load. Then the controller address must be set to 7 and the device address must be set to 0.

Note: For the 2644 tape input/output processor only, the device address may be set to 8 for alternate IPL if no device exists at address 0.

For models 3480, 3490, or 3490E, the channel type is as follows:

- The 2604 or 2622 Tape Input/Output Processor supports a maximum data rate of 3.0MB/sec (for example, X'7C')
- The 2644 Tape Input/Output Processor supports a maximum data rate of 4.5MB/sec (for example, X'7E')

Backing Up and Restoring Data with the 1/2-Inch Tape Cartridge Unit

The 3480 or 3490 attached tape unit is most often used to back up and restore data. You can use multiple tape units to back up and restore data plus the automatic cartridge load function to do an unattended backup. When using multiple tape units, the sequence of tape media used is across the tape units: the first tape is on tape unit 1, and the second on tape unit 2.

For example, if you use the 3490 tape unit (model D32) with the automatic cartridge load function to back up the data, 12 cartridges can be loaded using the automatic cartridge load function. When the job is complete, tapes 1, 3, 5, 7, 9, and 11 are in tape unit 1. Tapes 2, 4, 6, 8, 10, and 12 will be in tape unit 2. To restore the data, the odd-numbered tapes must be loaded into tape unit 1 and the even-numbered tapes in tape unit 2.

Before backing up data, all tapes should be initialized on the model and type of tape unit that will be used to do the backup. Tapes that are initialized on other tape units may not be recognized by the AS/400 system. Tapes that are initialized on a 3490 D3x tape unit cannot be used on 3490E D4x or Cxx tape units.

Cleaning the 1/2-Inch Tape Cartridge Unit

On the average, clean the tape path on each drive every seven days. If you use an unusually large amount of tape, clean the tape path more often. If the drive displays a *CLEAN message, clean the tape unit path as soon as possible. You should also clean the tape path after each initial program load (IPL), after a drive is reset, or whenever the power on the tape drive has been interrupted.

To clean the tape path, insert the special cleaning cartridge (IBM part 4780527 or equivalent) as you would a normal tape cartridge. Keep track of the number of uses on the label provided with each cleaning cartridge and then throw the cartridge away after 500 uses.

Notes:

1. Do not use a grease pencil on the label.
2. The cleaning cartridge should be undamaged and clean when it is inserted into a tape unit.

If your tape unit has the automatic cartridge loader feature, put the cartridge into the feed position and press the start pushbutton. The cleaning cartridge can also be put into the input stack, and the cleaning procedure takes place whenever the cleaning cartridge is loaded into the drive. If you start cleaning during a job, an inquiry message is displayed. After responding to the message, the drive threads the cleaning tape, cleans the read/write head, and then rewinds and unloads the cleaning cartridge. When the cartridge has been unloaded, remove it and mark the usage label.

Cleaning the 1/2-Inch Tape Reel Unit

Use Table 8-3 as a guide to establish how often to clean your tape reel unit.

Table 8-3. Cleaning the 1/2-Inch Tape Reel Unit

When:	Clean the tape path:
Less than ten reels are used in eight hours.	Every eight hours.
More than 10 reels are used in eight hours.	Every one to two hours of running.
Particles appear on the tape path or you are using new or seldom used tapes.	After each reel.

Use the following cleaning supplies:

- Tape cleaning kit, IBM part 352465 or similar
- Cleaning fluid, IBM part 8493001, 13F5647, or similar
- Lint-free cloth, IBM part 2108930
- Rigid cleaning tool, IBM part 2200574 or similar

To clean the tape reel unit:

1. Set the power switch to the Off position.
2. Clean the following areas using a lint-free cloth or swab and cleaning fluid:

   Read/write head
   Tape cleaner block
   Tape guides
   General tape path

Pay particular attention to the read/write head and tape cleaner block. Push hard against the read/write head. Dry the areas with a lint-free cloth until the cloth comes away clean.

If the tape unit is cleaned thoroughly and a particular tape is causing errors, discard the tape.

Using Tapes

There are four types of tapes commonly used on the AS/400 system: 1/4-inch tape cartridge, 8-mm tape cartridge, 1/2-inch tape cartridge, and 1/2-inch tape reel.

Regardless of the type of tape you are using, follow these guidelines to avoid damage and loss of the data that may be stored on the tape.

Remember:

- Leave the reels or cartridges in their protective container until you use them.
- Place reels or cartridges in the computer room for 24 hours before using them.
- Remove the reel or cartridge from the tape unit when it is not in use.
- Store reels or cartridges in the protective container.
- Copy and then throw away reels and cartridges that are over four years old or that have a high number of temporary errors. See "Monitoring Tape Volume Statistics" on page 8-12 for information on how to obtain the number of errors.

Apply an external label to the outside of each reel or cartridge and to the protective container when you store data on a tape. These labels can be ordered separately. Record information such as:

- Name or number of the reel or cartridge
- Type of data stored on the reel or cartridge
- Date the data was stored on the tape
- Tape volume ID

Do Not:

- Carry cartridges loosely in a box or basket because the leader blocks can catch on other tapes and become unlatched.
- Stack more than six cartridges on top of each other.
- Open a cartridge.

- Release the leader block and pull the tape from the cartridge.
- Touch any exposed tape.
- Expose the tape to direct sunlight, moisture, or high magnetic fields.
- Drop the tape reel or cartridge.

Tape Volume, Initialization, and Volume ID

A **volume** is a 1/2-inch tape reel, a 1/2-inch tape cartridge, a 1/4-inch or 8-mm tape cartridge, or a diskette. Each volume must be initialized before data files can be recorded on the tape (or diskette) magnetic medium. A tape **volume ID** is a name or number identification that is recorded in a standard volume label at the beginning of the tape when a tape is initialized.

Initializing Tape

Use the Initialize Tape (INZTAP) command to initialize a tape. When you run this command, a standard volume label at the beginning of the magnetic tape medium is recorded.

- When a tape is initialized, and when new data files are appended to the newly recorded volume label, any information previously recorded on the tape medium is erased and written over with new information.

> **Note**
>
> Do not reuse an old tape volume if permanent read or write errors have been detected more than two times. Also do not reuse an old tape volume if temporary read or write errors for that volume are excessive. To determine if temporary errors are excessive, see "Monitoring Tape Volume Statistics" on page 8-12.

Commonly Used Parameters of the INZTAP Command

The most commonly used INZTAP parameters are:

- New volume identifier (Volume ID)
- Check for active files
- Tape density

New volume identifier (Volume ID)

Use the new volume identifier parameter to provide a unique volume identification (ID) for a tape being initialized for use as a standard labeled tape. This parameter is required for 1/4-inch and 8-mm tape cartridges and for 1/2-inch tape cartridges. This option is not required by 1/2-inch tape reels.

- On the Initialize Tape display, type the volume identifier of your choice in the new volume identifier parameter. The identifier can be no longer than six characters in length.

Check for active files

An active file has an expiration date that is equal to or later than the current date.

Select one of three options to complete the parameter:

- Type *YES in the check for active files parameter if you want all data files on the tape to be checked before the tape is initialized. If an active file is found, the tape volume is not initialized and you receive an error message.

Warning

Check for active files=*YES is the default option. The processing of tapes that have a large file, or tapes that have many files, may take a long time. The processing of 8-millimeter tapes may take up to 3.5 hours.

- Type *NO in the check for active files parameter if you want the tape to be initialized immediately without checking for active files. Use *NO when:
  - The tape or data cartridge is new.
  - You are sure you want the volume initialized and you want the INZTAP processing to complete in the minimum amount of time.
  - You are sure you want the volume initialized and the INZTAP command failed when you entered *YES or *FIRST in the parameter field.

    Warning

    If you type *NO in the Check for active files parameter, the system writes over all data that is on your tape. Make sure the tape cartridge you are using is new. If the tape you are using is not new, be certain that you want the tape volume initialized regardless of the data that is on the tape.

- Type *FIRST in the check for active files parameter if you want to check only the first file on the tape. If this file is active, the tape volume is not initialized. The processing time for this parameter option depends on the size of the first file on the tape.

Tape density

The tape density parameter determines the amount of data recorded per inch of tape. The choice of density also changes the format of 1/4-inch and 8-mm tape cartridges.

If you are initializing two or more reels or cartridges for a multi-volume SAVE operation, the density and format of all volumes must be the same.

Clear

The clear parameter is used to erase all of the data on the tape medium that follows the standard volume label record at the beginning of the tape. The 1/2-inch and 1/4-inch tape drives have an erase head that erases all data tracks in one pass. The 8-mm tape drive erases the old data as it writes the new data from the beginning of the tape to the end of the tape.

Note: Using the clear parameter to erase 8-mm tapes is not recommended because the process time for erasing 8-mm tapes can be up to 3.5 hours.

Copying Tapes

To copy a tape:

1. You must have two tape drives.
2. Make sure the tape units are turned on.
3. Load the tape to be copied into one tape unit.

4. Load the tape receiving the information in the other tape unit.

   Note: If the tape that receives the information is new, you must initialize it before continuing. See "Tape Volume, Initialization, and Volume ID" on page 8-10 for information on how to initialize a tape.

5. Enter the Duplicate Tape (DUPTAP) command and press F4 (Prompt).
6. Specify the name of the tape unit from which the information is to be copied in the From device (FROMDEV) parameter.
7. Specify the name of the tape unit to which the information is to be copied in the To device (TODEV) parameter.
8. Press the Enter key. A message is displayed when it is time to insert a new tape.

Monitoring Tape Volume Statistics

To ensure that your tapes are in good condition, you should monitor the tape volume statistics on your AS/400 system.

1. Use the Start System Service Tools (STRSST) command.
2. Select option 1 (Start a service tool) on the System Service Tools menu.
3. Select option 1 (Error log utility) on the Start a Service Tool menu.
4. Select option 4 (Work with tape/diskette lifetime statistics) on the Error Log Utility menu.
5. Select the type of removable media for which you want data on the Select Media Option display. The Work with Lifetime Statistics display appears.

```
                        Work with Lifetime Statistics

Removable media . . . . . :   1/4 inch cartridge tape

Type options, press Enter.
  4=Delete entry   6=Print entry

          Volume      --------Errors--------     --------K Bytes-------
Option    ID               Read       Write          Read     Written
       >>PHB021        23452450       23450      23457123    97689690
          THB021               2           0         14307           0
          AIPLT                0           3        214494      137546
          AD0000               0           0             3           0
          AIPL                 0           0             2       27620
          IVIHE                0           0             1           0
          MM                   0           0           361           0
          PHB031               0           0             2           0
          PTFFIX               0           0             3         432


F3=Exit              F5=Refresh           F10=Delete all
F11=Print all        F12=Cancel

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```

Figure 8-1. Work with Lifetime Statistics Display

6. If you see the following symbols preceding the volume ID on the Work with Lifetime Statistics display, take the appropriate action:

Symbol	Explanation	Action to take
>>	Media replacement recommended	Copy the contents of the media to a new tape and discard the old tape.
>	Media approaching replacement criteria	• Replace the tape if the tape format is: – QIC-120 – 7208 2.3GB – 6250 bpi density • If the tape format does not fulfill the above conditions, continue to monitor this tape to ensure that media replacement is not necessary.

Note: To ensure accurate statistics, each tape cartridge or reel must have a unique volume ID.

After 400 MB of data transfers have occurred for the volume ID, the Error Log Utility uses the following guidelines to determine whether a particular tape should no longer be used. If a tape reel or cartridge exceeds the criteria listed below, copy the contents to a new tape and discard the old tape.

1/4-Inch Tape Cartridge

- Tape cartridges recorded in QIC-120 format
  - One temporary write error per 1 250KB written.
  - One temporary read error per 12 500KB read.
- Tape cartridges recorded in QIC-525 or QIC-1000 format
  - One temporary write error per 890KB written.
  - One temporary read error per 4 170KB read.

See Table 8-4 on page 8-15 and Table 8-5 on page 8-16 for a list of tape cartridges.

8-Millimeter Tape Cartridge:

- 7208 2.3GB Format
  - One temporary write error per 50KB written.
  - One temporary read error per 100KB read.
- 7208 5.0GB Format
  - One temporary write error per 10KB written.
  - One temporary read error per 10KB read.

1/2-Inch Tape Cartridge

- 3480 and 3490
  - One temporary write error per 160 000KB written.
  - One temporary read error per 50 000 000KB read.

1/2-Inch Tape Reel:

- 9347
  - One temporary write error per 4 500KB written.
  - One temporary read error per 50 000KB read.
- 9348 and 2440
  - One temporary write error per 5 000KB written for 1600 bpi.
  - One temporary write error per 8 500KB written for 6250 bpi.
  - One temporary read error per 100 000KB read.
- 3422
  - One temporary write error per 8 500KB written.
  - One temporary read error per 144 000KB read.

If all tapes used in a single drive exceed these criteria, the read/write heads are probably dirty. You should also discard tape reels and tape cartridges with a hard write or read error.

Using 1/4-Inch Tape Cartridges

Figure 8-2 shows a 1/4-inch tape cartridge and the box used for storage.

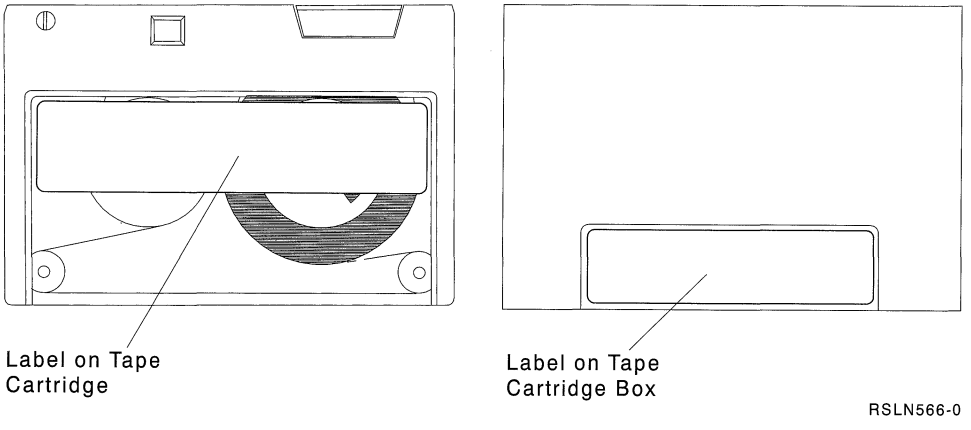


Figure 8-2. 1/4-Inch Tape Cartridge

Warning: Do not attach labels to the edges of the 1/4-inch tape cartridges as this may interfere with the cartridge sensors and cause the tape to run off the end of the spools.

Tape Cartridge and 1/4-Inch Tape Unit Compatibility

For full read/write capability, follow the guidelines in Table 8-4 on page 8-15 to determine which tape cartridges can be used for each tape unit. This table shows the QIC format of tape cartridges and the tape unit required to process each QIC format. For example, for a QIC-1000 format, the tape cartridge must be 9120 or 9120SL and the tape unit type must be QIC-1000. For more details on QIC formats, tape cartridges, and tape unit compatibility, see Table 8-5 on page 8-16.

Table 8-4. Compatibility Between Tape Cartridges and Tape Units

Tape Cartridge	Tape Unit to Use[1]
QIC-1000 Compatible (9120 and 9120SL)	QIC-1000
QIC-525 Compatible (6525, 6320, 6080)	QIC-525 or QIC-1000
QIC-120 Compatible (6150, 6037)[2]	QIC-120, QIC-525, or QIC-1000

[1] See "Using 1/4-Inch Tape Units" on page 8-4.

[2] The error correction code (ECC) is not available when tape cartridges are recorded in QIC-120 format

Error messages are displayed if the QIC format and the tape cartridge are not compatible. Errors that can occur are:

- Selecting a QIC format that cannot be written on the tape. For example, inserting a QIC-120 tape cartridge and specifying a QIC-1000 format.
- Attempting to process a high density tape cartridge in a low density tape unit. For example, you try to process a QIC-1000 tape cartridge in a QIC-525 or QIC-120 tape unit.
- Attempting to add a file and selecting a QIC format different from the format previously recorded on the tape. For example, inserting a tape cartridge recorded in QIC-525 format and specifying a QIC-120 format.

Table 8-5 on page 8-16 lists the tape cartridges that can be used with the different tape units. 1/4-inch tape units will read but not write on some tape cartridges.

Remember

For full read/write compatibility, follow the guidelines in Table 8-4. For special situations, see Table 8-5 on page 8-16.

When purchasing non-IBM tape cartridges, purchase a small quantity to verify the tape quality. Quality tape reduces the possibility of tape cartridge problems.

Table 8-5. QIC Formats, Tape Cartridges, and Tape Unit Compatibility

Tape Cartridge and QIC Format Actually Used					Tape Unit Used										
					S/36	AS/400									
						9402			9404			9406			
Industry ID	IBM Part Number	QIC Format[1]	Length (ft)	Maximum Capacity[1]	2675[2] 6157[2]	6341	6342	6343	6346	6347	6348	6366	6367[5]	6368	9346
QIC-1000 Compatible Tape Cartridges															
9120	21F8732	1000	950	1.2GB	—	—	—	R/W	—	—	R/W	—	—	R/W	—
9120SL	21F8734[3]		155	200MB	—	—	—	R/W	—	—	R/W	—	—	R/W	—
QIC-525 Compatible Tape Cartridges[4]															
6525	21F8587		1020	525MB	—	—	R/W	R/W	—	R/W	R/W	—	R/W	R/W	—
6320	21F8589	525	620	320MB	—	—	R/W	R/W	—	R/W	R/W	—	R/W	R/W	—
6080	21F8586[3]		150	77MB	—	—	R/W	R/W	—	R/W	R/W	—	R/W	R/W	—
6525	21F8587		1020	197MB	NR[4]	NR[4]	R/W	R/W	NR[4]	R/W	R/W	NR[4]	R[5]	R/W	NR[4]
6320	21F8589	120	620	120MB	NR[4]	NR[4]	R/W	R/W	NR[4]	R/W	R/W	NR[4]	R[5]	R/W	NR[4]
6080			150	37MB	NR[4]	NR[4]	R/W	R/W	NR[4]	R/W	R/W	NR[4]	R[5]	R/W	NR[4]
QIC-120 Compatible Tape Cartridges															
600A			620	120MB	NR[6]	NR[6]	R	R	NR[6]	R	R	NR[6]	R	R	NR[6]
6150	21F8588	120	620	120MB	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
6037	92X7510[3]		150	37MB	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
QIC-24 Compatible Tape Cartridges															
300XL/P			450	45MB	R/W	R	R	R	R	R	R	R	R	R	R
600A		24	620	45MB	R/W	R	R	R	R	R	R	R	R	R	R
6150	21F8588[7]		620	45MB	R/W	R	R	R	R	R	R	R	R	R	R

IBM Cleaning Cartridge for all AS/400 1/4-Inch Tape Units: See "Cleaning the 1/4-Inch Tape Unit" on page 8-5

Notes:

— The tape cartridge or the tape format cannot be used with the tape unit.
NR Not recommended.
R/W Read/Write: The tape unit will read or write on the tape.
R Read Only: The tape unit will read but not write on the tape.

1 QIC format and tape cartridge capacity

AS/400 QIC Formats: QIC-1000 tape cartridges 9120 and 9120SL may be recorded *only in QIC-1000 format*. QIC-525 tape cartridges 6525, 6320, or 6080 may be recorded in *QIC-525 format* or *QIC-120 format*. QIC-120 tape cartridges 6150 or 6037 may be recorded *only in QIC-120 format*. The error correction code improvement is not available in QIC-120 format.

Maximum Capacity: The maximum capacity of each tape cartridge in this table is determined by the QIC format and tape length.

GB = Gigabytes, 1 000 MB or 1 000 000 000 bytes.
MB = Megabytes, 1 000 000 bytes.

2 On the System/36, feature code 2675 is a QIC-120 tape unit; feature code 6157 is a QIC-24 tape unit.

3 These part numbers refer to IBM test tapes. For correct results, a test tape must be kept exclusively for the maximum QIC format of a tape unit. For example, test tape 6080 85F8586 must be used to test a 6342, 6347, or a 6367 tape unit. The test program in the tape unit automatically runs the test at the maximum format of QIC-525.

4 QIC-525 tape cartridges may be used occasionally in QIC-120 tape units for data distribution or data interchange. Continuous use of QIC-525 tape cartridges in QIC-120 tape units (2675, 6341, 6346, 6366, or 9346) is not recommended because QIC-525 tape cartridges cause excessive wear on the QIC-120 tape unit read/write head.

5 6367 Support:

- The 6367 (a QIC-525 tape unit) will read a QIC-120 format recorded on QIC-525 or QIC-120 tape cartridges.
- The 6367 tape unit will write QIC-120 format only on QIC-120 tape cartridges 6150 and 6037.

In contrast, as shown in this table, the 6342 and 6347 QIC-525 tape units, or the QIC-1000 tape units, will read or write QIC-120 format on QIC-525 or QIC-120 tape cartridges 6525, 6320, 6080, 6150, and 6037.

Note: Due to the enabling support from the input/output processor, when the 6367 tape unit has a QIC-525 tape cartridge, the OS/400 licensed program will display only the QIC-120 format (10 000 bpi density). The OS/400 licensed program displays the format supported by the 6366 even when the input/output processor is reading or writing in the format supported by the 6367 (QIC-525 format, 16 000 bpi density).

6 Write usage of DC600A tape cartridges available with tape units 2675, 6341, 6346, 6366, and 9346 is not recommended. All of the other 1/4-inch tape units will not write on a DC600A tape cartridge.

7 Tape cartridge 6150/21F8588 recorded on System/36 6157 (QIC-24) may be read on the AS/400 system. This tape cartridge may be re-used on the AS/400 system if the tape is initialized again on the AS/400 system.

Note: See "Tape Cartridge and 1/4-Inch Tape Unit Compatibility" on page 8-14. Full read/write capability is available by following these guidelines.

Loading 1/4-Inch Tape Cartridges

To load a 1/4-inch tape cartridge:

1. Push the pushbutton on the tape unit door to release the door.
2. Pull the tape unit door out, then push it down.
3. Insert the tape cartridge into the tape unit.

   The cartridge should be inserted firmly until it cannot go any further into the tape unit (about 10-mm (3/8 inch) of the cartridge remains outside the tape unit).
4. Lift up the tape unit door, then push it closed.

   Warning: The cartridge does not go all the way into the tape unit until the tape unit door is closed. Use moderate force to close the door. Slamming the door shut may damage the tape unit.

   Push the door until the latch holds the door closed.

If a tape cartridge is in the 1/4-inch tape unit, whenever the door is closed the tape unit automatically runs a **retention operation**. Retention means that the tape unit moves the tape to the end-of-tape position and rewinds it to the beginning-of-tape position. The approximate retention times are as follows:

Table 8-6. Retention Times for 1/4-Inch Tape Cartridges

Tape Unit	Tape Cartridge	Approximate Retention Time
QIC-1000	9120 (950 feet)	Less than 4 minutes
	9120SL (155 feet)	Less than 1 minute
QIC-525	6525 (1020 feet)	Less than 4 minutes
	6320 (620 feet)	Less than 3 minutes
	6080 (150 feet)	Less than 1 minute
QIC-120	6150 (620 feet)	Less than 3 minutes
	6037 (150 feet)	Less than 1 minute

Unloading 1/4-Inch Tape Cartridges

Warning: Do not remove a tape cartridge if the tape unit status light is green (only a tape unit cleaning cartridge can be removed when the light is green).

If you remove a tape cartridge while the green light is on:

- A system message indicates an error has occurred and the tape job must be repeated.
- You may not be able to retrieve data already on the cartridge because end-of-tape processing did not complete

To unload 1/4-inch tape cartridges:

1. Push the pushbutton on the tape unit door to release the door.
2. Pull the tape cartridge unit door out, then push it down.

   Moderate force is necessary to fully open the door with the tape cartridge in the tape unit. Excessive force damages the tape unit.
3. Grasp the tape cartridge and pull the cartridge straight out of the slot.

Warning: Turning the cartridge and pulling too hard may damage the door mechanism.

4. Lift up the tape unit door, then push it closed.

   Little force is required to close and latch the door when the tape unit is empty. Moderate force is required when a tape cartridge is in the tape unit.

If you remove the tape cartridge while the green light is on, turn the light off by:

- Inserting the cartridge again.
- Run the Check Tape (CHKTAP) command and specify *REWIND for the End of tape option (ENDOPT) parameter.

Remember: Do not remove a tape cartridge from the tape unit unless the last command was run with *REWIND or *UNLOAD specified for the End of tape option (ENDOPT) parameter.

If the last command ends with *LEAVE, the tape unit heads might be over a data area. To avoid this, specify *REWIND for the End of tape option (ENDOPT) parameter of the last tape command or use the Check Tape (CHKTAP) command with *REWIND specified for the End of tape option (ENDOPT) parameter.

Tape cartridges can be left in the drive for several hours or overnight if:

- The green light is off (*REWIND is specified for the End of tape option (ENDOPT) parameter).
- The room temperature does not vary by more than 9.5°C (15°F).
- Humidity levels are within the range shown in the table in "Shipping, Storage, and Operating Environments for the 1/4-Inch Tape Cartridge" on page 8-19.

Protecting Data Stored on 1/4-Inch Tape Cartridges

To protect data from being overwritten, set the pointer toward **SAFE** for QIC-525 and QIC-120 tape cartridges. For the QIC-1000 tape cartridge, set the pointer toward the locked padlock icon. To not protect the data, set the pointer away from **SAFE** for the QIC-525 and QIC-120 tape cartridges, as shown in Figure 8-3 on page 8-19. For the QIC-1000 tape cartridge, set the pointer toward the unlocked padlock icon, as shown in Figure 8-4 on page 8-19.

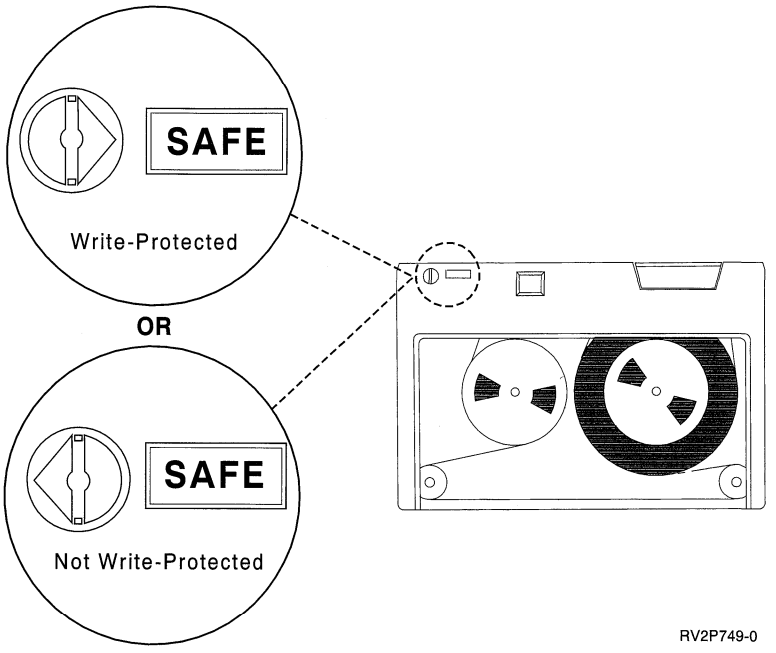


Figure 8-3. Write-Protect Positions for a 1/4-Inch Tape Cartridge (QIC-525 and QIC-120)

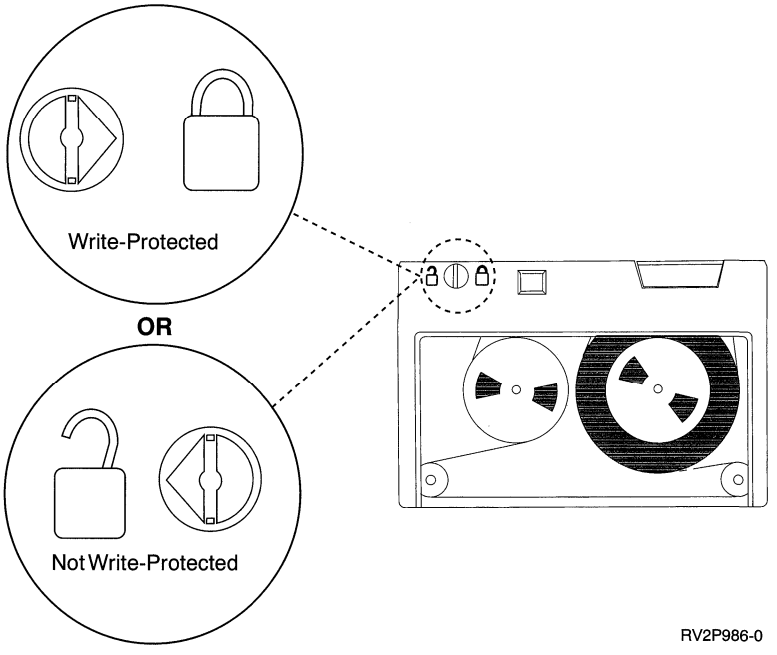


Figure 8-4. Write-Protect Positions for a 1/4-Inch Tape Cartridge (QIC-1000)

Shipping, Storage, and Operating Environments for the 1/4-Inch Tape Cartridge

The recommended environment for operation, storage, and shipment for 1/4-inch tape cartridges is a temperature of 15 to 25°C (59 to 77°F), and a relative humidity of 40 to 60%. Table 8-7 on page 8-20 provides maximum and minimum environmental conditions for safe shipment, storage, and use of the tape cartridges for an AS/400 tape unit. A hyphen (–) indicates that the dry bulb temperature is outside the recommended range for safe operation, storage, or shipment.

Table 8-7. Environment Ranges for 1/4-Inch Tape Cartridges

Dry Bulb Temperature Degrees		Relative Humidity (Percent)		
Celsius	**Fahrenheit**	**Operating**	**Storage**	**Shipping**
-40	-40.2	–	–	20 to 80
10	50	20 to 80	20 to 80	20 to 80
20	68	20 to 80	20 to 80	20 to 80
30	86	20 to 55	20 to 73	20 to 73
40	104	–	20 to 32	20 to 32
45	113	–	20 to 21	20 to 21

Using 8-Millimeter Tape Cartridges

The following are the cartridges you can use in the 7208 tape unit:

Test Cartridge #21F8577: Test Cartridge #21F8577 is used to write test data onto a tape cartridge. The tape unit reads the recorded data to check the write operation. Do not use this cartridge to save programs or data.

Note: This test cartridge may be used with the 7208 Model 002 or 012 tape units.

Diagnostic Cartridge #46G2660: Only use the Diagnostic Cartridge when the system is not available and you are not able to use Test Cartridge #21F8577. This test cartridge contains a program that tests only the read capability of the tape drive.

Note: Diagnostic Cartridge #46G2660 may only be used with 7208 Model 012 tape units. Call your service representative for additional copies of the Diagnostic Cartridge.

8-mm Tape Cartridge #21F8595: Use this cartridge to save your programs or data. Each tape cartridge provides up to 2.3GB of storage with the 7208 Model 002 or 5.0GB of storage with the 7208 Model 012. Any cartridges you use must be compatible for use in this tape unit and certified for data applications.

Cleaning Cartridge #21F8593: Use this cartridge for cleaning the 8-mm tape unit heads.

Loading the 8-Millimeter Tape Cartridge

To load a tape cartridge, push the blue load/unload pushbutton on the tape drive.

- For the Model 002, the tape drive opens and a cartridge tray ejects. After a tape cartridge is inserted, push the tape drive door closed until the mechanical latch holds the door closed. The tape drive loads the tape from the tape cartridge.
- For the Model 012, insert a tape cartridge through the cover door into the tape drive. The tape drive loads the tape from the tape cartridge.

  If you need more information, refer to the appropriate operator's guide:

  – *IBM 7208 2.3GB External 8mm Tape Drive Model 002 Operator Guide*, SA23-2675.

– *IBM 7208 5.0GB External 8mm Tape Drive Model 012 Operator Guide*, SA26-7036

The tape takes about 25 seconds to load. When the green ready light comes on, the drive is ready for data operations.

You can type commands on your display station while the tape is loading. Any commands to the tape unit start running once the tape has finished loading. Commands not requiring the tape cartridge are run immediately.

Unloading the 8-Millimeter Tape Cartridge

You can unload a tape cartridge by a system command or by pushing the blue load/unload pushbutton on the tape drive. Depending on the position of the tape, the time for rewind and unload is between 18 seconds and 3 minutes.

The drive rewinds the tape within the cartridge.

- The Model 002 ejects the tray containing the tape cartridge. The drive door must be pulled downward to remove a tape cartridge. After a cartridge is removed, another cartridge may be inserted. To keep dust and other contaminants out of the tape drive, push the drive door closed until the mechanical latch holds the door closed.
- The Model 012 ejects the tape cartridge, which can then be removed.

If the tape cartridge cannot unload and has to be removed manually from the drive, contact your service representative.

Protecting Data Stored on 8-Millimeter Tape Cartridges

The window on the tape cartridge shown in Figure 8-5 controls write protection. To prevent data from being written on the tape cartridge, slide the tab so that the window is closed. To allow data to be written on the tape cartridge, slide the tab so that the window is open.

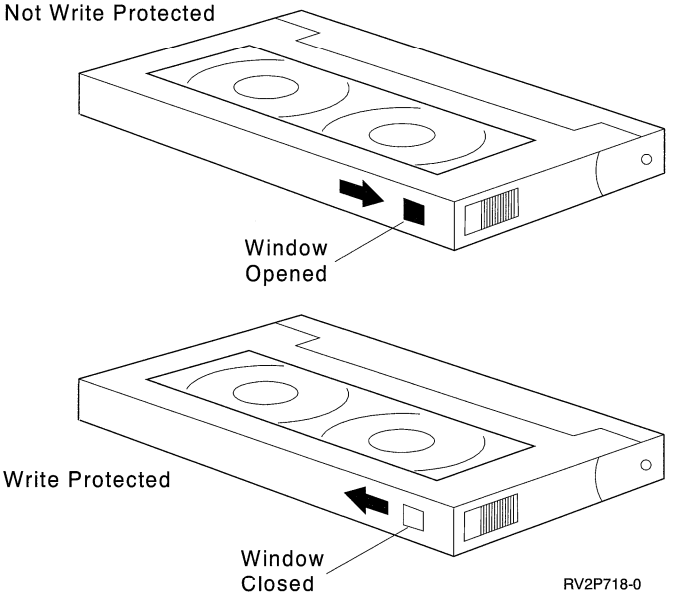


Figure 8-5. Write Protection of 8-mm Tape Cartridges

Erasing Data on the 8-Millimeter Tape Cartridge

To erase data on an 8-mm tape cartridge, use a tape erasing device that has a magnetic coercivity strength of 1500 oersteds or more.

Note: You may also erase the tape by specifying *YES for the *Clear* parameter on the Initialize Tape (INZTAP) command. However, this method takes up to 3.5 hours.

Using 1/2-Inch Tape Cartridges

Before You Start

Inspect the cartridge and do not use it if:

- The cartridge case is cracked or broken.
- The leader block or the latch is broken.
- The file-protect selector is damaged.
- The cartridge case contains any liquid.
- The cartridge case has any other obvious damage.
- The tape is wound completely out of the cartridge onto the machine reel and then reattached to the cartridge reel by the service representative. This repair is temporary and permits the cartridge to be loaded one time so that the data can be copied on a replacement cartridge.

  Note: If you have a damaged cartridge, substitute a backup version of the data from another cartridge. If the cartridge has a detached leader block but no other damage, you can repair the cartridge with the *IBM Leader Block Repair Kit*.

If dirt appears on the external surface of a cartridge, clean the cartridge by wiping the outside surfaces with a lint-free cloth (IBM part 2108930) that has been lightly moistened with IBM cleaning fluid (IBM part 8493001) or its equivalent.

Warning: Do not allow anything wet, including the cleaning fluid, to contact the tape.

Make sure all cartridge surfaces are dry and the leader block is snapped into place before you load the tape cartridge.

Protecting Data Stored on 1/2-Inch Tape Cartridge

To protect the data, roll the thumbwheel selector on the side of the cartridge left or right until it is in the correct position.

Note: For more detailed information about using 1/2-inch tape cartridges, see *Care and Handling of the IBM Magnetic Tape Cartridge*, GA32-0047.

Using 1/2-Inch Tape Reels

A magnetic tape reel consists of a 1/2-inch continuous strip of plastic coated with a layer of oxide. It is this oxide coating and how it is affected by the way we handle and use tapes, that can cause tape unit performance problems.

Use the following tape and reel recommendations for maximum performance and reliability:

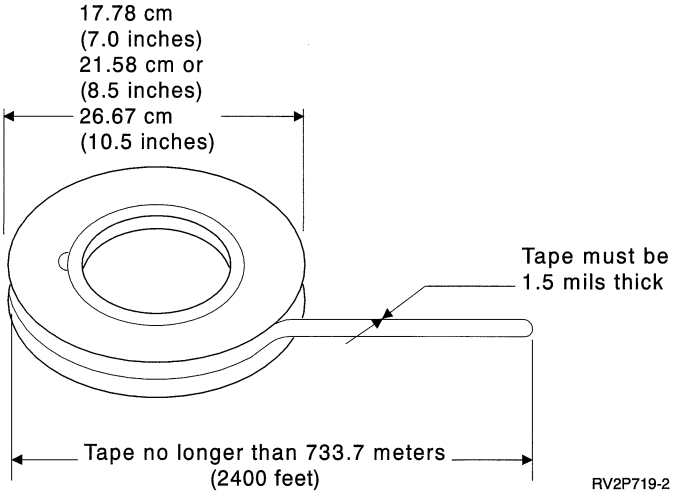
Tapes:

1.5 mil thick
A maximum of 733.7 meters (2400 feet)

Reels:

15.24 cm (6.0 inches)
17.78 cm (7.0 inches)
21.58 cm (8.5 inches)
26.67 cm (10.5 inches)

If you are using tapes that are longer than 2400 feet, the tape unit head will not wear correctly and you will see an increase in read and write errors.



Follow these tips to ensure your tape reels are used correctly:

Remember:

- Secure the end of the tape with a tape end fastener when not in use.
- Keep the reel protected with a locking collar when not in use.
- Store tapes in a vertical position.

Do Not:

- Squeeze the outer flanges of the reels when handling and loading tape (hold the tape evenly around the outer edge by the palm of your hand).
- Allow tape ends to drag on the floor and get dirty.
- Touch the tape surface.

Preparing a Tape Leader

A tape leader that is square or damaged can cause the tape to load incorrectly in units that automatically load tapes. When using this type of tape unit, ensure that the tape loads correctly by:

- Preparing the tape leader with the tape leader tool (IBM part 2512063).
- Pressing hard when cutting the tape. This prevents static problems on the tape leader.

Figure 8-6 on page 8-24 shows how to correctly prepare a tape leader.

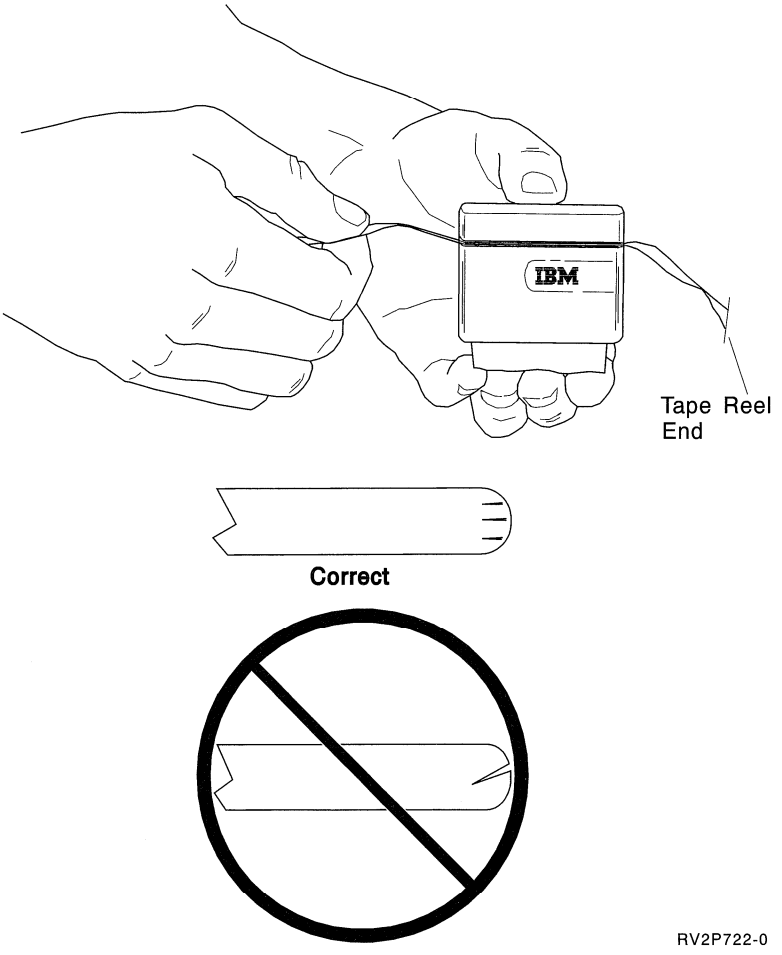


Figure 8-6. Preparing a Tape Leader

Loading the 1/2-Inch Tape Reel

When loading 6-inch reels of tape on the 9348, carefully place the tape reel on the center of the hub.

When loading a tape reel, ensure that the loose end of the tape is on the tape reel and not under the reel.

Protecting Data Stored on the 1/2-Inch Tape Reel

To prevent the drive from writing data, remove the write enable ring as shown in Figure 8-7 on page 8-25. To allow the drive to write on the tape, install the write enable ring.

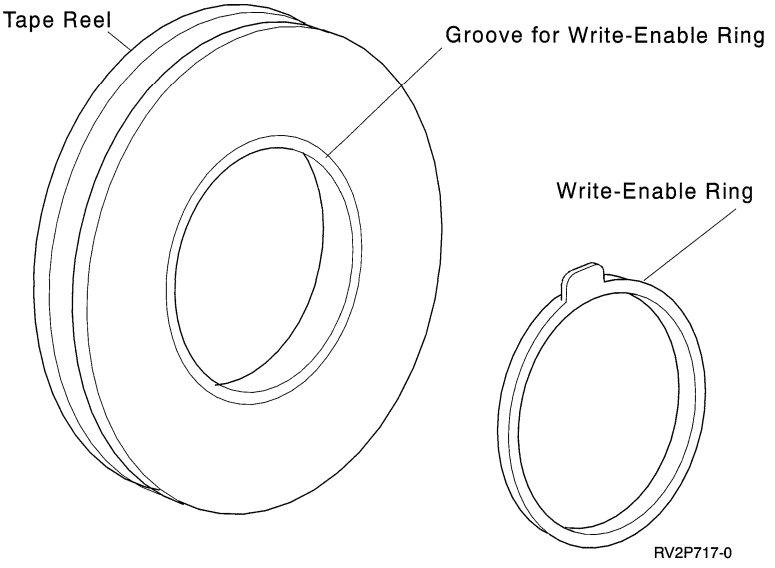


Figure 8-7. 1/2-Inch Tape Reel Write Protection

Using Diskettes

A **diskette** is a thin diskette that can turn freely while enclosed in a permanent jacket. A material inside the permanent jacket cleans the diskette as the diskette turns. When the diskette is not in use, it should be kept in its removable envelope for protection.

Before you use a diskette, check the diskette label to ensure that you are using the correct type of diskette.

The 8-inch diskette unit can use three types of 8-inch diskettes:

- Single-sided, single-density
- Double-sided, single-density
- Double-sided, double-density

The 5-1/4 inch diskette unit can use two types of 5-1/4 inch diskettes:

- Double-sided, high-density
- Double-sided, double-density

Note: Double-density, 5-1/4 inch diskettes can be read only. You cannot write to these diskettes.

IBM diskettes are designed to stand up to frequent, careful handling, but incorrect handling can cause damage.

Handling Diskettes

Damage to a diskette can cause problems such as reading or writing errors at unexpected intervals, or more serious problems such as permanent loss of the information on the diskette.

When you take a diskette out of its removable envelope, handle the diskette correctly as shown in Figure 8-8 on page 8-26.

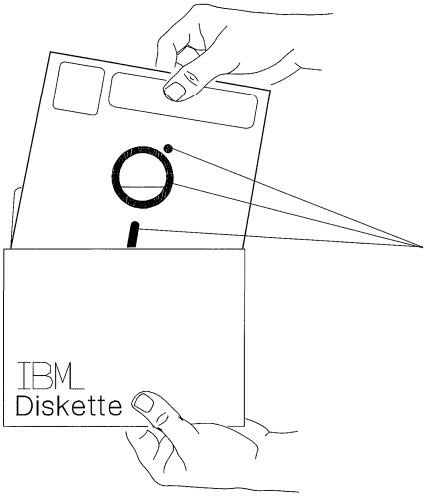


Figure 8-8. Handling Diskettes

Remember:

- Write on the diskette label with a felt tip pen.
- Keep the diskette in clean environment (away from smoke and dust).
- Keep the diskette away from direct sunlight.

Do Not:

- Touch the diskette surface.
- Use clips or rubber bands on a diskette.
- Place heavy books on a diskette.
- Put a diskette near magnetic materials.

Initializing Diskettes

Initializing a diskette means that identification information is written on it and it is given a specific format for storing information. Initializing also includes:

- Checking for files that are still active and that should not be cleared.
- Testing each track for physical defects on the recording surface.
- Initializing each track to a specified sector size (128, 256, 512, or 1024 Kbytes) and a recording mode (single density or double density).

To initialize a diskette:

1. Load the diskette into the diskette unit.
2. Enter the Initialize Diskette (INZDKT) command and press F4 (Prompt).

   Note: If the diskette is already formatted but contains active files, you can clear the diskette to delete the active files (see page 8-27). Because clearing a diskette does not involve reading or formatting the entire diskette, clearing a diskette takes less time than formatting a diskette.
3. Specify the name of the diskette unit for the Diskette device (DEV) parameter, on the Initialize Diskette (INZDKT) display.
4. Specify the format to be used to initialize the diskette for the Diskette format (FMT) parameter. If the diskette is to be used for a save or restore operation, use *SAVRST.

5. If you want the system to check for active files before formatting the diskette, leave *YES for the Check for active files (CHECK) parameter. If you choose to check for active files, make sure you respond to the messages sent to the system operator message queue (QSYSOPR).

   Note: To respond to system operator messages while you are initializing diskettes, press the System Request (SysReq) key and then the Enter key to display the System Request menu and select option 6 (Display system operator messages).

   If there are some active files on the diskette, the diskette is not formatted and a message is displayed indicating that active files were found. You can respond to that message by indicating whether you want the formatting to continue (active files are deleted) or to end.

6. If you want the diskette formatted regardless of its current contents, specify *NO for the Check for active files (CHECK) parameter. When the diskette is formatted, the contents of the diskette are deleted.
7. Change the default values for the other parameters if you want.
8. Press the Enter key. Diskette formatting begins.

Clearing Diskettes

To clear a diskette:

1. Enter the Clear Diskette (CLRDKT) command and press F4 (Prompt).
2. Specify the name of your diskette unit for the Diskette device (DEV) field.
3. If you want the diskette cleared regardless of its current contents, specify *NO for the Check for active files (CHECK) parameter. When the diskette is cleared, the contents of the diskette are deleted.
4. Press the Enter key. The diskette is cleared.

Labeling Diskettes

A permanent label is attached to the permanent jacket of each diskette before it is shipped. This label indicates the type of diskette and has space for you to write information describing the diskette, such as the date the diskette was first used and if the diskette is single-sided or double-sided.

You can order temporary labels to record changing items, such as:

- The name or number of the diskette.
- The kind of data stored on the diskette.
- The date the data was stored on the diskette.
- Who stored the data on the diskette.

If you write information on a label after it is on the diskette, use a felt-tip pen and press lightly. You should write on the temporary label before you place it on the diskette jacket.

Attach the temporary label next to the permanent label on the diskette jacket. The labels also help position the diskette correctly when placing it in the diskette unit.

Copying Diskettes

To copy a diskette:

1. Make sure the diskette unit is turned on.
2. Make sure both diskettes are of the same type (1, 2, or 2D) and of the same format.
3. Load the diskette to be copied in the diskette unit and close the latch.
4. If you have more than one diskette unit, place each diskette receiving the information in one of the other diskette units and close the latch.

   Note: If the diskette that receives the information is new, you must initialize it before continuing. See "Initializing Diskettes" on page 8-26 for information on how to initialize a diskette.
5. Enter the Duplicate Diskette (DUPDKT) command and press F4 (Prompt).
6. On the Duplicate Diskette (DUPDKT) prompt display, type the name of the diskette unit from which the information is to be copied.
7. Type the name of the diskette unit to which the information is to be copied. If you have only one diskette unit, repeat the name of your one diskette unit here. A message is displayed when it is time to remove the original diskette and insert the new diskette.
8. Type the number of copies you want.

   Note: If you specify more than one copy, you must specify more than one diskette unit.
9. For the Reorganize volume (RGZVOL) parameter, specify:
   - *YES if you want the unused space between the files deleted.
   - *NO if you do not want the unused space between the files deleted. The diskette copies will be exactly like the original diskette.
10. Press the Enter key. The information is copied.

Storage Device Ready Conditions

Use Table 8-8 if you are having trouble making a device ready. All the conditions listed for each device must be correct for the device to be ready.

If you are not able to make a device ready, contact your service representative.

Table 8-8 (Page 1 of 2). Storage Device Ready Conditions

Storage Device	Ready Description	Reference Information
Tape Unit		
2440	• Power light is on • Tape is loaded • Status display shows A 0 • Online light is on	*IBM 2440 Magnetic Tape Subsystem Operator's Manual*, G571-0149.

Table 8-8 (Page 2 of 2). Storage Device Ready Conditions

Storage Device	Ready Description	Reference Information
1/4-inch	• Tape cartridge is inserted. – The tape cartridge must be changed or, to reuse the same cartridge, the tape drive must be opened and closed again under the following conditions: - The tape unit was made unavailable (varied off). - The tape application program ended with the *UNLOAD option. – If the tape unit is inserted into the 5032 Removable Storage Unit, the 5032 power switch must also be on.	
7208 8mm	• Power light is on • Tape cartridge is inserted • Ready light is on The 7208 Model 002 and 012 are table top tape units. If a tape unit has been moved, ensure that the external signal cable is properly connected.	• *7208 2.3GB External 8mm Tape Drive Model 002 Operator's Guide*, SA23-2675. • *7208 5.0GB External 8mm Tape Drive Model 012 Operator's Guide*, SA26-7036.
9347	• Power light is on • Load/Rewind light is on • Online light is on	
9348	• Power light is on • Tape is loaded • Status display shows 00 A002 • Online light is on	*9348 Customer Information*, SA21-9567.
3422/3430	• Power light is on • Enable/Disable switch is set to the Enable position • Tape is loaded • Ready light is on	*IBM 3422 Magnetic Tape Subsystem Operator's Guide*, GA32-0090.
3480/3490/ 3490E	• Power light is on • DC Power light is on • Control unit Online switch is set to the Online position • Control unit Normal/Test switch is set to the Normal position • Control unit channel Enable/Disable switch is set to the Enable position • Tape unit Online/Offline switch is set to the Online position • Tape is loaded • Tape unit displays Ready U or Ready F	See the appropriate operator's guide for your specific model.
Diskette Unit		
9331	• Power light is on • Unit Ready light is on	

Using 3995 Optical Libraries

The IBM 3995 Optical Library Dataserver is a storage device for the AS/400 system that provides removable and permanent storage of a large capacity of information. The 3995 Optical Library lets you access data right at your work station. It is an alternative to retrieving data that is traditionally kept on paper, stored on diskette, stored on microfilm, or stored on magnetic tape.

If you are using the 3995 Optical Library and would like more information, see the following operator's manual:

- *IBM 3995 AS/400 Optical Library Dataserver: Operator's Guide Models 142 and 042, GA32-0140*

Chapter 9. Online Education

Online education presents educational material in the form of courses to students on your system. Anyone who has a valid user ID for your AS/400 system can be a student and start using online education as a training program.

The following are the kinds of courses available on the AS/400 system:

Tutorial System Support

This is the online education course supplied with the AS/400 system. This course contains introductory modules covering many aspects of the AS/400 system. It provides education for all types of AS/400 users including operators, managers, and business and technical professionals.

This course is part of the total IBM curriculum, which includes other forms of self-study as well as classroom courses.

Additional IBM Online Education

IBM produces other education courses, known as **Discover/Education*** for the AS/400 system, which you can order separately. These courses cover many of the same topics as Tutorial System Support, but at a more advanced level. The additional IBM courses are intended for the same types of AS/400 users as Tutorial System Support.

For some of these courses, you need a personal computer with PC Support/400 using shared folders on the AS/400 system.

Other Online Education

Additional courses may be acquired from sources other than IBM. These may come from education suppliers or other program suppliers, or the education developer could provide courses. They can cover many topics, and address the needs of most AS/400 users.

Additional reading: If you want to write your own online education course, you need a personal computer and the Self-Education Facility for the PS/2* (SEDF/2). Courses written using SEDF/2 can be installed on your AS/400 system and displayed by the online education presentation program. For information on how to create online education courses, see the *Self Education Facility on the Personal System/2*: Author's Guide*, SH12-5623.

Using Online Education

An online education course is a collection of several related subjects displayed on either a color or monochrome display connected to the AS/400 system.

Each course contains a variety of subjects. Each subject is presented in a unit called a **module**. A module is the basic unit of online education, organized in topics and subtopics. IBM-supplied modules take about 25 to 45 minutes to complete.

An **audience path** is a route through the modules in a course. The audience path suggests the modules and the order to study them, based on the student's job description. For example, the audience path for a secretary contains different modules from the audience path for a system operator.

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Students can select an audience path that matches their job description, or you, as an administrator, can determine the audience path for the students. If the audience paths do not fit the student's requirements, you can define a new audience path.

Students can interrupt their studies at any time by setting a bookmark and continue from that point when they return to the online education. Setting a bookmark allows students to return to the display last viewed at a later time. When students return to online education after setting a bookmark, they can either start at the bookmark or select another module to study. Each student can have only one bookmark active at a time.

For information on how to use online education, take the following modules:

Getting Started in Online Education

Describes online education and exercises for using the basic features. This module is included in every audience path.

An Additional Way to Select Modules

Describes how to select modules in other than the recommended sequence.

Additional Functions in Online Education

Describes special features of online education such as bookmarking, simulations, and using windows.

These modules are part of Tutorial System Support and available if you select the *How to Use AS/400 Online Education* audience path.

To start using online education:

1. Use the Start Education (STREDU) command or select option 21 (Start online education) on the Information Assistant Options (INFO) menu.
2. On the Start Education Administration (STREDU) menu, select option 3 (Work as a student).
3. On the Select Course Option display, make sure that the course title is *Tutorial System Support*. If not, select option 5 (Select a course) to display a list of courses installed on your system. Select the course called *Tutorial System Support*. Then, select option 4 (Select audience path) on the Select Course Option display.
4. Select the audience path called *How to Use AS/400 Online Education*. When you press the Enter key, the Select Course Option display is shown again with the selected audience path name displayed in the *Audience path title* field.
5. Use option 1 (Start next module) to take the "Getting Started in Online Education" module.

Administering Online Education

To learn about administering online education:

1. Use the Start Education (STREDU) command to display the Start Education Administration display.
2. Select option 3 (Work as a student) on the Start Education Administration display.

3. Select option 3 (Select module in audience path). On the Select Module in Audience Path display, select the module called "Administering Online Education."

   This module explains the steps in detail for the administrative tasks that follow.

Before students can study an online education course, you need to ensure that the course is ready to be used. Preparing the system for online education consists of verifying that the course is installed, adding the course to the list of available courses, and opening the course for students to study.

Verifying Installation of Online Education

Tutorial System Support is included with every AS/400 system and usually is installed with the operating system. It can be found in the library QSDE.

To check to see if Tutorial System Support is installed on your system:

1. Type `go licpgm` on any display with a command line and press the Enter key.
2. Select option 10 (Display installed licensed programs) on the Work with Licensed Programs (LICPGM) menu.
3. If in the list you find "OS/400 - Online Education" in the *Description* column, Tutorial System Support has been installed on your system. If you cannot find online education in the list, see the *Licensed Programs and New Release Installation Guide* for information on how to install Tutorial System Support.

To install courses other than Tutorial System Support, see the instructions included with the courses. Conversion from ASCII to EBCDIC is required if you want to run these courses on the AS/400 system. To convert a course:

1. Enter the Convert Education (CVTEDU) command and press F4 (Prompt).
2. Specify the course ID for the Course ID parameter and the language ID for the Language ID parameter on the Convert Education (CVTEDU) display.

   Note: When converting a course, make sure that you specify the same language ID with which your course is written. If the language IDs do not match, the course may not be readable. To find the languages and their ID numbers, use F4 (Prompt) with your cursor on the prompt.

Adding and Removing a Course

After a course is installed, it needs to be added to the list of available courses. When you add a course, you must supply a title for the course. This is the title that appears in the list of available courses when a student is selecting a course to study. You also need to provide a course ID, which is the same as the name of the library or shared folder that stores the course.

If a course cannot be added, it is not correctly installed in the library you specified as the course ID.

Note: When adding or changing a course, an Add Course Conversion Information display appears if the course is not converted. Follow the instructions on the display to convert the course.

Removing a course removes all records of student activity in the course; students lose any bookmarks left in the course, and no record of completed modules are saved. If the course is added again, students need to be enrolled again.

Opening and Closing a Course

After a course is installed and added, it must be opened before students can study the course.

After it has been opened, the course can be used by any student who has access to the library that contains the course. Closing a course makes it unavailable to students until it is opened again. While a course is closed, you can work with it without students trying to study the course.

Displaying General Course Information

From the Work with Courses display you can see the following information about a course:

- Description of the course
- List of students enrolled
- List of the audience paths available through the course (with audience path IDs)
- Description of each audience path
- List of the modules in each audience path (with module IDs)

Updating Courses

Updating a course replaces the course with a new version. When you update to a new release of the AS/400 system, the Tutorial System Support course is automatically updated if it is installed with the operating system. The modules change to reflect changes made in the system. When Tutorial System Support is updated, audience paths you have created are not removed.

Note: When updating the AS/400 system, all bookmarks active in Tutorial System Support at the time of the update are removed. You may want to let your students know their bookmarks are removed before updating to a new release.

Creating Audience Paths

You may find that some of your students do not need one or more modules in a defined audience path. You may also have students whose educational needs span several audience paths. For this reason, the online education program allows you to create and change audience paths.

You have two options when defining your own audience path. One option allows you to start with an empty audience path, the other creates a copy of an existing audience path. You can then add or remove modules in your new audience path until it suits your needs. You cannot have modules from different courses in the same audience path.

You can also change audience paths that you have created. This allows you to add or remove modules from the audience path as well as change the order in which the modules appear.

Note: You cannot change the existing audience paths for the system-supplied course. You can, however, copy these audience paths and change the copies.

Saving Student and Course Information

Like other valuable system information, student and course status information should be periodically saved. If a major system failure should damage this information, you can restore the saved copy with a minimum of disruption to your training operation. All student and course information that changes with regular use of online education is in database files in the QUSRSYS library. The database files starting with QAEA contain online education information. To save this information, see the *Basic Backup and Recovery Guide*, SC41-0036.

Enrolling Students

After the course is available on the system, students need to be enrolled in order to study the course. The students can enroll themselves when they initially start their education, or you can enroll them in advance. Once enrolled, the student's enrollment status can be changed by you or by the student.

To enroll students yourself, you need to type the student's name, the course you want the student enrolled in, and the audience path the student should follow. While the online education program suggests an order for studying the modules, the student is free to study the modules in any order.

While selecting a course and audience path for a student, you can display the following information:

- Description of the course
- List of students enrolled
- List of the audience paths through the course (with audience path IDs). From this list you can display:
  - Descriptions of each audience path
  - Lists of the modules in each audience path (with module IDs)

In Tutorial System Support, the first module in each audience path is "Getting Started with Online Education." This module teaches the student how to select and study a module. If students need more information about online education, you can enroll them in the audience path entitled "How to Use AS/400 Online Education." This audience path consists of several modules that explain how the student can control the education presented. This information is normally not necessary unless students administer education for themselves.

If none of the supplied audience paths fit the needs of a student, you can define a new audience path. This function is described in "Creating Audience Paths" on page 9-4.

After a student is enrolled, you can change some of the information about the student. You can change the student's name, course, or audience path. You can also remove a student from enrollment, which removes all records of that student's activities in online education. However, you cannot perform any of these activities if the student is currently signed on and using online education. Likewise, a student cannot access online education if you are currently changing that student's enrollment information.

Chapter 10. Using Electronic Customer Support

Your AS/400 system has an integrated set of functions that are designed to help service and support your system. These functions are referred to as AS/400 electronic customer support and include:

- Hardware and software problem analysis, reporting, and management
- Copy screen image
- Question and answer support
- IBM technical and product information access

AS/400 electronic customer support provides a connection to the IBM service system following problem analysis and isolation procedures on the AS/400 system. For more information on how this works, see "Reporting Problems Detected by the System" on page 13-10.

AS/400 electronic customer support is included with the OS/400 licensed program. Communications hardware and software needed to access remote IBM service and support functions are part of your AS/400 system.

Security Considerations

Before you use electronic customer support, you need to be authorized by your security officer to use the following commands:

- Send PTF Order (SNDPTFORD) command
- Send Service Request (SNDSRVRQS) command
- Work with Contact Information (WRKCNTINF) command

Figure 10-1 on page 10-2 shows how AS/400 electronic customer support is organized to accommodate your needs for problem reporting and response.

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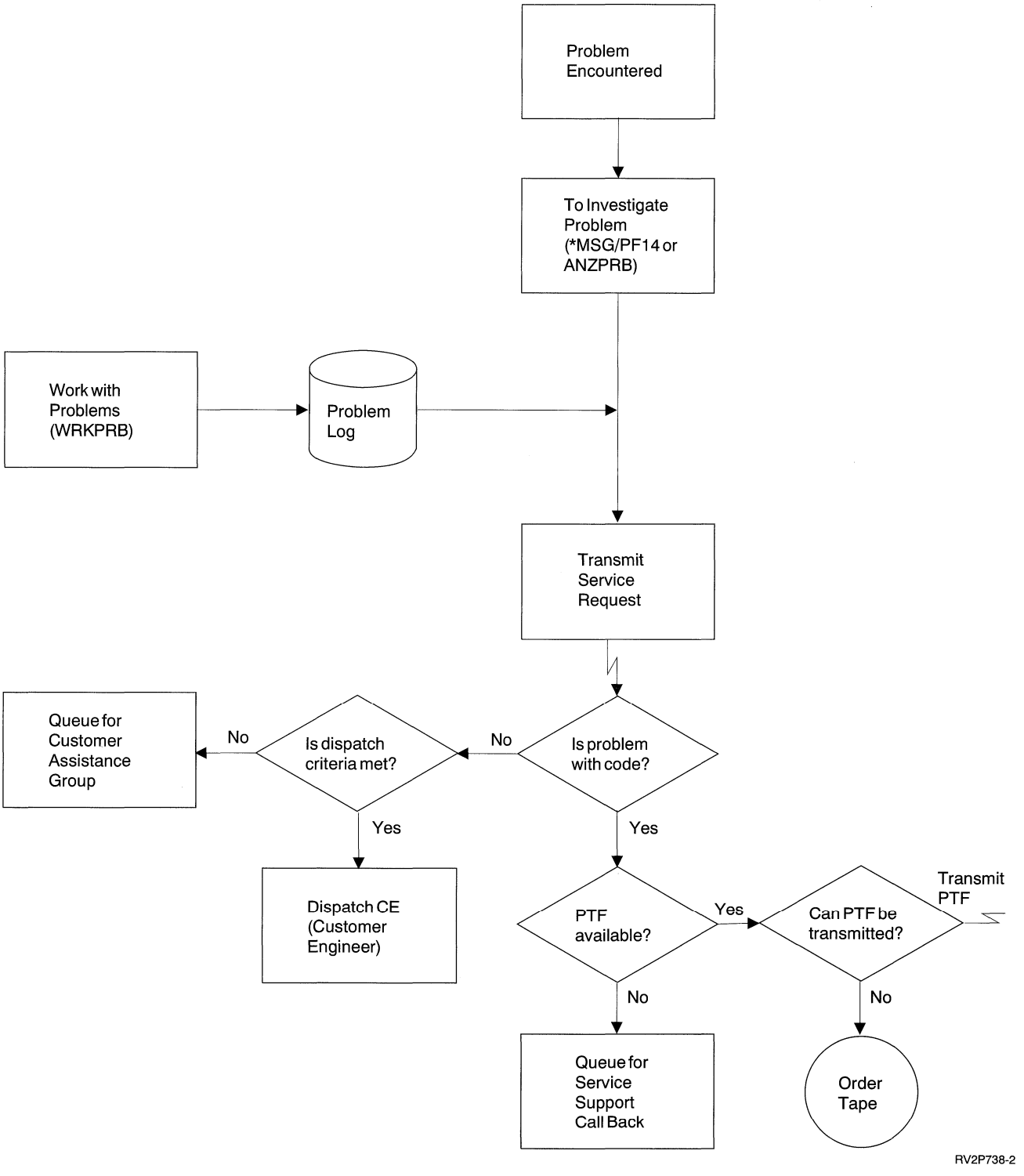

Figure 10-1. Overview of Electronic Customer Support

See "Reporting Hardware and Software Problems" on page 13-9 for information on how to report hardware and software problems.

Copying Displays to Another Display Station

The OS/400 licensed program allows you to copy display images to another user. This allows another user to help you identify a problem.

The requirements for both display stations are as follows:

- Both are defined to the system.
- Both are color or both are monochrome, but not one color and the other monochrome.
- Both have the same number of character positions horizontally and vertically.

Start Copy Screen

To copy screen images to another user:

1. Select option 12 (Copy your screen on another display station) on the Technical Support Tasks (TECHHELP) menu or use the Start Copy Screen (STRCPYSCN) command.
2. Type the ID of the display station that is sending the copied displays on the Start Copy Screen display.

   Note: If you type your own display station's ID as the sending device, the receiving display station must have the Sign On display shown when you start copying screen images. Graphics or illustrations are copied as blanks.
3. Type the ID of the display station to receive the copied displays and press the Enter key.

   A message is sent to you.
4. Type a g (Go) in reply to the inquiry message and press the Enter key. The sending display station's screens are copied to the other display station.

The image shown on the receiving display station trails the sending display station by one display. If the operator of the sending display station presses a key that is not active (such as the Home key), both display stations show the same display. However, the operator that pressed a key that is not active receives an error message and the keyboard locks. If this occurs, press the Error Reset key to unlock the keyboard. Then continue copying screens to the other display station.

End Copy Screens

While you are copying screens, the operator of the receiving display station cannot do any other work at that display station until the copying of screens is ended.

To end the copy screen function from the sending display station:

1. Select option 13 (Stop copying your screen) on the Technical Support Tasks (TECHHELP) menu or enter the End Copy Screen (ENDCPYSCN) command and use F4 (Prompt).
2. Specify the name of the display station that requested the copied screens for the Source device (SRCDEV) parameter on the End Copy Screen (ENDCPYSCN) display and press the Enter key.

To end the copy screen function from the receiving display station:

1. Press and hold the Alt or Shift key and press the System Request (Sys Req) key.
2. Enter the End Copy Screen (ENDCPYSCN) command.

Using the AS/400 Question-and-Answer (Q & A) Database

With the OS/400 licensed program, IBM also supplies a question and answer (Q & A) database that contains frequently asked questions and answers about your AS/400 system and supported licensed programs. You can find information about the system by:

- Searching for answers to questions
- Displaying answers to questions you have asked
- Asking questions online of your question-and-answer database coordinator

Your question-and-answer database coordinator can use the system to:

- Create, change, or delete a question-and-answer database file.
- Save and restore a copy of a question-and-answer database file using tape or a save file on the system.
- Place an answer to a question in the question-and-answer database file for people to read.
- Answer or delete questions.

For more information about using the Q & A database, managing Q & A databases, and providing support to other users in your company, see the *Q & A Database Coordinator's Guide*.

Searching the Local Q & A Database

Before You Start

- Make sure the Q & A database is loaded on your system. See the *Q & A Database Coordinator's Guide* for information on how to install it on your system.
- Update the support contact information for *Work with question and answer (Q & A) database* with the data from the *Support Data - Contact Information* sheet in your *AS/400 Welcome Packet*.

To search the Q & A database on your system:

1. Use the Start Question and Answer (STRQST) command and press the Enter key.
2. Select option 1 (Search for answers, then ask questions) on the Question and Answer (Q & A) menu.
3. Type the name of the database in the *Database* field or press F4 (List) to select the database name from a list on the Search for Answers display.

Notes:

a. If the IBM-supplied Q & A database is the only Q & A database on your system, that database name appears on the *Database* field.

b. If you have more than one Q & A database, press F4 (List) and select QSYSQST (or the name you have chosen for the IBM Q & A data base).

4. Fill in the *Primary topic* and *Secondary topic* fields and search words on the Search for Answers display and press the Enter key.

   The database is searched for matching keywords. The Search for Answers display reappears indicating the number of questions found.

5. Press the Enter key to see a list of the question titles.

6. Select option 5 (Display answer) on the Display Answers to Questions display for the question you want to review on the Display Answer display.

7. Press F3 (Exit) to return to the Question and Answer (Q & A) menu.

Note: The search words HELP and SEARCH can be used with any primary and secondary topic combination to find search words that are permitted. Remember, however, that this technique applies only to the IBM-supplied AS/400 system Q & A database (QSYSQST) and its corresponding national Q & A database.

Searching the Remote Q & A Database

If your company has access to a remote database and the Q & A support contact information on your system has been properly set up, F21 (Remote search) appears on the Display Answers to Questions display.

To connect to the remote Q & A database:

1. Press F21 (Remote search) on the Display Answers to Questions display.

   The Sign On to Remote Support for Q & A display appears. This display tells you who provides the support for the remote Q & A database that corresponds to the local Q & A database you are searching. The customer assistance telephone number for the remote Q & A database is also displayed.

   The account number you enter in the AS/400 support contact database for Q & A is filled in after the *Account* field on this display. Type over this account number if it is not correct.

2. Type your IBMLink* user ID and password and press the Enter key. A series of status messages appear at the bottom of the sign on display as your system automatically dials the remote support system and completes the sign on process.

   When the connection is complete, the Search Remote Database for Answers display appears. Note that the topics and search words you used during your local search are passed to the remote system.

3. Press the Enter key to search the remote database using the same topics and search words.

   Note: You can also change topics and search words to search for other information in the remote Q & A database.

   The Search Remote Database for Answers display reappears indicating the number of questions found.

4. Press the Enter key to display the list of question titles. The Display Remote Answered Questions display appears. You can now display answer text and copy answers to your local Q & A database, print the list of question titles using F6 (Print list), print answer text for individual questions, or print answers for all questions in the list using F23 (Print all).

   To do other searches on the remote Q & A database, press F12 (Cancel) to return to the Search Remote Database for Answers display. Then type other topics and search words.

5. Press F3 (Exit) to disconnect from the remote system. The Exit Remote Q & A Database display is shown.
6. Select option 1 (End conversation and return to local database). The connection to the remote system is ended and you return to the Display Answers to Questions display on your AS/400 system.

Reviewing Q & A Database Remote Question Status

To review the status of questions you asked in the remote database:

1. Use the Start Question and Answer (STRQST) command to get to the Question and Answer (Q & A) menu.
2. Select option 2 (Work with questions you have asked) on the Question & Answer (Q & A) menu.
3. Select the remote IBM AS/400 Q & A database on the Select Q & A Database display and press the Enter key.
4. Enter your account number, user ID, and password on the Sign On to Remote Support for Q & A display and press the Enter key.

   The connection process begins. When the sign on is complete, the Work with your Remote Questions display appears.

5. Press F11 (Display date/status) to show the date and status on the Work with your Remote Questions display.

   You can now display and accept answers, copy questions and answers to your local Q & A database, or print questions and answers.

6. Press F3 (Exit) to disconnect from the remote Q & A database. Then select the option to end the conversation and return to the local database.

Getting IBM Technical and Product Information

Using IBM product information, you can display additional information about your AS/400 system, such as information about system education schedules and system product announcements.

To use IBM product information:

1. Use the Work with Product Information (WRKPRDINF) command and press the Enter key.
2. Press the Enter key after reading the Request for IBM Product Information display.
3. Type your account number, your user ID, and password on the Welcome display and press the Enter key.

4. A 3279 emulation display is shown. You are now connected to IBMLink. Easy-to-use menus guide you to specific areas of interest about IBM products and services.

   Note: If the previous session is active, you will see a display that says you are reconnected. You must type a `b` and press the Enter key.

Using Technical Information Exchange (TIE)

Technical information exchange allows you to exchange files with your market support system.

To start a technical information exchange session:

1. Enter the Work with Technical Information Exchange (WRKTIE) command and press F4 (Prompt).
2. Specify your IBMLink user ID and password for the User ID (SPTUSRID) and Password (SPTPWD) parameters on the Work with TIE (WRKTIE) display.

   If your IBMLink account number is properly entered in the AS/400 support contact information on your system, specify *RTV for the Account number (ACCOUNT) parameter and the number will be retrieved for you.

   You can also type the IBMLink account number found on the *User Information* sheet in your *AS/400 Welcome Packet* after the account number prompt.
3. Press the Enter key.

   When connection to the IBM support system is complete, the Start Technical Information Exchange (TIE) menu appears.

Your IBMLink user ID is associated with a special IBMLink Information Exchange mailbox. You can save a file on your IBMLink personal storage disk and transfer it to this special mailbox and then to your AS/400 system.

After the file arrives in the mailbox, use technical information exchange to receive that file on your AS/400 system.

You can also send a file that you create on your AS/400 through the mailbox to your in-basket on IBMLink or to someone in your local IBM branch office.

Receiving a File Using Technical Information Exchange

To send a request to see if any files are in your IBMLink mailbox:

1. Enter the Work with Technical Information Exchange (WRKTIE) command and press F4 (Prompt).
2. Specify your user ID, password, and account number for the corresponding parameters on the Work with TIE (WRKTIE) display and press the Enter key.
3. Select the option to look for files on the Start Technical Information Exchange menu.

   If no files are present, the message `No files to receive` appears. If files are present in your mailbox, a message displaying the total bytes is shown.
4. Select the option to receive a file if files are present.
5. Type the following information in the corresponding fields on the Receive TIE Files display and press the Enter key:

Library	Library name
File Type	*ALL
Output	*
Maximum records	10000

The file transfer process begins. Depending on the number and size of the files, it may take some time to send the data to your AS/400 system.

The Process Received Files display appears when all requested files are received on your AS/400 system. If you receive more than one file, each file is listed. You now decide if you want to keep the files you just received.

6. Press F3 (Exit) on the Process Received Files display to keep the files you just received.

   If you do not want to keep a file you just received, use option 4 (Delete) for the file you want to erase.

   Note: Once you receive a file on your AS/400 system, it is automatically deleted from your IBMLink mailbox. It remains on your IBMLink personal storage disk until you delete it using the LISTFILE option 4 (Delete) while signed on to IBMLink.

7. Press F3 (Exit). The technical information exchange session is ended and an AS/400 system menu is displayed.

Sending a File Using Technical Information Exchange

You may have information stored on your AS/400 system that you want to send to your local IBM branch office. If your IBM account team has told you what node and user ID to enter for this purpose, you can use technical information exchange to transfer files.

On the Work with TIE (WRKTIE) menu, sign on to technical information exchange, following the steps outlined in "Using Technical Information Exchange (TIE)" on page 10-7.

1. Select the option to send a file on the Start Technical Information Exchange (TIE) menu.
2. Specify the information describing the file you want to send for the File, Library, and Member parameters on the Send TIE File (SNDTIEF) display.
3. Type the user ID and node of the person you want to send the file to.

   You can change the name of the file with the To file (TOFILE) parameter. The person who receives the file sees the new name you assign to the file.

4. Press the Enter key after you type all requested information on this display.

   The file is sent to the special IBMLink mailbox and then to the person you named by user identifier and node.

5. Press F3 (Exit) to end the technical information exchange session.

Note: You must know a recognized user ID and node (system name) so that your file can be delivered. If the file cannot be delivered, a message is returned to your IBMLink mailbox.

If a recipient does not receive a file you send:

1. Select the option to look for files on the Start Technical Information Exchange (TIE) display.

2. Select the option to receive a file if files are present.
3. The message `File name not delivered` is displayed if a file you sent has not been delivered. Place the cursor on this message and press the Help key to show the full text of the message.
4. Verify that you have entered the correct user ID and node.

   If the node and user ID you entered are correct, call the IBMLink customer assistance number listed on your *User Information* sheet for help.

Changing Your Default Service Support Contact Information

To permanently change your default service support contact information:

1. Use the Work with Contact Information (WRKCNTINF) command.
2. Select option 2 (Work with local service information) on the Work with Support Contact Information display.
3. Select option 2 (Change service contact information) on the Work with Service Information display.
4. Type your changes on the Change Service Contact Information display and press the Enter key.

   The Work with Service Information display is shown again with this message: `Support contact information updated.`

You can also change the QTIPHONE program to include the numbers for marketing support. Then when you call this program, the numbers will be automatically dialed for you.

Chapter 11. Managing Your AS/400 System Operations

The AS/400 system is designed to run with very little intervention by a system operator. However, there are some tasks you can do to keep your system running smoothly. You can check up on your system. **Checking up** refers to watching how the system is running, looking for problem areas, and responding to messages.

You can also clean up your system. **Cleaning up** consists of keeping the system free of unnecessary clutter so that it runs efficiently and objects are easier to find.

Checking Up on Your System

It is a good idea to give your system a quick checkup several times during the day. If your system runs during the night, make a list of things to review in the morning. If you have periods of heavy activity during the day, check frequently during those periods to make sure everything is running well.

Checking for Messages

To check the system operator message queue for messages requiring a response, type `dspmsg qsysopr` on any command line and press the Enter key. The Work with Messages display for the system operator message queue (QSYSOPR) is shown. The messages needing a reply are at the top of the display.

Note: If you see the Display Messages display instead, switch to basic assistance level by pressing F21 (Select assistance level) to see the Work with Messages (WRKMSG) display.

To have the system operator messages interrupt you, type:

```
CHGMSGQ MSGQ(QSYSOPR) DLVRY(*BREAK)
```

on any command line and press the Enter key.

To check the QSYSMSG message queue for critical system messages that indicate a potentially severe system condition, type `dspmsg qsysmsg` on any command line and press the Enter Key. The Work with Messages display for the QSYSMSG message queue is shown.

Note: If you are using a break-handling program to monitor messages sent to the QSYSMSG message queue, you cannot view the QSYSMSG message queue.

See "Handling Important System Messages in the QSYSMSG Message Queue" on page 6-10 for more information about creating and monitoring the QSYSMSG message queue.

See Chapter 6, "Handling Messages" for complete information about monitoring for and responding to messages.

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Checking on Jobs

To check for jobs that may be causing problems:

1. Select option 2 (Work with jobs) on the Operational Assistant (ASSIST) menu.
2. Press F14 (Select other jobs) on the Work with Jobs display.
3. Type the status values as shown in Figure 11-1 in the Select Other Jobs window.

```
                              Work with Jobs
:.............................................................................:
:                           Select Other Jobs                                 :
:                                                                             :
:  Select the following jobs for the list.                                    :
:                                                                             :
:  Type choices below, then press Enter.                                      :
:                                                                             :
:    User . . . . . . . . . . . . .  *ALL_____    Name, *ALL, F4 for list     :
:    Status:                                                                  :
:      Message waiting  . . . . . .  Y            Y=Yes, N=No                 :
:      Running  . . . . . . . . . .  N            Y=Yes, N=No                 :
:      Running job held . . . . . .  Y            Y=Yes, N=No                 :
:      Ending . . . . . . . . . . .  N            Y=Yes, N=No                 :
:      Waiting to run/Scheduled . .  N            Y=Yes, N=No                 :
:      Held . . . . . . . . . . . .  Y            Y=Yes, N=No                 :
:      Job queue held . . . . . . .  Y            Y=Yes, N=No                 :
:      Queue not assigned . . . . .  Y            Y=Yes, N=No                 :
:      Printer output . . . . . . .  N            Y=Yes, N=No                 :
:                                                                             :
:                                                                             :
:  F1=Help   F5=Refresh   F12=Cancel                                          :
:                                                                             :
:.............................................................................:
```

Figure 11-1. Select Other Jobs Window

4. Press the Enter key. The Work with Jobs display is shown again with those jobs that might require your attention.

Looking at All Active Jobs on the System

The Work with Active Jobs display shows you information about every job that is running in your system.

Note: To find information on batch jobs only, use option 2 (Work with jobs) on the Operational Assistant (ASSIST) menu. To find information on interactive jobs only, use option 12 (Work with Signed-On Users) on the Manage Your System, Users, and Devices (MANAGESYS) menu.

Performance Note

It requires significant system resources to build the information in the Work with Active Jobs display, particularly if many jobs are on your system. Use it sparingly.

1. Use the Work with Active Jobs (WRKACTJOB) command. Figure 11-2 on page 11-3 shows the Work with Active Jobs display.

```
                          Work with Active Jobs                    SYSTEM01
                                                          01/21/92  08:26:38
CPU %:   25.2     Elapsed time:   00:10:58     Active jobs:   77

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

Opt  Subsystem/Job  User        Type  CPU %  Function        Status
__   QCTL           QSYS        SBS      .0                 DEQW
__     QSYSSCD      QPGMR       BCH      .0  PGM-QEZSCNEP   EVTW
__   QINTER         QSYS        SBS      .0                 DEQW
__     CEMADDENS2   CEMADDEN    INT      .0  *  -CMDENT     DSPW
__     DSP010201    USER        INT     1.5  CMD-STREDU     DSPW
__     DSP020605    LKC         INT     3.7  *  -CMDENT     DSPW
__     DSP020704    JSMITH      INT      .0  MNU-MAIN       DSPW
__     DSMOTHERS1   DSMOTHER    INT      .0  MNU-ASSIST     DSPW
__     FALKELS1     FALKEL      INT      .0  *  -CMDENT     DSPW
                                                                More...
Parameters or command
===>
F3=Exit      F5=Refresh   F10=Restart statistics   F11=Display elapsed data
F12=Cancel   F23=More options   F24=More keys
```

Figure 11-2. Work with Active Jobs Display - Status

2. To display information about elapsed data, press F11 (Display elapsed data). Figure 11-3 shows the Work with Active Jobs display.

```
                          Work with Active Jobs                    SYSTEM01
                                                          01/21/92  08:26:38
CPU %:   25.2     Elapsed time:   00:10:58     Active jobs:   77

Type options, press Enter.
  2=Change   3=Hold   4=End   5=Work with   6=Release   7=Display message
  8=Work with spooled files   13=Disconnect ...
                                          --------Elapsed---------
Opt  Subsystem/Job  Type  Pool  Pty     CPU  Int   Rsp  AuxIO  CPU %
__   QCTL           SBS      2    0     1.0                0     .0
__     QSYSSCD      BCH      2   10      .1                0     .0
__   QINTER         SBS      2    0     5.2               101    .0
__     CEMADDENS2   INT      4   20      .3    0    .0      0     .0
__     DSP010201    INT      4   20    10.2  102    .1     25    1.5
__     DSP020605    INT      4   20    25.0   19   3.5   1461    3.7
__     DSP020704    INT      4   20      .4   10    .3     70     .0
__     DSMOTHERS1   INT      4   20      .1    0    .0      0     .0
__     FALKELS1     INT      4   20      .9    0    .0      0     .0
                                                                More...
Parameters or command
===>
F3=Exit      F5=Refresh         F10=Restart statistics   F11=Display status
F12=Cancel   F23=More options   F24=More keys
```

Figure 11-3. Work with Active Jobs Display - Elapsed Data

You can use these displays to observe the overall performance of your system by pressing F5 (Refresh). For more information on observing performance and doing basic system tuning, see "Performance Tuning" on page 11-51.

You can also use this display to locate a job that is having a problem. For example, if you notice that your system response time is much worse than usual, perhaps a job on your system is in a loop or is logging many errors. Look first for any jobs that have messages, using the Work with Jobs display. However, this kind of problem does not always cause an error message.

To use the *CPU %* column on the Work with Active Jobs display to help you find a job with a problem, start with the status version of the display (Figure 11-2).

1. Press F10 (Restart statistics) to restart the calculation of statistics and wait approximately one minute.
2. Press F5 (Refresh) to update the data on the display. Look for a job whose processing unit (CPU) percentage is significantly higher than the other jobs on the system.
3. Press F11 (Display status) to look at the Elapsed data version of the display. Look for a job that has a high processing unit (CPU) percentage and high numbers in the *AuxIO* column.

   Note: High values in these fields are not necessarily abnormal. If only a few jobs are on your system, these fields are not a reliable signal of problems. Also, you may run some jobs that normally require a great deal of system resource. As you use this display, you will become familiar with the normal limits for your own system.
4. Use option 5 (Work with) for the job to display detailed information about the job. See Chapter 4, "Controlling Jobs" for more information on working with jobs.

Checking on Printer Output and Printers

To check on printer output:

1. Select option 1 (Work with printer output) on the Operational Assistant (ASSIST) menu.
2. On the Work with Printer Output display, press F14 (Select other printer output).
3. On the Select Other Printer Output display, type in the fields on the display as shown in Figure 11-4.

```
                          Work with Printer Output

.....................................................................
:                       Select Other Printer Output                 :
:                                                                   :
: Select the following printer output for the list.                 :
:                                                                   :
:                                                                   :
: Type choices below, then press Enter.                             :
:                                                                   :
:   User    . . . . . .   *ALL_____   Name, *ALL, F4 for list       :
:                                                                   :
:   Printer . . . . . .   *ALL_____   Name, *ALL, F4 for list       :
:                                                                   :
:   Status  . . . . . .   2           1=All statuses                :
:                                     2=Statuses requiring action   :
:                                                                   :
:   Output  . . . . . .   *ALL_____   Name, *ALL                    :
:                                                                   :
:                                                                   :
: F1=Help   F5=Refresh   F12=Cancel                                 :
:                                                                   :
:...................................................................:
```

Figure 11-4. Select Other Printer Output Display

4. Press the Enter key. The Work with Printer Output display is shown again with the printer output that might require your intervention.

To check on printers:

1. On the Work with Printer Output display, press F22 (Work with printers).

   Note: If F6 (Include all printers) is displayed at the bottom of your display, press F6 to include all of the printers on the system.

2. On the Work with Printers display, check the status of each printer for messages or to see if it needs to be started.

Checking Devices

To check on the status of display devices:

1. Select option 1 (Work with display devices) on the Device Status Tasks (DEVICESTS) menu.
2. On the Work with Display Devices display, look for the devices with an `Unavailable` status.
3. Select the options to make any unavailable display available.

Follow the same procedure to look at the status of your printers, tape and diskette devices. See Chapter 7, "Working with Devices and Communications" for more information about managing your devices.

Checking Communications Status

If your AS/400 system communicates with remote computer systems or work stations, you should check on the status of communications periodically during the day. If your system runs during the night, communications status should be included on your list of things to check when you arrive in the morning. If you power your system on or do an IPL, check to make sure that your communications lines and controllers have successfully varied on.

You can use the Configuration Status displays to check your lines and controllers:

1. Use the Work with Configuration Status (WRKCFGSTS) command and specify *LIN for the Type (CFGTYPE) parameter. Figure 11-5 on page 11-6 shows the Work with Configuration Status display with the status of all the communications lines.

```
                      Work with Configuration Status                SYSTEM01
                                                          11/06/92  14:17:25
Position to . . . . .  _________   Starting characters

Type options, press Enter.
  1=Vary on   2=Vary off   5=Work with job   8=Work with description
  9=Display mode status ...

Opt  Description       Status               -------------Job--------------
  _   ALINETH1         VARIED OFF
  _   CAROL            VARIED OFF
  _     CAROL          VARIED OFF
  _   ELF              VARIED OFF
  _   ETHERNET1        VARIED OFF
  _   ETHLINE          VARIED OFF
  _   ETHNET           VARIED OFF
  _   FULBERT          VARIED OFF
  _   HOSTLINE         ACTIVE
                                                                      More...
Parameters or command
===> ____________________________________________________________________
F3=Exit   F4=Prompt   F11=Display types   F12=Cancel   F23=More options
F24=More keys
Intermediate assistance level used.
```

Figure 11-5. Work with Configuration Status Display

2. Check the status of each line on the system. Take any action necessary to correct problem situations.
3. Use the Work with Configuration Status command specifying *CTL for the Type (CFGTYPE) parameter.
4. On the Work with Configuration Status display for controllers, check the status of each controller on the system. Take any action necessary to correct problem situations.

See Chapter 7, "Working with Devices and Communications" for additional information about working with devices.

Checking for Communications Errors

To check for possible errors on a communications line:

- Check the system operator message queue (QSYSOPR) regularly for any communications messages. If you have more than one line and controller, keep a record of which ones are affected by the errors.
- Check the history log (QHST) for communications error messages. Some error recovery causes messages to be logged to QHST, even though QSYSOPR is not notified.
- Adjust the recovery limit (CMNRCYLMT) for the line to specify how many errors occur before you are notified. Use the Change Line Description (CHGLIND) command to change the recovery limit.
- Adjust the **threshold** parameters in the line description. These parameters control how many automatic error recoveries you are allowed before a message is sent to the system operator (QSYSOPR). Use the Change Line Description (CHGLIND) command to change the error thresholds.
- Collect communications performance data using the Start Performance Monitor (STRPFRMON) and End Performance Monitor (ENDPFRMON) commands. The communications performance data includes detailed information about how

much data is transmitted without errors compared to how much data requires retransmitting.

Use your own application program or the Performance Tools/400 licensed program to analyze the information you collect.

Additional Reading: See the error recovery section of the *Communications Management Guide* for more information about automatic recovery and line description parameters. See the *Work Management Guide* for more information about collecting and analyzing communications performance information.

Checking Distribution Queues

If you use Systems Network Architecture distribution services (SNADS) to distribute information between your system and other systems in your network, check the status of your distribution queues periodically.

To check distribution queues:

1. Use the Work with Distribution Queues (WRKDSTQ) command. Figure 11-6 shows the Work with Distribution Queues display:

```
                        Work with Distribution Queues

Type options, press Enter.
  2=Send queue  3=Hold queue  5=Work with queue entries
  6=Release queue  7=Reroute queue


                     Queue      -----Send Time------  -Queue Depth-
Opt  Queue Name      Priority   From     To    Force  Send  Current  Status
 _   SYSTEM01        Normal       :   -   :      :      1      0     Ready
 _   SYSTEM02        High         :   -   :      :      1      0     Ready
 _   SYSTEM03        Normal       :   -   :      :      1      0     Ready
 _   SYSTEM04        High         :   -   :      :      1      0     Ready
 _   SYSTEM05        Normal       :   -   :      :      1      0     Ready
 _   SYSTEM06        High         :   -   :      :      1      0     Ready
 _   SYSTGAT1        Normal       :   -   :      :      1      1     Sending
 _   SYSTGAT2        High         :   -   :      :      1      0     Ready




F3=Exit      F5=Refresh         F10=Configure distribution queues
F12=Cancel
```

Figure 11-6. Work with Distribution Queues Display

2. Check the *Status* column to make sure each queue is ready. If a queue is not ready or sending, release it using F6 (Release queue).
3. Check the *Queue Depth* columns to see at what depth the queue should be sent and how many items are currently on the queue. If you think the queue has enough objects to send, use option 2 (Send queue).

Additional Reading: For more information about how to manage distribution queues, see the *Distribution Services Network Guide*.

Working with Alerts

If your system is part of a network, you can use OS/400 alert support to inform the network operator at the central AS/400 system of problems that occur on other systems in the network. An alert is an SNA-architected message that is automatically sent from any system in the network to the system designated as the problem management focal point.

The basic function of an alert is to provide a network operator with:

- Notification of an actual or impending loss of availability of a resource.
- As much problem analysis data as is available about the problem underlying this actual or impending loss.

An alert summarizes the nature of the problem and gives the network operator guidance on corrective actions. For those problems that a network operator cannot correct, the alert provides information that a specialist can use to isolate the source of the problem.

An alert is created whenever an **alertable message** is sent to the local system operator. An alertable message is any message that has a value other than *NO for the Alert option parameter of the message description. Some IBM-supplied OS/400 messages are pre-defined as alertable. You can define others by using the Change Message Description (CHGMSGD) command. You can also create and define your own application messages as alertable.

In addition to having alerts sent to the system operator at the central system, you can also have alerts logged at either the local system, the central system, or both. Use the Alert logging status (ALRLOGSTS) parameter on the Change Network Attributes (CHGNETA) command to specify whether you want alerts logged.

Use the Work with Alerts (WRKALR) command to display alerts that have been logged. You can specify the time period and type of alerts to see.

Additional Reading: For more information about alert support, see the *Alerts and DSNX Guide*.

Checking Disk Space Storage

You can set up a batch job which collects information on how the disk space is being used on your AS/400 system and answer the following questions:

- How is my disk space distributed among libraries on the system?
- Which libraries are active?
- How much space is allowed for different objects?

Besides answering these questions, you can also:

- Analyze how the system uses its disk storage.
- Gather input for analysis to help reduce the amount of storage used by less critical system functions.
- See how disk space is growing compared to the previous report.

Once the information has been collected, you can print a customized report of the information you have collected. After reviewing the report, you can determine

where disk space is being used unnecessarily and make adjustments to your system by working with libraries, folders, and objects.

You need to determine your system use to know when and how often to collect disk space information. You could run a collection once a week or once a month during a time when the system is not busy. By running the collection at the same time each week or month, you will receive consistent information.

All of these activities can be done from the Disk Space Tasks (DISKTASKS) menu. To find this menu, type `go disktasks` on any command line and press the Enter key.

Security Consideration

To collect information about disk space usage, you must have all object (*ALLOBJ) authority, security officer (*SECOFR) user type, and be enrolled in the system directory.

Collecting Disk Space Information

To set up a batch job which collects information about disk space on your system:

1. Type `go disktasks` on any command line and press the Enter key.
2. Select option 1 (Collect disk space information) on the Disk Space Tasks (DISKTASKS) menu.

You can also use the Retrieve Disk Information (RTVDSKINF) command to collect disk space information. Figure 11-7 shows the Collect Disk Space Information display.

```
                      Collect Disk Space Information              SYSTEM01
                                                          05/17/92  14:00:00

Information collected . . . . . . . . . . . . :   05/15/92  23:00:00

A job will be submitted to collect disk space information.  This job may
take several hours to complete, depending on the size of your system.

Type choice below, then press Enter.

  When to collect information . . . . . . . . .  _   1=Date/time
                                                     2=Weekly
                                                     3=Monthly









F1=Help   F3=Exit   F12=Cancel
```

Figure 11-7. Collect Disk Space Information Display

Scheduling Information Collection: There are three ways you can schedule a batch job to collect your disk space information: a specific date and time, weekly, or monthly.

Note: Because the batch job cannot collect sizes of information on objects in use, do not schedule the collection to run when the system is in heavy use. If you include all of the objects in a report and objects are in use or damaged, the report identifies them as shown in Figure 11-8 on page 11-10.

```
                          Disk Space Report
                    Library and Objects Information

Library/                                % of     Size in      Last       Last
  Object     Type     Owner             Library  1000 Bytes   Change     Use        Description

QDOC         *LIB     FARLEY                        122.7     10/03/91   01/24/92   My Library
  ODDATA     *FLR                       00.00        00.0                           LOCKED
  EVEDATA    *FLR                       00.00        00.0                           DAMAGED
    .          .          .                            .          .          .          .
    .          .          .                            .          .          .          .
    .          .          .                            .          .          .          .
```

Figure 11-8. Library and Objects Disk Space Information Report with Objects in Use and Damaged Objects

The *% of Library* and *Size in 1000 Bytes* columns show zero for objects that are damaged or in use, although their sizes are actually larger. The *Owner*, *Last Change*, and *Last Use* columns are blank.

- **Specific date and time**

  To set up a specific date and time to collect disk space information, select option 1 (Date/time) on the Collect Disk Space Information display. In the Collect Information on Date/Time window, type the date or use *CURRENT for the current date in the *Date* field. In the *Time* field, type the time (in a 24-hour clock format) or *CURRENT to collect information immediately.

- **Weekly**

  To set up a specific day and time each week to run a batch job that collects the disk space information, select option 2 (Weekly) on the Collect Disk Space Information display. In the Collect Information Weekly window, specify the day of the week and time (in a 24-hour clock format).

- **Monthly**

  To set up a specific day and time each month to collect disk space information, select option 3 (Monthly) on the Collect Disk Space Information display. In the Collect Information Monthly window, specify the day of the week, occurrence of that day in the month, and time (in a 24-hour clock format).

  When 5 (Last) is selected for the *Occurrence of day in month* field, the collection runs during the fourth week of the month when the day occurs only four times that month, and during the fifth week of the month when the day occurs five times that month.

To find out when disk space collection has finished, use option 2 (Work with jobs) on the Operational Assistant (ASSIST) menu. Look for the status of Ending for job QEZDKWKMTH (for a collection scheduled weekly or monthly) or QEZDKSPDT (for a collection scheduled on a specific date/time). After disk space information is collected, it is stored in the QAEZDISK data file in the QUSRSYS library. Each time disk space information is collected, the data in this file is overlaid with the most recent data. If you want to keep the collection data for later comparison, save this

file. For information on the specific fields in this file, see "Disk Space Data Output Files" on page D-1.

Notes:

1. The values shown in the Collect Information windows are the current values and can be changed anytime. To cancel any collection, blank out all of the information from the entry fields in the window.
2. You can schedule weekly or monthly data collection, but not both. You may, however, schedule a weekly collection with a specific date and time or a monthly collection with a specific date and time.
3. Jobs that miss their scheduled time because the system is powered down or in a restricted state are not run when you do an IPL or when the system is no longer in a restricted state. These circumstances will not affect future scheduled jobs.

Warning: The system job schedule function is used to schedule the collection of disk space information. The entry names for scheduling the collection are QEZDKSPDT (for scheduling a specific date/time) and QEZDKWKMTH (for scheduling weekly or monthly). Do not change these entries using the job scheduling commands.

Printing Disk Space Information Reports

After you have collected the disk space information, you can print the information you have collected in a customized report format. You can select the type of information that you want your reports to contain, the detail of the information in the reports, and how you want the information sorted.

Important Note

Depending on the report type (all objects in particular), it may take several hours to generate a report. System performance may be degraded. Also, do not print disk information reports when the system is being used heavily.

To print disk space information:

1. Type `go disktasks` on any command line and press the Enter key.
2. Select option 2 (Print disk space information) on the Disk Space Tasks (DISKTASKS) menu. Figure 11-9 on page 11-12 shows the Print Disk Space Information display.

```
                          Print Disk Space Information                SYSTEM01
                                                              04/30/92  14:02:31
Information collected . . . . . :   03/04/97  16:21:27


Select one type of report below, then press Enter.
  1=Select

Opt     Type of Report
 _      Library
 _      Folder
 _      Owner
 _      Specific object
 _      System summary information
```

Figure 11-9. Print Disk Information Display

On the Print Disk Space Information display, select one of the following report types: library, folder, owner, specific object, or system summary information.

Note: Your printer output is placed in the output queue that is associated with your job. The output is stored under file name QPEZDISK.

For information on how to interpret the reports you receive, see "Interpreting Disk Space Information Reports" on page 11-24.

Printing System Summary Information

System summary information is on the first page of the library, folder, owner, and specific object report types, or can be printed alone by selecting the system summary information report type on the Print Disk Space Information display. The objects on your system are grouped into categories, and the system summary information provides you with the percentage of disk space being taken up by these categories.

The total percentage for the % *of Disk* column on the system summary information report may be slightly above 100 due to the way the system calculates and rounds the sizes and percentages. Some of the items may vary in size, depending on how you use your system. When included with a report type, the system summary information also includes the customize options you selected to produce the report.

Figure 11-10 on page 11-13 shows an example of system summary information. The start time is shown in the *Information collected* field. To find out what is included in each category, see Table 11-1 on page 11-24.

Disk Space Report
System Information

Information collected . . . . . : 01/23/92 01:12:10
Total disk space on system in 1,000,000 bytes . . : 1272
Main storage size in megabytes . . . . . : 16
Machine type-model . . . . . : 9404-B20
System serial number . . . . . : 10-10248

Description	% of Disk	Size in 1,000,000 bytes
User libraries	4.55	57.83
Folders and documents	1.26	16.05
QSYS	19.55	248.71
Other IBM libraries	24.28	308.87
Licensed Internal Code	7.69	97.81
Temporary space	1.91	24.31
Unused space	38.29	486.99
Internal objects	.85	10.76
Objects not in a library	.58	7.43
TOTAL	98.96	1258.76

Figure 11-10. System Information Disk Space Information Report

Figure 11-11 on page 11-14 shows more items and how much disk space they are using. This report shows the items of interest on the system.

Disk Space Report
System Information

Description	% of Disk	Size in 1,000,000 bytes
OS/400 items reported:		
History files	.40	5.13
Journal receivers	.10	1.21
User profiles	.33	4.19
Configuration information	.09	1.15
System help (QHLPSYS)	1.82	23.20
Calendars	.04	.47
Directories	.10	1.30
Document files	.06	.81
Office Vision/400 items reported:		
Enrollment	.00	.06
Mail files	.01	.13
Text search	.03	.44
Personal directories	.02	.22
Licensed Internal Code:		
LIC and tables	5.84	74.27
Dump space	1.32	16.78
Error logs	.02	.20
Trace tables	.01	.13
VLIC logs	.25	3.15
VLIC control blocks	.26	3.28
Space used by internal objects:		
Additional configuration information	.03	.33
Communications	.01	.13
Database	.03	.32
Manage jobs	.23	2.95
Monitor performance	.00	.00
Folders	.00	.06
Mail	.01	.07
OS/400	.28	3.60
S/36 Environment	.01	.13
Security	.03	.34
SNADS and object distribution	.19	2.43
Spool	.01	.09
Cross component	.00	.06
Product installation	.01	.17
Recovery of information	.00	.01
Obsolete	.00	.00
Miscellaneous items reported:		
Printer output & Spooling (QSPL)	1.72	21.82
Replaced object library (QRPLOBJ)	.00	.01
Storage affected by RCLSTG	.00	.01
Reclaim storage library (QRCL)	.00	.00

Figure 11-11. System Information Disk Space Information Report

Printing a Library Information Report

You can print a report that contains library name, owner, description, size, dates when last used and changed, and the percentage of disk space or percentage of library being used.

To print a library report:

1. Type `go disktasks` on any command line and press the Enter key.
2. Select option 2 (Print disk space information) on the Disk Space Tasks display.
3. Select the library report type on the Print Disk Information display.
4. Press the Enter key to display more fields on the Customize Library Report display as shown in Figure 11-12.

   Notes:

   a. You can also use the Print Disk Information (PRTDSKINF) command and specify *LIB for the Type of report (RPTTYPE) parameter.

   b. If you want to print a more detailed report that includes specific information about the objects in the libraries, see "Printing a Library and Objects Information Report" on page 11-16.

```
                          Customize Library Report                SYSTEM01
                                                        05/17/92  14:00:00

Information collected . . . . . :  05/15/92  23:00:00

Type choices below, then press Enter.

  Include information about objects
    in libraries  . . . . . .  .   N            Y=Yes, N=No

  Libraries to include:
    Libraries . . . . . .  . . .   *ALL         Name, generic*, *ALL

    Size of smallest library  . . . . .  4      Size in 1000 bytes
                                                (1=1000)

                                                                  More...
F1=Help    F3=Exit    F5=Refresh    F12=Cancel
```

Figure 11-12. Customize Library Report Display

5. Fill in the following fields to customize your report:

Library Name: For a single library, type the library name; for a group of libraries, type the first few characters of the library name followed by an asterisk (*); and for all libraries, type `*all`.

Size of Smallest Library: Type the minimum size (in thousands of bytes) of the libraries you want shown in the report. For example, if you want to include only those libraries that are greater than 4 000 bytes, type a `4` in the field.

Press the Page Down key. The rest of the Customize Library Report display is shown in Figure 11-13 on page 11-16.

```
                          Customize Library Report                SYSTEM01
                                                          05/17/92  14:00:00
Information collected for report . . . :  05/15/92  23:00:00

  Sort by . . . . . . . . . . . . . . .  1          1=Size
                                                    2=Owner name
                                                    3=Date last changed
                                                    4=Date last used
                                                    5=Library name
```

Figure 11-13. Customize Library Report Display – Sort by Field

Sort by: On this display, select how you want the report sorted: by size, owner name, date last changed, date last used, or library name.

Figure 11-14 shows an example of a library information report:

```
                              Disk Space Report
                             Library Information

                      % of     Size in      Last       Last
Library    Owner      Disk     1000 Bytes   Change     Use        Description

QSYS       QSYS      19.56      248711.2   01/09/92   01/09/92   System Library
QHLPSYS    QSYS       1.82       23200.8   12/21/91   01/03/92   Q&A database file
GRPLIB     FULTON      .44        5635.6   12/21/91   01/09/92   Group library
RPGLIB     QSECOFR     .21        2676.7   12/20/91   01/06/92   File for RPG source
TESTLIB    BROWN       .10        1232.9   11/20/91   12/21/91   Test library
*NOLIBRARY                        1000.3
 .          .                        .          .          .          .
 .          .                        .          .          .          .
SAVLIB     LUTHER      .00          10.8   10/09/91   01/07/92   Output for DSPOBJD


TOTAL                            640476.4
```

Figure 11-14. Library Disk Space Information Report

Note: *NOLIBRARY is a general name given to those objects that do not have a library address. The size of *NOLIBRARY is determined by the number of unassigned objects in *NOLIBRARY. *NOLIBRARY is not a real library and cannot be used as one.

Printing a Library and Objects Information Report

To print information about objects in libraries,

1. Type `go disktasks` on any command line and press the Enter key.
2. Select option 2 (Print disk space information) on the Disk Space Tasks display.
3. Select the library report type on the Print Disk Information display.
4. Press the Enter key to display more fields on the Customize Library Report display as shown in Figure 11-12 on page 11-15.

5. Type a Y in the first field on the Customize Library Report display and press the Enter key. Additional fields that allow you to specify object criteria are shown in Figure 11-15 on page 11-17.

```
                          Customize Library Report              SYSTEM01
                                                          05/17/92  14:00:00

Information collected . . . . . . . . :  05/15/92  23:00:00

Type choices below, then press Enter.

  Include information about objects
    in libraries . . . . . . . . . . .  Y         Y=Yes, N=No

  Libraries and objects to include:
    Libraries . . . . . . . . . . . .  *ALL_____   Name, generic*, *ALL

    Objects . . . . . . . . . . . . .  *ALL_____   Name, generic*, *ALL
      Object type . . . . . . . . . .  *ALL_____   Name, *ALL
                                       _________
                                       _________
                                       _________

    Size of smallest object . . . . . .  4_____   Size in 1000 bytes
                                                   (1=1000)

                                                                   More...
F1=Help   F3=Exit   F5=Refresh   F12=Cancel
```

Figure 11-15. Customize Library Report Display - Including Information about Objects

On this display, include information about the objects in the libraries, such as the object name, object type, and size of the smallest object in thousands of bytes. Specifying the size of the smallest object eliminates very small objects from cluttering up your report.

Figure 11-16 shows an example of a library and objects information report.

```
                          Disk Space Report
                    Library and Objects Information

Library/                              % of     Size in      Last       Last
  Object     Type     Owner           Library  1000 Bytes   Change     Use        Description

RUPPORT      *LIB     QSYSOPR                    122.7      10/03/91   01/24/92   AS/400 Tools
  DELETE     *PGM     QSYSOPR          40.90      50.2      02/28/91   01/10/92   Delete program
    .          .        .                .         .          .          .          .
    .          .        .                .         .          .          .          .
    .          .        .                .         .          .          .          .
  CALC       *PGM     QSYSOPR          28.50      35.0      01/05/91   10/03/92   Calculator
  SCRUNCH    *PGM     QSYSOPR          13.60      16.7      03/01/91   01/24/92   Compression tool
MHRT         *LIB     MRHT                        37.5      01/10/92   01/23/92   Production library
  MMSGQ      *MSGQ    MRHT             41.06      15.4      05/31/91   01/10/92   MHRT message queue
  MJOBQ      *JOBQ    MRHT             28.85      10.1      02/28/91   01/12/92   MHRT job queue
  MPRT       *FILE    QSYSOPR          16.00       6.0      10/12/90   10/12/90   MHRT printer output

TOTAL                                          236250.0
```

Figure 11-16. Library and Objects Disk Space Information Report

Printing a Folder Information Report

You can print a report that contains folder name, owner, size, dates when changed, and the percentage of disk space or percentage of folder being used.

To print a folder report:

1. Select the folder report type on the Print Disk Information display.
2. Press the Enter key to display more fields on the Customize Folder Report display shown in Figure 11-17.

   Note: If you want to print a more detailed report which includes specific information about the documents in the folders, see "Printing a Folder and Document Information Report" on page 11-19.

```
                          Customize Folder Report                SYSTEM01
                                                          05/17/92  14:00:00

Information collected . . . . . :  05/15/92  23:00:00

Type choices below, then press Enter.

  Include information about documents
    in folders . . . . . .  N              Y=Yes, N=No

  Folders to include:
    Folders . . . . . .  *ALL_____         Name, generic*, *ALL

    Size of smallest folder . . . . . .  4____   Size in 1000 bytes
                                                  (1=1000)

  Sort by . . . . . .  1                   1=Size
                                           2=Owner name
                                           3=Date last changed
                                           4=Folder name


F1=Help   F3=Exit   F5=Refresh   F12=Cancel
```

Figure 11-17. Customize Folder Report Display

3. Fill in the following fields to customize your report:

Folder Name: For a single folder, type the folder name; for a group of folders, type the first few characters of the folder name followed by an asterisk (*); and for all folders, type `*all`.

Size of Smallest Folder: Type the minimum size (in thousands of bytes) of the folders you want shown in the report. For example, if you want to only include those folders that are greater than 4 000 bytes, type a `4` in the field.

Sort by: Select how you want the report sorted: by size, owner name, date last changed, or folder name.

Figure 11-18 on page 11-19 shows an example of a folder information report.

```
                                Disk Space Report
                              Folder  Information

                          % of      Size in       Last
Folder      Owner         Disk      1000 Bytes    Change        Folder Path

PAPER       SUZZY          .12          1521.2   01/04/92      S Folders
CMC         QSECOFR        .00            16.4   12/31/92      Tools
FLR1        QSYSOPR        .00             8.2   01/24/92
FLR2        GUY            .00             4.1   10/04/92
FLRA        RODNEY         .00             4.1   12/20/92
*NOFOLDER                                1000.3
 .            .                             .       .
 .            .                             .       .
ZAPPER      OBRIEN         .00             4.1   09/25/92


TOTAL                                    2177.0
```

Figure 11-18. Folder Disk Space Information Report

Note: *NOFOLDER is the general name given to those objects that do not have a folder address. The size of *NOFOLDER is determined by the number of unassigned objects in *NOFOLDER. *NOFOLDER is not a real folder and cannot be used as one.

Printing a Folder and Document Information Report

To include information about documents in folders in your report, type a Y in the first field on the Customize Folder Report display and press the Enter key. The additional fields that appear on the Customize Folder Report display are shown as in Figure 11-19.

```
                          Customize Folder Report                SYSTEM01
                                                          05/17/92  14:00:00

Information collected . . . . . :  05/15/92  23:00:00

Type choices below, then press Enter.

  Include information about documents
    in folders . . . . . .  Y              Y=Yes, N=No

  Folders and documents to include:
    Folders . . . . . .  *ALL_____         Name,generic*,*ALL
      Documents . . . . .  *ALL_____       Name,generic*,*ALL

    Size of smallest document . . . . .  4____  Size in 1000 bytes
                                                (1=1000)

  Sort by . . . . . .  1                   1=Size
                                           2=Owner name
                                           3=Date last changed
                                           4=Folder/document name

F1=Help   F3=Exit   F5=Refresh   F12=Cancel
```

Figure 11-19. Customize Folder Report Display - Including Information about Documents

On this display include information about the documents in the folders, such as the document name and size of the smallest document in thousands of bytes. Specifying the size of the smallest document eliminates very small documents from cluttering up your report.

Figure 11-20 shows an example of a folder and document information report.

```
                              Disk Space Report
                        Folder and Document Information


Folder/                          % of      Size in      Last
  Document      Owner            Folder    1000 Bytes   Change       Folder Path

PAPER           SUZZY                          31.2    01/04/92     Normal/Junk/Paper
  JUNK          SUZZY             1.30         12.3    01/40/92
  CLIPS         YOU               0.50          4.7
  NAPKINS       ME                1.50         14.2
CMC             CMAROLT                        13.2    12/31/92
  JAASYSOP      QSYSOPR           1.20         11.3    01/24/92
PARADISE        GUY                            9.4    10/04/89
  HAVEN         ME                 .50          4.7
  GUY           GUY                .50          4.7
    .             .                             .        .
    .             .                             .        .
    .             .                             .        .
ZAPPER          JOBRIEN                        4.7    09/25/90
  DANGER        RODNEY            0.90         8.5    12/20/92


TOTAL                                       236250.0
```

Figure 11-20. Folder and Document Disk Space Information Report

Printing an Owner Information Report

You can print a report that contains user names and information about the objects they own. You can select the type of information that you want your report to contain and specify how you want the information sorted.

To print an owner report:

1. Select the owner report type on the Print Disk Information display.
2. Press the Enter key to display more fields on the Customize Owner Report display as shown in Figure 11-21 on page 11-21.

   Note: If you want to print a more detailed report which includes specific information about the objects owned, see "Printing an Owner and Owned Object Information Report" on page 11-22.

```
                          Customize Owner Report                SYSTEM01
                                                          05/17/92  14:00:00

Information collected . . . . . :  05/15/92  23:00:00

Type choices below, then press Enter.

  Include information about owned
    objects . . . . . .  N              Y=Yes, N=No

  Owners to include:
    Owners  . . . . . .  *ALL           Name, generic*, *ALL

    Smallest size of total objects
      owned . . . . . .  4              Size in 1000 bytes
                                       (1=1000)

  Sort by . . . . . .  1                1=Size
                                        2=Owner name


F1=Help   F3=Exit   F5=Refresh   F12=Cancel
```

Figure 11-21. Customize Owner Report Display

Fill in the following fields to customize your report:

Owners to Include: For a single user, type the user name; for a group of users, type the first few characters of the user name followed by an asterisk (*); and for all users, type *ALL.

Smallest Size of Total Objects Owned: Type the minimum size (in thousands of bytes) of the objects you want shown in the report. For example, to include only those objects that are greater than 4 000 bytes, type a 4 in the field.

Sort by: Select whether you want the report sorted by size or owner name.

Figure 11-22 shows an example of an owner information report.

```
                        Disk Space Report
                        Owner Information


                % of      Size in        Description
Owner           Disk      1000 Bytes

ALUTHER          .00           24.1      Al the company auditor
COGSTED          .00           13.8      Dave Cogsted
FRIEDA           .15         1908.2      Frieda P. Dogwater
QSYSOPR        14.86       188929.5      System operator
*NOOWNER                       8.7


TOTAL                       638885.1
```

Figure 11-22. Owner Disk Space Information Report

Note: *NOOWNER is the general name given to objects that do not have an assigned user. The size of *NOOWNER is determined by the number of objects that do not have an owner. *NOOWNER is not the name of a real owner and cannot be used as one.

Printing an Owner and Owned Object Information Report

To include information about objects owned in your report, type a Y in the first field on the Customize Owner Report display and press the Enter key. The additional fields that appear on the Customize Owner Report display are shown in Figure 11-23.

```
                          Customize Owner Report                SYSTEM01
                                                      05/17/92  14:00:00

Information collected . . . . . :  05/15/92  23:00:00

Type choices below, then press Enter.

  Include information about owned
    objects . . . . . .  Y              Y=Yes, N=No

  Owners and owned objects to include:
    Owners  . . . . . .  *ALL           Name, generic*, *ALL

    Objects . . . . . .  *ALL           Name, generic*, *ALL
      Object type . . . .  *ALL         Name, *ALL
                           _____
                           _____

    Smallest object owned . . . . . .  0_____  Size in 1000 bytes
                                               (1=1000)

                                                              More...
F1=Help   F3=Exit   F5=Refresh   F12=Cancel
```

Figure 11-23. Customize Owner Report Display

On this display include information about the objects owned, such as the object name and object type. Press the Page Down key to specify how the report should be sorted: by size, owner name, object, date last changed, date last used, or library name.

Figure 11-24 on page 11-23 shows an example of an owner and owned objects information report.

```
                        Disk Space Report

                 Owner and Owned Objects Information

Owner/                                  % of     Size in     Last       Last
  Object      Library      Type         Owned    1000 Bytes  Change     Use        Description

CMARRIE                                           4312.1
  CMCDOC      QDOC         *DOC          .10        4.1     01/07/92   01/21/92   Carols documents
  WORMS       QDOC         *DOC          .10        3.1     11/15/91   01/19/92   Document on worms
QSYSOPR                                             24.1
  DELETE      MYLIB        *PGM        19.09        4.6     02/28/91   01/10/92   Delete program
  PRTSTF      YERLIB       *FILE       36.10        8.9     03/31/90   12/19/90   Qsysoprs print stuff
BEUCH                                             229.4
  PRTSTF      HISLIB       *FILE        3.79        8.7     01/21/92   01/21/92   Save my print stuff


TOTAL                                            4595.0
```

Figure 11-24. Owner and Owned Objects Information Report

Printing an Object Information Report

You can print a report that contains objects, object types, size of smallest object, and dates when last used and changed.

To print an object report:

1. Select the object report type on the Print Disk Information display.

   The Customize Object Report display is shown in Figure 11-25.

```
                          Customize Object Report                SYSTEM01
                                                        05/17/92  14:00:00

Information collected . . . . . :  05/15/92  23:00:00

Type choices below, then press Enter.

  Objects and object types to include:
    Objects . . . . . .  *ALL_____   Name, generic*, *ALL
      Object type . . . .  *ALL_____   Name, *ALL
                           _____
                           _____

    Size of smallest object . . . . . .  0____      Size in 1000 bytes
                                                     (1=1000)

    Sort by . . . . . .  1           1=Size
                                     2=Owner name
                                     3=Date last changed
                                     4=Date last used
                                     5=Object name

F1=Help   F3=Exit   F5=Refresh   F12=Cancel
```

Figure 11-25. Customize Library Report Display

2. Fill in the following fields to customize your report:

Objects and Object Types: For a single object, type the object name; for a group of objects, type the first few characters of the object name followed by an asterisk (*); and for all objects; type `*all`.

Size of Smallest Object: Type the minimum size (in thousands of bytes) of the objects you want shown in the report. For example, if you want to only include those objects that are greater than 4 000 bytes, type a 4 in the field.

Sort by: Select how you want the report sorted: by size, owner name, date last changed, date last used, or object name.

Figure 11-26 shows an example of a specific object information report.

```
                        Disk Space Report
                    Specific Object Information

                                                 % of      Size in      Last      Last
Object     Library     Type      Owner           Disk      1000 Bytes   Change    Use       Description

CALC       HISLIB      *PGM      TESTER           .03           361.5   01/05/92  10/03/92  Calculator
DELETE     HERLIB      *PGM      TESTER           .03           355.8   02/28/91  01/10/92  Delete pgm
JUNKSTF    MYLIB       *FILE     JUNKER           .02           269.8   01/21/92  01/22/92  Junk file
MMSGQ      MYLIB       *MSGQ     TESTER           .02           268.8   05/31/91  01/10/92  MHRT msgq
PRTSTF     MYLIB       *FILE     TESTER           .01           172.0   01/21/92  01/21/92  Save my prt
RAPID      YOURLIB     *PGM      TESTER           .00           171.0   06/30/90  06/30/90  Power type
SCRUNCH    MYLIB       *PGM      TESTER           .00            11.7   03/01/90  01/24/90  Compression

TOTAL                                                          1598.9
```

Figure 11-26. Specific Object Disk Space Information Report

Interpreting Disk Space Information Reports

Table 11-1 shows the specific entries on a System Summary Information Disk Space Report. The *Description* column shows what makes up the storage size, and the *Possible Actions* are some suggestions for helping maximize the efficiency of your disk space use.

Table 11-1 (Page 1 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
User libraries	Size of all nonsystem libraries and external object contents.	• If this percentage is larger than expected, run a library report (including objects) and sort (last used date and last changed date) to find the old or unused objects. • Use the Compress Object (CPROBJ) command to compress the size of menu (*MENU), panel group (*PNLGRP), file (*FILE), and program (*PGM) objects. This will reduce the size of the objects within libraries.
Folder and documents	Size of all folders and their contents	If this percentage is larger than expected, run a folder report and sort it to find old or unused folders.

Table 11-1 (Page 2 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
QSYS	Size of all external objects in QSYS library.	• Check to make sure there are no user objects stored in this library. • See *History files* on page 11-26 and *User profiles* on page 11-26 for other possible actions.
Other IBM libraries	Size of all system libraries and the contents of external objects. The libraries in this category include those libraries that start with a pound sign (#), except #LIBRARY. All libraries that start with the letter Q and are not considered user libraries are also included in this category. For a list of Q libraries, see *Chapter 6, Description of the Save Processes* in the *Basic Backup and Recovery Guide*, SC41-0036.	• Delete any IBM libraries included in this category that are not needed. • See the individual fields under the Miscellaneous items reported column on page 11-27 for other possible actions.
Licensed Internal Code	Size of reserved vertical licensed internal code (VLIC), Licensed Internal Code (LIC), dump space, error logs, and trace tables.	See the individual fields in the description for possible actions.
Temporary space	Size of all temporary objects that will be automatically deleted at the next IPL. This includes QTEMP libraries for active jobs.	• This number could be low if the report is created when the system is not busy. This space is deleted during an IPL. • Use QACTJOB and QADLACTJ system values to reduce the number of temporary job structures that are part of the temporary space used by jobs. • For spooled files, check the QRCLSPLSTG system value.
Unused space	Size of currently unused storage. This is auxiliary storage pool (ASP) 1 and all user ASPs, if any.	No action required.
Internal objects	Space used by internal objects. The report puts the internal objects into logical categories and the percent amount is assigned to a category, not to the individual internal objects. See Figure 11-11 on page 11-14 for a list of those categories.	• Change QADLSPLA, QADLTOTJ, QJOBMSGQSZ, QJOBMSGQTL, and QJOBSPLA system values to reduce the number of permanent job structures that are part of the internal objects used by jobs. • Reduce mail and spooled files. • Clean up old documents.

Table 11-1 (Page 3 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
Objects not in a library	Size of permanent external objects that do not exist in a library. These are typically objects that were not completely created or deleted.	Use the Reclaim Storage (RCLSTG) command if the size is significant. See the *Basic Backup and Recovery Guide* for dependencies.
OS/400 items reported:		
History files	Size of QHST* files in the QSYS library.	Look at the files first, then use the Operational Assistant cleanup function to clean up the logs on the system. See "Setting Up Automatic Cleanup" on page 11-34 for information on how to set up automatic cleanup.
Journal receivers	Size of all system journal receivers that start with the letter Q and are found in libraries that start with the letter Q.	Use the Operational Assistant cleanup function. Clean up the security journal and all user journals not cleaned up by automatic cleanup. See "Cleaning Up the Security Auditing Journal" on page 11-42 for information on how to do this.
User profiles	Size of each object of type *USRPRF.	Delete unused user profiles.
Configuration information	Size of all *DEVD *CTLD *COSD *CNNL *LIND *MODD *NWID object types.	Delete unused configuration descriptions.
System help (QHLPSYS)	Size of system-supplied online help information.	• Use the Compress Object (CPROBJ) command to compress the size of the objects within the library. • If the size is larger than the decompressed sized, check to make sure there are no user objects stored in this library.
Calendars	Size of database files in QUSRSYS managing OfficeVision/400 calendar.	Use the Operational Assistant cleanup function to remove old calendar items.
Directories	Size of database files in QUSRSYS managing the system distribution directory.	Delete directory entries, distribution lists, and nicknames that are not needed. Also, review the number of user authorities that are granted for directories and see if some can be deleted.
Document files	Space managing OfficeVision/400 folders and documents.	Delete any documents and folders that are not needed.
OfficeVision/400 items reported:		
Enrollment	Size of database files managing OfficeVision/400 enrollment information.	Delete any users that do not need to be enrolled in OfficeVision/400.
Mail files	Size of all external objects managing OfficeVision/400 mail.	• Delete hard-copy references. • Do not log outgoing mail status if not needed. • Delete all outgoing mail status.

Table 11-1 (Page 4 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
Text search	Space for managing OfficeVision/400 text search files.	• Delete any documents and folders that are not needed. • Use the Remove Text Index Entry (RMVTXTIDXE) command to remove index entries for documents from the text search index.
Personal directories	Space for managing OfficeVision/400 directories.	Delete any directories or directory entries that are not needed.
Licensed Internal Code:		
LIC and tables	Space for Licensed Internal Code.	Cannot be adjusted.
Dump space	Space on load source to dump main storage in case of a system failure.	Cannot be adjusted.
Error logs	Space for VLIC logs, error logs, and trace tables. This is the amount of space required for error logs, and its size depends on how the system is running.	Set the sizes using the Start System Service Tools (STRSST) command. On the STRSST menu, select option 1 (Start a service tool), then select option 1 (Error log utility), and then option 3 (Change error log size).
Trace tables	Space for trace tables.	To clear the trace tables where the Vertical Licensed Internal Code is recorded, use the Start System Service Tools (STRSST) command. On the STRSST menu, select option 1 (Start a service tool), then select option 2 (Trace Vertical Licensed Internal Code).
VLIC logs	Space for VLIC logs.	Use the Start System Service Tools (STRSST) command, option 1 (Start a service tool), and select the option to set the size of the VLIC log.
Vertical Licensed Internal Code (VLIC) Control Blocks	Space on each unit used to track system configuration.	Cannot be adjusted.
Space used by internal objects:		
Space used by internal objects	Size of internal objects for system use. The objects are divided into categories to show the percentage of use per function; however, the categories listed are not the internal objects. The objects cannot be seen by using the DSPLIB or DSPOBJD command.	See *Internal objects* on page 11-25.
Miscellaneous items reported:		
Printer output and spooling (QSPL)	Size of all printed output and other spooled output, such as diskette files and inline data files.	Delete unneeded spooled output files using the Work with Spooled Files (WRKSPLF) command, option 4 (Delete). Then use the Reclaim Spool Storage (RCLSPLSTG) command.

Table 11-1 (Page 5 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
Replaced object library (QRPLOBJ)	Size of all objects that were replaced on the system.	This library is deleted during an IPL. You can use the Clear Library (CLRLIB) command to clear this library if the objects are not in use.
Storage possibly affected by RCLSTG	Approximate size of all objects that will be deleted during a Reclaim Storage (RCLSTG) command.	The higher the number, the more you need to run the Reclaim Storage (RCLSTG) command. **Note:** Reclaiming storage takes a long time and requires a dedicated system.
Reclaim storage library (QRCL)	Size of all objects that have been reclaimed and put into library QRCL prior to running this function.	Since these objects have lost their library address, process them on an individual basis. Some objects can be moved into another library as is and some objects may need to be deleted and re-created in the correct library. See "Cleaning Up the Recovery Library (QRCL)" on page 11-43 for information on how to clean up this library.

Saving and Restoring Objects and Information

This section contains an overview of how to save and restore objects and information to your system. See the *Basic Backup and Recovery Guide*, SC41-0036, for complete and detailed information on how to save and restore objects and information.

You can save or restore an entire system or individual objects in the system. Use the save and restore commands and functions to ensure that, following any type of failure, information exists that allows you to recover your system or to re-create any objects in your system that were damaged.

You can save copies of files, libraries, or other objects to tapes. These tapes are used as a backup copy of the data if the system data is damaged or deleted, or they can be used as a copy of information to send to another system.

The information you have saved on the tape can be put back on the system (restored). The information is restored from the tape into system storage where it is accessed by users.

You can use the save and restore functions by using specific commands or by using menu options on the Save and Restore menus. To display the Save menu, type `GO SAVE` on any command line and press the Enter key. To display the Restore menu, type `GO RESTORE` on any command line and press the Enter key.

Overview of the Save and Restore Commands

Figure 11-27 on page 11-30 and Figure 11-28 on page 11-31 provide an overview of the save and restore commands. They show the save and restore processes for different types of objects and information.

The save commands on the left of the figures correspond with the restore commands on the right. For example, Figure 11-27 on page 11-30 indicates that the RSTLIB SAVLIB(*NONSYS) command restores all libraries saved by the Save Library (SAVLIB) command with *NONSYS specified on the Library parameter.

Following Figure 11-27 and Figure 11-28 is a brief description of the commands used to save and restore objects and information. It is important to note that these figures and descriptions are only an overview of the save and restore processes. Consult the *Basic Backup and Recovery Guide*, SC41-0036 for a more detailed explanation of when and how to use these commands.

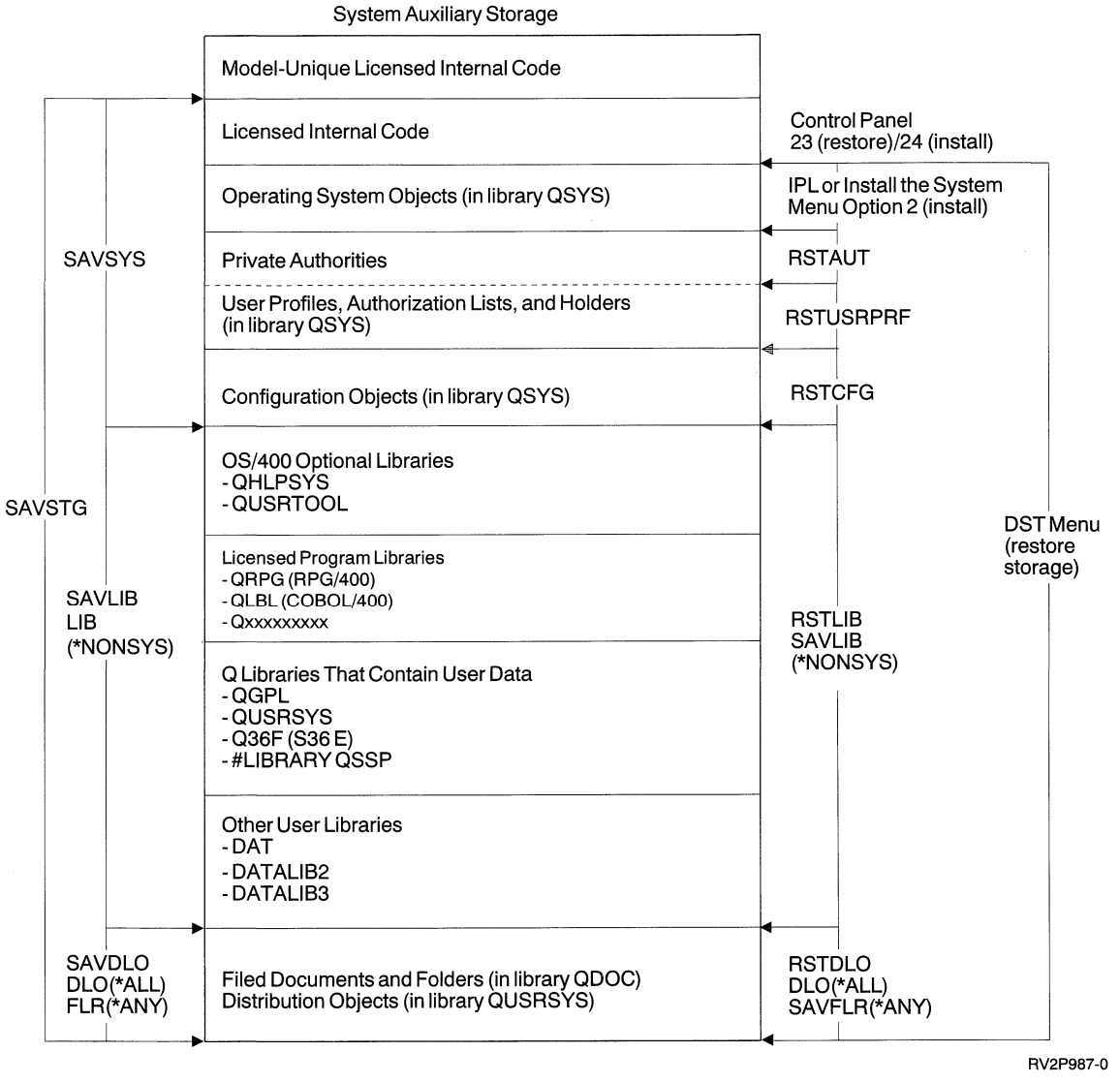

Figure 11-27. Overview of Save and Restore Commands

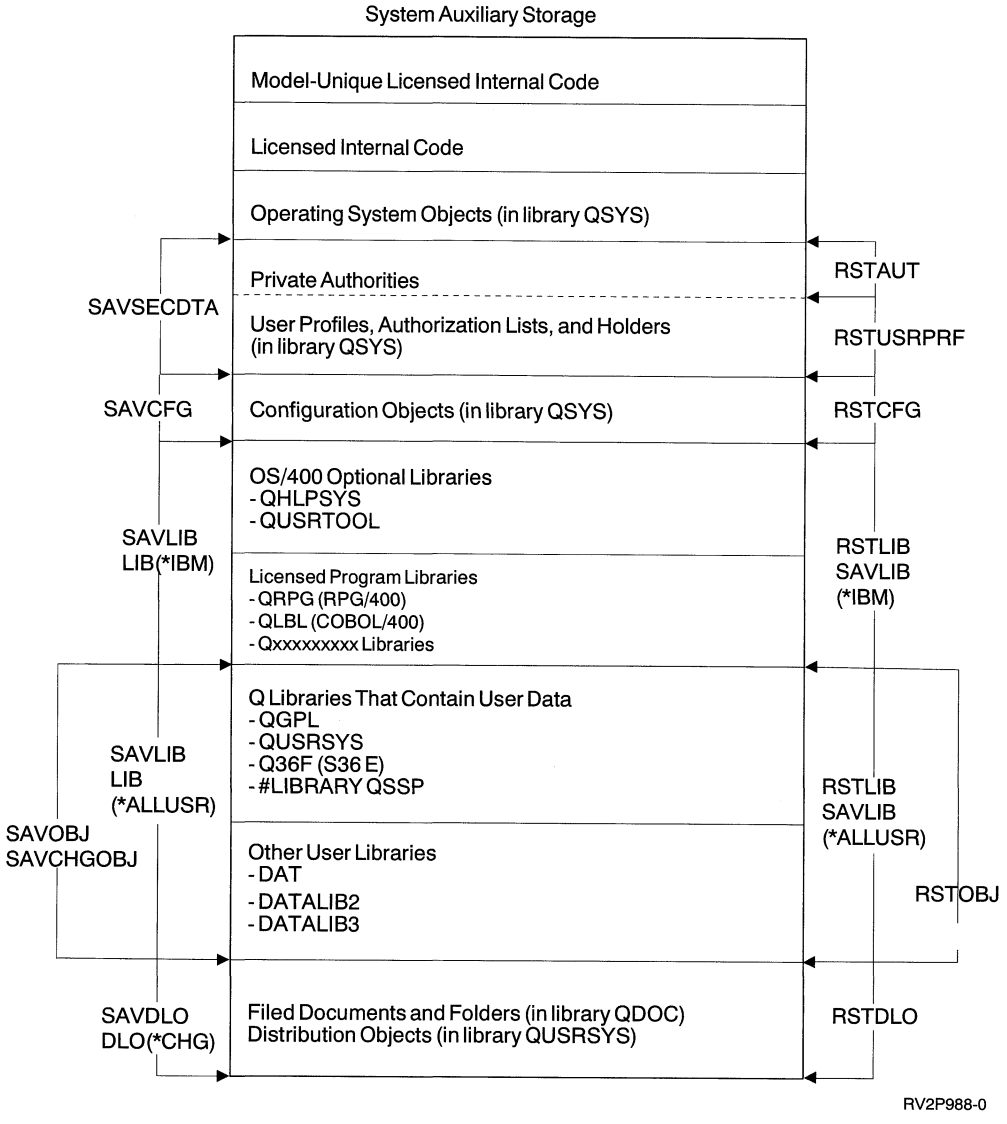

Figure 11-28. Overview of Alternative Save and Restore Commands

Saving Storage (SAVSTG)

The Save Storage (SAVSTG) command causes the licensed internal code and the contents of the auxiliary storage to be saved to tape. When you run the SAVSTG command, the save function causes an IPL of the system. This function is intended for disaster recovery backup. Individual libraries or objects cannot be restored from a save storage tape.

Saving the System (SAVSYS)

The Save System (SAVSYS) command saves a copy of the licensed internal code and the QSYS library (including security information and configuration objects) in a format compatible with the installation of the AS/400 system. It does not save objects from any other library.

Saving Security Data (SAVSECDTA)

The Save Security Data (SAVSECDTA) command saves all security information without requiring a system in a **restricted state**.

Saving Configuration Data (SAVCFG)

The Save Configuration (SAVCFG) command saves all configuration and system resource management (SRM) objects without requiring a system in a **restricted state**.

Saving Individual Objects to a Save File, Tape, or Diskette (SAVOBJ)

The Save Object (SAVOBJ) command saves a copy of a single object or a group of objects located in the same library. When you specify OBJ(*ALL), you can save all objects in up to 300 libraries. Libraries are processed in the order specified in the library parameter. If you specify more than one library, you overlap processing, which can improve performance.

When saving to a save file, only one library can be specified. The system saves the specified objects by writing a copy of each one on diskette, tape, or in a save file.

Saving Libraries (SAVLIB)

The Save Library (SAVLIB) command allows you to save a copy of one or more libraries.

The SAVLIB command saves the entire library, including the library description, the object descriptions, and the contents of the objects in the library. You can save 1 to 300 libraries using the SAVLIB command. If you specify multiple libraries, you overlap processing, which can improve performance. All libraries, including all user libraries, can be saved to diskette or tape using the SAVLIB command. User libraries are defined as libraries that you create or IBM-supplied libraries that are intended to contain user data.

The SAVLIB LIB(*NONSYS) command saves all user-created libraries, the QGPL library, and licensed program libraries, such as QRPG and QIDU.

The SAVLIB LIB(*IBM) command saves all system (IBM) libraries.

The SAVLIB LIB(*ALLUSR) command saves all user libraries. See the *Basic Backup and Recovery Guide*, SC41-0036, to determine which libraries are IBM libraries and which libraries are user libraries.

Saving Documents, Folders, and Mail (SAVDLO)

The Save Document Library Object (SAVDLO) command saves copies of the following:

- Documents
- Folders
- Distribution objects (mail)

Documents can be saved individually or in a group using the SAVDLO command.

Distribution objects (mail) cannot be saved or restored for individual users. Mail can only be saved for all users.

The SAVDLO DLO(*ALL) FLR(*ANY) command saves a copy of all documents, folders, and distribution objects (mail).

The SAVDLO DLO(*CHG) saves all documents created or changed, all folders created since the last complete save operation, and all mail.

Saving Changed Objects (SAVCHGOBJ)

The Save Changed Objects (SAVCHGOBJ) command saves a copy of each changed object (since a specified date and time). The SAVCHGOBJ command is the same as the SAVOBJ command except that the SAVCHGOBJ command saves only changed objects and members.

Restoring Storage

To use the restore storage function, the system must be in a DST-restricted state. The restore storage process is started by using an option on the Dedicated Service Tools (DST) menu. The restore storage operation can only be started when the operating system is not active (before an IPL of the operating system). This function is intended for disaster recovery backup. The procedure does not restore single objects or libraries.

Restoring User Profiles (RSTUSRPRF)

The Restore User Profile (RSTUSRPRF) command restores the basic parts of a user profile or a set of user profiles. The command restores any user profiles that were saved by the Save System (SAVSYS) command or the Save Security Data (SAVSECDTA) command.

Restoring Configuration Data (RSTCFG)

The Restore Configuration (RSTCFG) command restores a device configuration object to the system. The command restores any device configuration object that was saved to tape by the Save System (SAVSYS) command or the Save Configuration (SAVCFG) command.

Restoring Individual Objects (RSTOBJ)

The Restore Object (RSTOBJ) command restores objects to a library. Objects can only be restored to one library at a time with the RSTOBJ command.

Warning: When you restore an object, it replaces any existing object in the same library with the same name and object type.

Restoring Libraries (RSTLIB)

The Restore Library (RSTLIB) command restores a single saved library or a group of libraries. The RSTLIB command restores the entire library, including the library description, object descriptions, and the contents of the other objects. Any library that was saved by the Save Library (SAVLIB) command can be restored by the RSTLIB command.

The RSTLIB SAVLIB(*IBM) command restores to the system all system (IBM) libraries (with the exception of the QSYS library).

The RSTLIB SAVLIB(*ALLUSR) command restores to the system all libraries with names that do not begin with the letter Q. See the *Basic Backup and Recovery Guide*, SC41-0036, for exceptions.

The RSTLIB SAVLIB(*NONSYS) command restores to the system all libraries saved by SAVLIB LIB(*NONSYS) command.

Restoring Documents, Folders, and Mail (RSTDLO)

The Restore Document Library Object (RSTDLO) command restores documents, folders, and distribution objects (mail).

The RSTDLO DLO(*ALL) SAVFLR(*ANY) command restores to the system all documents, folders, and distribution objects (mail) saved on media, regardless of the folders (if any) from which they were saved.

Restoring Object Authority (RSTAUT)

The Restore Authority (RSTAUT) command restores object authorities. When you restore objects and user profiles, you do not simultaneously restore the authority to those objects. Authority is only restored by using the RSTAUT command.

Cleaning Up Your System

To control unnecessary clutter on your AS/400 system, use automatic cleanup and encourage system users to regularly delete unneeded objects.

Setting Up Automatic Cleanup

To clean up your AS/400 system, use the Cleanup Tasks (CLEANUP) menu. To display this menu, type `go cleanup` on any command line and press the Enter key.

To set the cleanup options for your system, select option 1 (Change cleanup options).

Security Consideration

To select option 1 (Change cleanup options) you must have *JOBCTL, *ALLOBJ, and *SECADM authorities.

Figure 11-29 on page 11-35 shows the Change Cleanup Options display:

```
                          Change Cleanup Options                SYSTEM01
                                                          11/05/90  08:50:08
Type choices below, then press Enter.

Allow automatic cleanup . . . . . .  Y            Y=Yes, N=No

Time cleanup starts each day  . . . . . .  01:00:00      00:00:00-
                                                         23:59:59,
                                                         *SCDPWROFF,
                                                         *NONE

Number of days to keep:
  User messages . . . . . .  7___          1-366, *KEEP
  System and workstation messages . . . . . .  4___          1-366, *KEEP
  Job logs and other system output  . . . . . .  7___          1-366, *KEEP
  System journals and system logs . . . . . .  30__          1-366, *KEEP
  OfficeVision/400 calendar items . . . . . .  30__          1-366, *KEEP




F1=Help   F3=Exit   F5=Refresh   F12=Cancel
```

Figure 11-29. Change Cleanup Options Display

Security considerations

To change the cleanup options, you need to have a user class of security administrator (*SECADM). To start or end cleanup, you need to have a user class of system operator (*SYSOPR).

You can change or set the following options to clean up your system:

Allow automatic cleanup

If you type a y (Yes) on the Change Cleanup Options display, automatic cleanup is allowed to run on your system. You cannot run automatic cleanup (even immediate) if you specify no here. The schedule value indicates whether or not the schedule is used. If you type an n (No), automatic cleanup does not run on your system.

Automatic cleanup is an excellent way to help keep your system free of unnecessary clutter. If you choose not to use automatic cleanup, develop your own procedures for cleaning up all of the items listed on the Change Cleanup Options display.

Time cleanup starts each day

For the time, type one of the following choices:

***NONE**

No automatic cleanup is scheduled. If you have specified Y on the *Allow automatic cleanup* field, you can still select to start cleanup on the Cleanup Tasks menu. You may want to use this option if you plan on doing this type of cleanup on an irregular schedule.

***SCDPWROFF**

The system looks at your automatic power off schedule. It starts cleanup at the scheduled power off time and then powers off the system when cleanup has completed. See the section "Setting Up Your Auto-

matic Power On and Off Schedule" on page 2-6 for more information about the power off schedule.

A specific time

You may want to run cleanup daily, even if you don't power off your system every day. You can type a specific time for automatic cleanup to start. Be sure to specify the time using the 24-hour clock format (for example, 17:00 is 5:00 pm).

Number of days to keep

The system cleans up different types of objects. For each object, you can specify how old it should be before the system removes them by specifying calendar days, including weekends, to keep them. Or, you can keep some objects all the time by typing *KEEP.

Table 11-2 is a checklist of objects that are cleaned up by automatic cleanup in the *Automatic Cleanup* column and the objects you must remember to clean up in the *Manual Cleanup* column.

Table 11-2. Cleanup Checklist

Automatic Cleanup	Manual Cleanup
Messages • User message queues • Work station message queues • System operator message queue	Messages • All other message queues
Printer output • Output queue QEZJOBLOG (job logs) • Output queue QEZDEBUG (service and program dumps)	Printer output • All other output queues
Journals • APD journal • DSNX journal • Job accounting journal (See note below) • OfficeVision/400 journal • Performance adjustment journal • Problem log journal • QSNADS journal • X.400 journal	Journals • Security journal • All user journals
OfficeVision/400 program • Calendar entries • Folders (reorganized) • Database files (reorganized)	OfficeVision/400 program • Mail log (remove old items) • Folders (remove old items) • Outgoing mail status
Other system objects • History log • Problem log and files • Alerts database • PTF save files • Reclaim temporary storage used by temporarily decompressed objects	Objects created by applications and users • Database files (delete if no longer needed) • Database files (reorganize) • Programs (for example, Query/400)

Note: The job accounting journal is cleaned up only if you have a Y (Yes) in the *Save job accounting information about completed output* field on the Change System Options display. To find this display, type `go setup` and select option 1. If you have an N (No) in this field, the accounting journal must be manually cleaned up.

Cleaning Up Messages Automatically

Automatic cleanup regularly removes old messages including old unanswered messages. The default reply is sent for unanswered inquiry messages just before they are removed. The following types of messages are removed from the system:

User messages

Each user who is enrolled on your AS/400 system has a message queue. This message queue usually has the same name as the person's user ID. The system automatically removes the old messages from users' message queues.

However, message queues for the following IBM-supplied user profiles are not cleaned up by automatic cleanup:

- QDBSHR
- QDFTOWN
- QDOC
- QLPAUTO
- QLPINSTALL
- QRJE
- QSECOFR
- QSPL
- QSYS
- QTSTRQS

Note: The automatic cleanup option does not clean up the message queue QSYSOPR. The QSYSOPR message queue is cleaned up during the cleanup of system and work station message queues.

System and work station messages

- Messages sent to the system operator message queue (QSYSOPR).
- Every display station on your system has a **work station message queue**. The messages on this queue can be removed automatically.

  Note: Work station message queues include the queues for all devices on the system with a Category of device value of *DSP. This includes virtual displays and emulation devices.

Cleaning Up Job Logs and Other System Output Automatically

Jobs logs and system printer output can be deleted after a certain period of time.

Job logs

Every time a batch job runs, the system creates a history of what happened during that job, called a **job log**. "Working with Job Logs" on page 4-17 describes how to use and manage job logs.

If you allow automatic cleanup, the system assigns the printer device file for job logs to the output queue QUSRSYS/QEZJOBLOG. Even if you later discontinue automatic cleanup, all of your job logs are still assigned to this output queue. Use the Change Printer File (CHGPRTF) command, as follows, to change this:

```
CHGPRTF FILE(QPJOBLOG)  OUTQ(outqname)
```

Other system output

The system creates diagnostic reports when jobs encounter certain conditions. You might want to automatically delete these reports after a certain number of days.

If you allow automatic cleanup, the system assigns three printer device files to the output queue QUSRSYS/QEZDEBUG:

- QPSRVDMP
- QPPGMDMP
- QPBASDMP

Even if you later decide not to allow clean up, the printer device files are still assigned to the QEZDEBUG output queue. You can use the Change Print File (CHGPRTF) command to change this.

Cleaning Up System Journals, System Logs, and PTFs Automatically

The OS/400 licensed program keeps journals, journal receivers, and logs for its own use in tracking what it has done and recovering from error situations. It also creates a number of objects during the application of program temporary fixes (PTFs). You can request automatic cleanup of all of the following objects.

System journals

Journaling logs database activity. A **journal** controls which database files are to be journaled. If a file is journaled, a copy of every transaction to that file is written to a **journal receiver**. These transactions can be used to recover information if the database file is damaged.

Commitment control is an extension of journaling. If a single transaction updates more than one file, programmers can use commitment control to make sure that all of the files are updated successfully.

Some OS/400 functions use commitment control (such as OfficeVision/400). Others simply need a way to keep track of things (such as job accounting). They require journaling of all transactions into a journal receiver. These journal receivers continue to grow and can become quite large, which takes up disk space and affects system performance.

Automatic cleanup changes (detaches) the attached journal receiver whenever it is greater than 5 megabytes or is older than the number of days you have specified. Any journal receivers that have been detached for more than the number of days specified are deleted. The default value is 30 days.

"Managing Journal Receivers" on page 11-45 provides more information about working with journal receivers.

The journal receivers associated with the journals listed below are cleaned up:

QAOSDIAJRN
Journal for Document Interchange Architecture (DIA) files

QAPD/ADJRNL0
Journal for the APD licensed program

QCQJMJRN
Journal for the Managed System Services/400 licensed program

QDSNX
Journal for Distributive Systems Node Executive (DSNX) log

QO1JRN
Journal for the Application Enabler OFC files

QSNADS
Journal for SNA distribution services (SNADS) files

QSXJRN
Journal for problem log database

QPFRADJ
Journal for performance adjustment data

QACGJRN
Journal for job accounting data (only cleaned up if it was created by the Operational Assistant function to support the completed printing)

QX400
Journal for the X.400 licensed program

Note: The security journal QAUDJRN is not cleaned up by the Operational Assistant cleanup function. If you use this journal, you should change and delete journal receivers periodically. For more information, see "Cleaning Up the Security Auditing Journal" on page 11-42.

System logs

The OS/400 licensed program keeps system logs of certain kinds of events and messages for use in diagnosing problems. A **system log** is a special kind of database file used by the system. For more information about how system logs are used, see Chapter 13, "Handling and Reporting System Problems."

You can request that old information from these logs be removed. The following system logs are cleaned up:

History log (QHST)
A log of all system messages. The system deletes any history files named QSYS/QHST* that are older than the number of days specified. The age of the file is based on the creation date.

Problem log
A list of problem records containing information that can be used to resolve problems. Entries in the problem log are deleted if they are older than the number of days specified. In addition, the database files for the problem log are reorganized to take up less space.

Note: If the number of days specified for the *Number of days to keep* field is less than the number of days specified for the system value QPRBHLDITV (Problem Log Hold Interval), the value for QPRBHLDITV is used for problem log cleanup.

In addition to the problem log entries being deleted, the following problem log files in the QUSRSYS library are reorganized:

- QASXCALL
- QASXFRU
- QASXNOTE
- QASXPROB
- QASXPTF
- QASXYMP
- QASXEVT

- QASXDTA

Alerts

Notifications of system-detected problems. Any alerts in the alert database that are older than the specified number of days are deleted. In addition, the database file for the alert log (QUSRSYS/QAALERT) is reorganized to take up less space.

PTF Cleanup

When you apply PTFs to your system, a number of objects used during application are created. Sometimes the created objects are left in the system because of PTFs that are damaged. If you select automatic cleanup of system journals and logs, the system deletes old PTF objects that are no longer associated with the PTF.

The following objects are deleted:

- Temporary objects named:
  - QPZA000000 through QPZA999999
  - QPZR000000 through QPZR999999
  - QSCA000000 through QSCA999999
  - QSCR000000 through QSCR999999
- Exit programs shipped with PTFs which start with QPZ1
- PTF save files and cover letters from previous releases

The following physical files in QUSRSYS are reorganized:

- QAPZPTF
- QAPZREQ
- QAPZSYM
- QAPZOBJ

Note: PTF save files can be identified as `Pxxxyyyy` and `Qxxxyyyy` where `xxx` is alphanumeric and `yyyy` is numeric, or `Qzzzzzzz` where `zzzzzzz` is numeric.

If the QSMU library does not exist on your system and:

- If IBM licensed programs are installed, PTF save files for releases prior to the installed release are deleted.
- If IBM licensed programs are not installed, PTFs for any release prior to the installed release are deleted.
- If non-IBM licensed programs are installed, PTFs for any release that is prior to the earliest installed release are deleted. If non-IBM licensed programs are not installed, PTFs are not deleted.

If the QSMU library does exist and the user callable program QPZDLOBJ is called from the command line with *PRV specified as the parameter:

- For IBM licensed programs, any PTFs for a release prior to the installed release are deleted.
- If the product is supported but not installed, any PTFs for a release prior to the earliest supported release are deleted. If the product is not supported or installed, all PTFs prior to the operating system release are deleted.
- For non-IBM products that are not installed and not supported, the PTFs are not deleted. If the product is installed, PTFs for any release prior to

the earliest installed release are deleted. If the product is supported but not installed, the PTFs for any release prior to the earliest supported release are deleted.

Cleaning Up OfficeVision/400 Calendars and Files Automatically

Individuals who use OfficeVision/400 can choose to keep their calendars on the system. Calendars can also be used to schedule such things as conference rooms and special equipment. Usually, people don't need to refer back to old entries on calendars, but those entries take space on the system and affect OfficeVision/400 performance. You can request that old calendar entries be removed.

The following OfficeVision/400 files are reorganized during automatic cleanup:

Table 11-3. OfficeVision/400 Files Reorganized during Automatic Cleanup

Personal Directories	Hard-Copy Document	Office Enrollment	Library Descriptions	Remote Document Library Service	Mail	Calendars
QAOFDDH	QAOFDOCH	QAOFENRY	QAOFLDFH	QAOFBSTH	QAOFMLH	QAOCAU5
QAOFDTH					QAOFODH	QAOCGM5
QAOFDHH					QAOFASGH	QAOCIN5
QAOFDDTH					QAOFODTY	QAOCJOB5
QAOFDH					QAOFOAUH	QAOCITM5
QAOFHDRH						QAOCCL5
						QAOCGR5
						QAOCIT5
						QAOCTXT5

Cleanup Activities You Should Do

The automatic cleanup function takes care of many objects that can accumulate on your system. However, you should also do these additional activities to ensure that your system is running smoothly.

- Clean up the security auditing journal (QAUDJRN)
- Clean up user printer output
- Clean up OfficeVision/400 items
- Clean up the recovery library (QRCL)
- Do an IPL regularly
- Reorganize physical files
- Manage journal receivers
- Clear save files
- Reset message queue size
- Reclaim spool storage
- Reclaim storage

Cleaning Up the Security Auditing Journal

The security auditing level (QAUDLVL) system value controls which security-related events are recorded to the security auditing journal QAUDJRN. If you do not set up security auditing on your system, you will not have this journal to clean up. For information on how to set up security auditing on your system, see the *Security Reference*.

If you have the QAUDJRN journal, you need to detach the journal receiver periodically. For information on how to do this, see "Managing Journal Receivers" on page 11-45.

Cleaning Up User Printer Output

Automatic cleanup removes old printer output that is created by system functions. It does not remove printer output that belongs to users. Often, users save printer output on the system and view it, rather than printing it. This saves time and paper, but it takes system resources to store and manage this printer output. Encourage users periodically to use the Work with Printer Output display to remove printer output they no longer need.

If you have spool control (*SPLCTL) authority, you can also use the Work with Printer Output display to review all of the printer output on the system. Use the Dates/Pages/Forms version of the display to look for old output.

Cleaning Up OfficeVision/400 Items

Active users of the OfficeVision/400 licensed program tend to use a lot of auxiliary storage. They create, revise and delete many documents, send and receive mail, and maintain calendars, personal directories, and nickname files. To control the amount of disk storage used by OfficeVision/400 users:

- Encourage users to regularly remove items they no longer need from their mail and their folders.
- Encourage users to delete the status of outgoing mail entries.
- Consider limiting users' disk storage usage by setting the *Maximum storage (MAXSTG)* value in the user profiles.
- Regularly reorganize OfficeVision/400 files, documents, and folders.

Additional Reading: For more information about the OfficeVision/400 program, see the *Managing OfficeVision/400** manual.

Reorganizing OfficeVision/400 Files: The following is a list of files used for various functions in the OfficeVision/400 licensed program. OfficeVision/400 database files are located in the library QUSRSYS. For information on how to reorganize them for better performance, see "Reorganizing Physical Files" on page 11-44.

Table 11-4. OfficeVision/400 Files You Should Reorganize

System Distribution Directories	Distribution List	Nickname	Calendar	Application Enabling Files	Shadowing Files
QAOKP01A	QAOKP02A	QAOKP06A	QAOOUF	QAO1CVNP	QAOKPCLA
QAOFP05A	QAOKP03A			QAO1CVNPBK	QAOKPLGA
QAOKP09A				QAO1CVNPX	QAOKPLCA
QAOFP04A					QAOKPSPA
QAOFP08A					
QAOKPX4A					

Cleaning Up the Recovery Library (QRCL)

The system creates and uses the recovery library (QRCL) to store some of the damaged objects it encounters when the Reclaim Storage (RCLSTG) command is run. You need to examine this library and decide what to do with each of the objects in it. You should not leave objects in QRCL for an extended period of time. They take up space and do not perform any useful function on your system.

To obtain a list of what is in QRCL, use the Display Object Description (DSPOBJD) command or the Display Library (DSPLIB) command. For the reclaimed objects in the library, you can do the following:

- Delete unusable objects.
- Move objects to another library and rename them, if necessary.
- Grant authority for objects, if necessary.
- Transfer ownership of objects.
- Copy data from rebuilt files to other files.

Additional Reading: For additional information about the reclaim storage procedure and the recovery library, see the *Basic Backup and Recovery Guide*.

Doing an IPL Regularly

Many AS/400 systems run 24 hours a day, 7 days a week and are rarely powered down for any type of maintenance. However, you can improve performance by doing an IPL periodically, perhaps monthly.

Several tasks occur during an IPL:

- More disk storage is made available because temporary libraries are deleted and work control blocks are compressed.
- Unused addresses are made available to the system.
- The job logs for each active subsystem are closed when you power down the system, and new ones are created when you IPL.

One way to gauge whether you should IPL is to observe the *% of addresses used* field on the Work with System Status display. To find this display, use F21 (Select assistance level) to switch to the intermediate assistance level on the Display System Status display. The percent of addresses used should not exceed 90. To reset the percent of addresses used threshold, you must do an IPL to the system.

Another indication that you should IPL is the % of system storage used. Avoid running your system with a small amount of disk space left. If you cannot avoid this, IPL your system more frequently. Keep a record of the percent of auxiliary storage used before and after you IPL. The following shows the percent used and how often you should IPL.

% Used	IPL Frequency
95%	Daily
90%	Weekly
Below 90%	As necessary

The system sends a warning message to the system operator's message queue (QSYSOPR) whenever the percent of addresses used exceeds 90 or if an object distribution object is sent to your AS/400 system and the size of the object exceeds the amount of storage you currently have. Take measures to make disk space available as soon as you receive this message. If the message is ignored, the system eventually stops with a system reference code (SRC) displayed on the control panel. If this occurs, see Chapter 13, "Handling and Reporting System Problems." You may also notice that your performance decreases as the auxiliary storage runs out.

Reorganizing Physical Files

When you create a physical file on your AS/400 system, a certain amount of disk space is allocated to that file. As you add more records to the file, the space allocation for that file may be extended. When you delete records from the file, those records are removed from the system but the space they took does not automatically become available for other use.

To free up the storage used by deleted records in a physical file, you may either **reorganize** the file or change the file's attributes so that the file reclaims space used by the deleted records. To change the file's attributes, use the Change Physical File (CHGPF) command and specify *YES for the reuse deleted records parameter.

When you tell the system to reorganize a file, it makes a new copy of the file. It compresses the space used by the file. In some cases, it also puts the records in a more efficient sequence. Reorganizing a file not only frees up the disk space used by deleted records, it might also improve system performance when accessing that file.

To determine which files need reorganization, use the Display File Description (DSPFD) command. Look at the *Current number of records* and *Number of deleted records* fields to determine whether you are likely to gain any benefits by reorganizing the file.

Note: If you reorganize a file that is journaled, you should back up that file immediately after the reorganization. Journal receiver records created before the reorganization cannot be applied to the reorganized file. See "Managing Journal Receivers" on page 11-45 for more information about journals and journal receivers.

To reorganize a file, use the Reorganize Physical File Member (RGZPFM) command. If a job is using the file you try to reorganize, you receive an error message. To find out which job is using the file, use the Work with Object Locks

(WRKOBJLCK) command. Figure 11-30 on page 11-45 shows the Work with Object Locks display, where any jobs on the system that are using that particular file are listed.

```
                          Work with Object Locks
                                                              System:   SYSTEM01
Object:   MYFILE         Library:   MYLIB          Type:   *FILE

Type options, press Enter.
  4=End job   5=Work with job   8=Work with job locks

Opt     Job            User           Lock        Status
 8      DSP19          HILGEREL       *EXCL        HELD
```

Figure 11-30. Work with Object Locks Display

If you want to reorganize the file but jobs are using it, you can either wait for the jobs to end or take some action to end them. Press F5 (Refresh) to check on the locks periodically. When there are no longer any jobs using the file, you can try again to reorganize it.

Reorganizing a file could take several hours if the file is large. If the file has a number of access paths, reorganizing a file may take several days. You can speed up the operation by removing the access paths prior to reorganizing the file. When the reorganization is successfully completed, you receive a message.

Managing Journal Receivers

Journal management provides a method of logging activity to the database files on your system. The OS/400 licensed program uses journaling for some system data files. You can also use journaling for your own application database files.

You use a journal receiver to record journal entries for a certain period of time. Then you **change (or detach)** it and assign a new journal receiver. Usually, you save your detached journal receivers as part of your normal system backup procedures.

When journal receivers become very large, they can adversely affect performance as well as taking up disk space. You should monitor their size, using the Display Object Description (DSPOBJD) command. Use the Change Journal (CHGJRN) command to detach a journal receiver and assign a new one.

You can use the Change Journal (CHGJRN) command at any time, even if the files being journaled are in use. However, you should try to change journals when the system is not busy, because it will slow down the performance. Changing journal receivers allows you to save and delete the detached journal receiver.

Detached journal receivers can take up a great deal of disk storage on your system and should be deleted. Detached journal receivers used for journaling the OS/400 licensed program are deleted if you use the Operational Assistant automatic cleanup function and specify system journals and logs. You need to delete the journal receivers used by your applications.

Example of Detaching an OfficeVision/400 Journal Receiver

The following is an example of the commands needed to detach, save, and delete an OfficeVision/400 journal receiver called QAOSDIAC01.

Note: This example gives you commands with parameters. If you prefer, you can type the command names and press F4 (Prompt) to fill in the parameters.

1. The following Change Journal command detaches the QAOSDIAC01 journal receiver from the journal and creates a new journal receiver named QAOSDIAC02:

   ```
   CHGJRN JRN(QUSRSYS/QAOSDIAJRN) JRNRCV(*GEN)
   ```

2. The following Save Object command saves the journal receiver on tape:

   ```
   SAVOBJ OBJ(QAOSDIAC01) OBJTYPE(*JRNRCV) LIB(QUSRSYS) DEV(TAP01)
   ```

   Note: If you save the library holding journal receivers as part of your regular backup, this step may not be necessary.

3. The following Delete Journal Receiver command deletes the journal receiver:

   ```
   DLTJRNRCV JRNRCV(QUSRSYS/QAOSDIAC01)
   ```

   Note: Journal receivers must be deleted in the order in which they were attached to the journal.

   If you attempt to delete a journal receiver that has not been saved, you receive a warning message.

The system keeps track of all the journal receivers associated with each journal on your system. To find out which journals are on your system:

1. Use the Work with Journal (WRKJRN) command.
2. On the Specify Journal Name display, fill in the fields, using *ALL. (IBM-supplied journals start with **Q**.)
3. Use 5 (Display journal status) to display the status of a particular journal, including the associated journal receivers.

You can also use the Work with Journal Attributes (WRKJRNA) command to find out which journal receivers are associated with a particular journal.

Additional Reading: For more information about journaling, see the *Basic Backup and Recovery Guide*.

Clearing Save Files

When you do save and restore operations on your system, you can save information to a file on the system called a **save file**, instead of to a tape or diskette. Save files are used for two basic reasons:

- As the first step in a backup procedure, to speed the backup process and eliminate the need for someone to mount tapes
- As the container for information, such as programs, that are to be sent to other systems in a network

Once the information in a save file has been successfully saved to tape or diskette, or sent through your network, you can clear the save file to free up most of the disk space it uses. Use the Clear Save File (CLRSAVF) command.

If you have backup procedures written that use save files, those procedures might wait to clear the save file until immediately before the next time it is used. If the disk space on your system is crowded, you may want to consider changing your procedures and clearing save files as soon as they are saved to a tape or diskette.

Additional Reading: For more information about save files, see the *Basic Backup and Recovery Guide*.

Resetting Message Queue Size

You can keep user and work station message queues to a manageable size by removing old messages regularly with the automatic cleanup function. See "Setting Up Automatic Cleanup" on page 11-34 for information on setting up automatic cleanup.

When message queues are created, a certain amount of disk space is allocated to them. If they become full, they are extended by allocating additional disk storage to them. Even though you later remove messages, the queues are not automatically returned to their original size.

In the case of a message queue, the only way to return it to its original size is to completely clear it.

Note: This method helps you manage the size of all message queues except the system operator message queue (QSYSOPR). Do not clear this message queue.

1. Make sure no jobs are running which might need the message queue you plan to resize. You can use the Work with Object Locks (WRKOBJLCK) command.
2. Use the Clear Message Queue (CLRMSGQ) command to clear the message queue.
3. A message is displayed confirming that the message queue was successfully cleared.

Reclaiming Spool Storage

Every spooled file on your system is a member of a system-managed database file. When a new spooled file is created, it uses an empty member of the database file, if one is available. If no empty members are available, it creates a new member.

Whenever a spooled file is deleted from the system, the corresponding database file member is emptied but not deleted so it can be used again.

If you have created a large number of spooled files and then deleted them, you may have an excessive number of empty members available for newly created spooled files. These members, although empty, can take up a large amount of disk storage.

To delete empty database file members, set the QRCLSPLSTG system value or run the Reclaim Spool Storage (RCLSPLSTG) command.

Notes:

1. If you choose to keep the number of empty members very low, your spooling performance may suffer. A new member has to be created every time a spooled file is created.
2. If you keep the number of empty members higher, more disk space is used on your system.

QRCLSPLSTG System Value: Set this value if you want to have the system automatically delete empty members when they have been empty for the specified number of days (1 to 366).

The default value is eight days. If you set this value to *NOMAX, the system does not automatically delete empty database members. To delete them in this case, use the Reclaim Spool Storage (RCLSPLSTG) command.

Note: To ensure that you always have an empty database file member available for creating new spooled files, do not set this value to *NONE.

Reclaim Spool Storage (RCLSPLSTG) Command: If you want to control when empty members are deleted rather than have the system do it automatically, use the Reclaim Spool Storage (RCLSPLSTG) command. Running this command immediately deletes all members that have been empty for the number of days (1-366) you specify on the prompt. If you type `*NONE` in the *Days* field, the system immediately deletes all empty members.

Reclaiming Storage

An unexpected failure, such as a power or equipment failure, can create unusual conditions in storage. For example, objects may not be completely up to date, and user profiles may contain incorrect information about object ownership.

You can often correct these damaged objects and profiles by using the Reclaim Storage (RCLSTG) command. The purpose of this command is to ensure that objects residing permanently in auxiliary storage can be accessed and that all auxiliary storage is either used properly or is available for use. You should consider reclaiming storage when:

- You have a high percent of auxiliary storage used (on the Work with System Status display).
- You notice unusual things when working with object descriptions and user profiles.
- You attempt to start the system and receive a message that not enough storage is available.
- You have not run the reclaim storage procedure in a while (6 months).

Reclaiming storage can take a long time to run, because the system must examine all objects. The time it takes to reclaim storage depends on the number of objects and disk space your system has. It must be run while no users are on the system and the system is in a restricted state.

After reclaiming storage, the QRCLSTG data area in the QUSRSYS library contains the following information:

- Beginning and ending times for the last time you reclaimed storage.
- Error notification if the last reclaim storage operation was not successful.

- Current OS/400 licensed program release level.
- Name and serial number of your system.

See "Stopping the System" on page 2-23 for information on what you should do before you reclaim storage.

To reclaim storage:

1. Use the Work with Active Jobs (WRKACTJOB) command and press the Enter key to check to make sure jobs are not running on the system.
2. Use the End Subsystem (ENDSBS) command to end all subsystems.
3. Use the Reclaim Storage (RCLSTG) command to reclaim storage.

See the *Basic Backup and Recovery Guide*, SC41-0036, for more detailed information about reclaiming storage.

Displaying System Status

To help you decide when you need to perform additional cleanup tasks, display the status of the system. To display the system status, type `go managesys` on any command line and press the Enter key. Then select option 1 (Display system status). You can also use the Display System Status (DSPSYSSTS) command.

Figure 11-31 shows the Display System Status display.

Note: You can change information about the current status of the system with the Work with System Status (WRKSYSSTS) command.

```
                          Display System Status                  SYSTEM01
                                                        11/26/91  11:27:08

Disk space:
  System storage (in 1,000,000 bytes)  . . . . . :      5050
  System storage used  . . . . . . . . . . . . . : B 91.34%

Users:
  Signed on  . . . . . . . . . . . . . . . . . . :        16
  Temporarily signed off . . . . . . . . . . . . :         0
  Suspended by system request or group jobs  . . . . . . :         1
  Signed off with printer output waiting to print  . . . . :       380

Batch jobs: A
  Waiting for messages . . . . . . . . . . . . . :         1
  Running  . . . . . . . . . . . . . . . . . . . :        16
  Held while running . . . . . . . . . . . . . . :         1
  Ending . . . . . . . . . . . . . . . . . . . . :         0
                                                                    More...
Press Enter to continue.

F1=Help   F3=Exit   F5=Refresh   F12=Cancel   F21=Select assistance level
```

Figure 11-31. Display System Status Display

Two fields on this display can tell you it is time to do some additional cleanup:

A Batch jobs

This is different from actively running jobs. Batch jobs refers to any job that has not been entirely removed from the system. The OS/400 licensed program keeps a record of a job until everything associated with it, including printer output, job logs, and messages, has been deleted.

Check the total number on a regular basis. If you are running cleanup regularly, it should not continue to grow. If it does continue to grow larger, you may be missing some objects in your cleanup process. Look for printer output, messages, and job logs in particular.

B System storage used

This refers to how much of the disk storage on your system is used. For optimum performance, try to keep this number below 70% to 80%.

Running Your Own Cleanup Programs Automatically

You can incorporate your own cleanup programs into the IBM-supplied automatic cleanup function using the QEZUSRCLNP job. Then, whenever the system runs automatic cleanup, it also runs your own cleanup programs.

To add your cleanup programs to the automatic cleanup program supplied with the system:

1. Enter the Retrieve CL Source (RTVCLSRC) command and press F4 (Prompt).
2. Specify QEZUSRCLNP for the Program (PGM) parameter and QSYS for the library. Also type the name of the source file and library where you want source for the program to reside in the appropriate fields. Press the Enter key.
3. Insert statements that run your own cleanup programs into your copy of QEZUSRCLNP.

   Your statements should go after the SNDPGMMSG statement of CPI1E91. When your cleanup job has started and ended, messages are sent to the system operator (QSYSOPR) message queue.
4. Compile your copy of the QEZUSRCLNP program and store it in a library that appears before QSYS in the system part of the library list, as defined by system value QSYSLIBL.

Whenever the system runs the Automatic Cleanup function, your version of QEZUSRCLNP is also run.

Monitoring User Clean Up

If you have the proper authority, you can use two CL commands to help you monitor some of the user objects that accumulate on your system:

Work with Objects by Owner (WRKOBJOWN)
: This command provides a list of all of the objects owned by a user profile. You can use option 8 (Display description) to find out when an object was created and when it was last changed.

Display Library (DSPLIB)
: This command gives you a list of all the objects in a library. You can use the display option to find out when a particular object was created and when it was last changed. This command is useful in monitoring user libraries.

Performance Tuning

You can improve the way your system runs by observing the performance of your system and tuning it to increase performance. You can have your system tune itself automatically or it can be tuned manually.

Manual system tuning requires planning and an understanding of what affects performance on your system. For information on how to manually tune your system, see the *Work Management Guide*. For information about the Performance Tools/400 licensed program, see the *Performance Tools/400 Guide*.

Automatic Performance Tuning

The AS/400 system can automatically tune itself. The methods available for automatic performance tuning are:

- Initial program load (IPL) adjustments
- Dynamic adjustments

The performance adjustment system value (QPFRADJ) determines whether you tune your system automatically or manually.

Note: To see the results of automatic tuning, set up your system to record any changes it makes in a journal. The *Work Management Guide* provides information about how to do this.

Adjusting Performance at Initial Program Load (IPL)

To enable the system to do initial tuning for you, set the QPFRADJ system value to '1'. For information on how to change system values, see "System Values that Control IPL" on page 2-13.

Each time you do an IPL, the system looks at how much main storage you have and what communications hardware and software you are using. The system also checks your controlling subsystem value.

If the QPFRADJ system value is set to '1', the system uses the configuration information to set the pool sizes and activity levels on your system. No further performance adjustments occur until you do an IPL again, select dynamic performance adjustments, or run CL commands that change performance values.

Adjusting Performance Dynamically

If you want the system to dynamically make performance adjustments, set the system value QPFRADJ to '2' or '3'. When the system value QPFRADJ is set to '2' or '3', the system periodically examines the machine configuration, the active jobs, storage requirements, and other performance information. The system then makes performance adjustments, as necessary, to improve resource utilization on the system. If you do not IPL your system often, use this method rather than using IPL performance adjustments.

Managing Your Problem Log

The problem log can include many problem entries that are old and not considered to be current problems. You should change journal receivers and delete problem log entries that are more than 30 days old to reduce the size of the problem log and to avoid using your storage for problem information that is no longer needed. The automatic cleanup function can help with this. For information on how to set up automatic cleanup, see "Setting Up Automatic Cleanup" on page 11-34. To reduce the size of the problem log:

- Use the Change Journal (CHGJRN) command to change your journal receivers. See "Changing the Journal Receiver for the Problem Log."
- Use the Delete Problem (DLTPRB) command to delete the entries from the problem log. See "Deleting Entries from the Problem Log" on page 11-53.
- Use the Change Message Description (CHGMSGD) command to specify whether you want problem entries put into the error log.

If you do not change journal receivers and delete problem log information that is more than 30 days old, you may receive an error message and you may notice that your jobs and programs take longer to process. See "Cleaning Up System Journals, System Logs, and PTFs Automatically" on page 11-38 for information on the Operational Assistant automatic cleanup function provided.

Changing the Journal Receiver for the Problem Log

The OS/400 licensed program journal support is used to log information that can be used to track changes and processing done on the local system problem log. A journal (QSXJRN) and a journal receiver (QSXJRN0001) are shipped in the QUSRSYS library. You are responsible for changing the journal receiver. Do this approximately every 30 days or when the journal receiver is full by using the Change Journal (CHGJRN) command.

Note: Do not delete a journal receiver until it is at least 30 days old.

Although the size of the journal receiver is limited only by the system capacity and the maximum size of files, a message is sent to the system operator when the journal receiver exceeds 10 megabytes. Even after this limit is reached, journaling to the receiver can continue until the file limits are reached.

You can change the journal receiver while the journaling function is active. If journaling is stopped, the next time the problem log is used journaling is started again automatically. This is because the commitment control support used by the problem log manager is dependent on information in the journal receiver. If access to the problem log is attempted while commitment control is on, the attempted access fails.

For more information on journaling and changing journal receivers, see the journal management chapter in the *Advanced Backup and Recovery Guide*.

Deleting Entries from the Problem Log

To delete problem log entries:

1. Enter the Delete Problem (DLTPRB) command and press F4 (Prompt).
2. Type the status of the problems you want deleted, such as opened, ready, prepared, or sent, on the Delete Problem display. *ALL is the default parameter value.
3. Type a number for the *Days* field. The system deletes problems that have been open for this number of days. If you specified problems with a status of `Closed`, the system deletes problems that were closed this number of days ago.

   Note: The system value QPRBHLDITV specifies the minimum number that can be used for the *Days* prompt. If the number of days specified for the *Days* prompt is less than the number specified in the system value QPRBHLDITV, the number in the system value will be used instead. To display or change the value specified in QPRBHLDITV, see "System Values that Control IPL" on page 2-13.
4. Press the Enter key. The problems are deleted and your previous display is shown.

   Note: The amount of space used by the problem log files will not be reduced until the files are reorganized after the problem entries are deleted. For information about reorganizing the problem log files, see "Reorganizing Physical Files" on page 11-44.

See "Cleaning Up System Journals, System Logs, and PTFs Automatically" on page 11-38 for a list of the files that need to be reorganized.

Collecting and Printing Problem Information

If you have a problem while working on the system, you can collect and print the necessary information about the session for a technical support person to do problem analysis at a later time.

To collect problem information, select option 10 (Save information to help resolve a problem) on the Information and Problem Handling (USERHELP) menu.

The following information is collected and stored in the QUSRSYS/QEZDEBUG output queue:

- Entries in the history log QHST for the previous hour.
- Printer output from the following commands:
  - WRKACTJOB (Work with Active Jobs)
  - DSPMSG (Display Messages)
  - DSPMSG QSYSOPR (Display System Operator Messages)
  - DSPJOBLOG (Display Job Log—for each group job at your display station)
  - DSPJOB (Display Job—for each group job at your display station)
- Any service dumps (QPSRVDMP), program dumps (QPGMDMP), and job logs (QPJOBLOG) for this user.

Each printer output for this problem has a problem identifier associated with it. The problem identifier is the same name for each printer output collected for this problem. The problem identifier is the same as that of the problem log entry that is created to track your problem.

Printing the Error Log

If you have an error, you may want to print the error log. Your error log contains a list of errors that occurred on your system. By reviewing these errors, you may be able to determine the problem.

To print the error log:

1. Enter the Print Error Log (PRTERRLOG) command and press F4 (Prompt).
2. Type the parameter value for the kind of error log information you want to print on the Print Error Log prompt display.
3. Press the Enter key. The error log information is sent to the output queue identified in your user profile.
4. Type `go assist` to display the Operational Assistant menu.
5. Select option 1 (Work with printer output).
6. Look for the error log at or near the bottom of the printer output list on the Work with Printer Output display. Use option 5 (Display) to view the printer output.
7. Use option 10 (Start printing) on the Work with Printer Output display to print the error log.

Printing the System Configuration List

To print a system configuration list:

1. Use the Work with Hardware Products (WRKHDWPRD) command.
2. Select option 1 (Work with system configuration) on the Work with Hardware Products display.
3. Press F17 (Print) on the Work with System Configuration List display.
4. Type the name of the printer you want to use on the Specify Printer display and press the Enter key.

   Your system configuration list is sent to the output queue identified in your user profile.
5. Type `go assist` to display the Operational Assistant menu.
6. Select option 1 (Work with printer output).
7. Look for the configuration list at or near the bottom of the printer output list on the Work with Printer Output display. Use option 5 (Display) to view the printer output.
8. Use option 10 (Start printing) on the Work with Printer Output display to print the system configuration list.
9. Keep a printed copy of the system configuration list with the System Operator's Guide for your service representative.

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Chapter 12. Working with Program Temporary Fixes (PTFs)

IBM periodically creates program temporary fixes (PTFs) to correct problems or potential problems found within a particular IBM licensed program. PTFs may also fix problems that appear to be hardware failures.

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

PTFs packaged using the SystemView* System Manager/400 licensed program may also be available for non-IBM programs. See the *SystemView* System Manager/400 User's Guide* for information on this licensed program.

The program maintenance strategy discussed in this chapter applies specifically to IBM AS/400 system service and delivery.

AS/400 Program Maintenance Strategy

The AS/400 program maintenance strategy consists of preventive service and corrective service.

Preventive Service (Cumulative PTF Packages)

Preventive service helps you avoid problems that have been resolved since the start of the current release.

Cumulative PTF packages contain PTFs which affect the general system population. If a PTF provides a change for a limited set of users or requires special handling, it may not be included in the package. Cumulative PTF package application is useful for ensuring you have key changes and improvements for your system. The entire cumulative PTF package should be installed after you first load or reload Version 2 Release 3 on your system. Cumulative PTF packages can be ordered electronically or by telephone and are always sent by mail on a tape.

Cumulative PTF packages should be installed every three to four months if there is no change to the equipment or programs on your system. Between releases of cumulative PTF packages, IBM service support provides PTFs that may be important to your system. For information about these PTFs, see "Ordering Preventive Service Planning (PSP) Information" on page 12-9. You should periodically order preventive service planning information and review the PTFs listed. If any of these PTFs are needed for your system, you should order and install them.

Corrective Service

Corrective service corrects problems reported to IBM service support. If you have a problem with an IBM licensed program, you can describe the problem using the Analyze Problem (ANZPRB) command or the Work with Problem (WRKPRB) command. You can then report the problem electronically or by calling your service support representative. For more information on reporting problems, see Chapter 13, "Handling and Reporting System Problems."

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Ordering PTFs and PTF Information

Table 12-1 shows how to use the Send PTF Order (SNDPTFORD) command to order PTFs and PTF information. Details on how to order a PTF follow this table.

To process your PTF order in batch, use the Submit Job (SBMJOB) command.

Table 12-1. Getting PTFs and PTF Information

PTF Information	Command
Specific PTFs and cover letters	SNDPTFORD *nnnnnnn*[1]
PTF cover letter only	SNDPTFORD *nnnnnnn*[1] PTFPART(*CVRLTR)
PTF cross-reference summary list V2R1M0 to V2R3M0 V2R1M1 to V2R3M0 V2R2M0 to V2R3M0	SNDPTFORD SF97042 SNDPTFORD SF97051 SNDPTFORD SF97060
Cumulative PTF packages	SNDPTFORD SF99*vrm*[2]
PSP information for licensed programs	SF98*vrm*[2]
PSP information for Licensed Internal Code	MF98*vrm*[2]
PTF summary list	SF97*vrm*[2]

Notes:

1 *nnnnnnn* is the PTF identifier. You can order up to 20 PTFs at a time.

2 *v* is the version, *r* is the release, and *m* is the modification level of the system. For Version 2 Release 3, type 230.

Ordering Individual PTFs and Cover Letters

To order individual PTFs and cover letters electronically, type the following command on any command line and press the Enter key:

```
SNDPTFORD nnnnnnn
```

where nnnnnnn is the number of the individual PTF you want to order. You can order up to 20 PTFs at a time.

When you receive PTFs electronically on your service support communications line, they are placed in a save file in library QGPL. The save file name is the PTF identifier prefixed with a **Q**. For example, the save file for PTF identifier SFnnnnn is QSFnnnnn.

Notes:

1. If the PTF files are too large to be delivered electronically, they are delivered on magnetic tape.
2. For non-IBM PTFs, there is a chance that duplicate PTF identifiers could be created. In this case, the first one will be **Q** plus the PTF identifier and the second one will be **Q** plus the timestamp.
3. When you order a PTF that has been replaced (superseded) with another PTF, you receive the ordered PTF, not the replacement PTF. To identify PTFs that have been replaced (superseded), consult the PTF summary list.

Ordering a PTF Cover Letter Only: To order a PTF cover letter without ordering the PTF, type the following command on any command line and press the Enter key:

```
SNDPTFORD nnnnnnn PTFPART(*CVRLTR)
```

Copying PTF Cover Letters from Magnetic Tape

PTFs on magnetic tape are sent by mail. A shipping information letter is included with the tape. Each PTF on the tape may also have a cover letter.

Copy the cover letter into file QAPZCOVER in library QGPL.

- If the tape contains multiple PTFs:
  1. Type the following on any command line:

     ```
     LODPTF LICPGM(XXXXXXX) DEV(TAPYY) COVER(*ONLY) ENDOPT(*LEAVE)
     ```

     where XXXXXXX is the licensed program number found in the shipping information letter and YY is the tape unit ID.
  2. Repeat step 1 for each licensed program PTF cover letter on the tape except the last licensed program PTF cover letter.
  3. For the last PTF cover letter on the tape, change ENDOPT(*LEAVE) to ENDOPT(*REWIND).

     Note: If you are using this function to simultaneously load PTFs and copy PTF cover letters, change COVER(*ONLY) to COVER(*YES). This loads the PTF and copies the cover letter into a physical file. You must then specify the PTF sequence number for the Sequence number (SEQNBR) parameter. Your PTF sequence number is in the cover letter that comes with your tape. For each PTF package, you need to specify the correct sequence number.
- If the tape contains only one PTF, type the following on any command line:

  ```
  LODPTF LICPGM(XXXXXXX) DEV(TAPYY) COVER(*ONLY)
  ```

  where XXXXXXX is the licensed program number, and YY is the tape device ID.

Displaying and Printing PTF Cover Letters

To display or print PTF cover letters:

1. Enter the Display Program Temporary Fix (DSPPTF) command and press F4 (Prompt).
2. Specify the product, PTF identifier, and release for the appropriate parameters on the Display Program Temporary Fix (DSPPTF) display.
3. Specify *YES for the Cover letter only (COVERONLY) parameter and press the Enter key to display the letter or specify *PRINT for the Output (OUTPUT) parameter to print it.

You can also print a PTF cover letter using the following command:

```
DSPPTF LICPGM(xxxxxxx) SELECT(yyyyyyy) COVERONLY(*YES) OUTPUT(*PRINT)
```

where xxxxxxx is the licensed program number, and yyyyyyy is the PTF identification number.

For example, if you wanted to print the SF97 file, type the following command on any command line:

```
DSPPTF LICPGM(5738SS1) SELECT(SF97230) COVERONLY(*YES) OUTPUT(*PRINT)
```

Note: Your output will be placed in the output queue that is associated with your job. The output is stored under the file name QSYSPRT. For more information on how to print your output, see "Where Is My Output and Why Won't It Print?" on page 5-6.

Figure 12-1 on page 12-6 shows the contents of a typical PTF cover letter from IBM. PTF cover letters from systems using the SystemView System Manager/400* licensed program appear different.

```
          5738SS1 5001 0000 SF04400 2924 R03M0
   XPF-DSPOBJD-CPF9999-DSPOBJD FUNCTION CHECKS WITH LIN(*) PARM

PTF/FIX # SF04400 - OS/400 - BASE SYSTEM
LICENSED PROGRAM: 5738SS1

-------------------------------------------------------------------------------
| SYSTEM  | MODELS | RELEASE | RECOMPILE | LIBRARY | MRI     | APAR
|         |        |         |           |         | FEATURE | FIXED
|         |        |         |           |         |         |
| AS/400  | *ALL   | V2R3M0  |    N      | QSYS    | 2937    | SA45678
-------------------------------------------------------------------------------
PRE/CO-REQUISITE PTF/FIX LIST
-----------------------------
   REQ   LICENSED  PTF/FIX
   TYPE  PROGRAM   NUMBER    LICENSED PROGRAM DESCRIPTION

   PRE   5738SS1   SF00000   OS/400 - BASE SYSTEM
   PRE   5738999   MF11111   LICENSED INTERNAL CODE
   CO    5738SS1   SF11111   OS/400 - EXTENDED BASE SUPPORT
   CO    5738CM1   SF22222   AS/400 - COMMUNICATIONS UTILITIES

DESCRIPTION OF PROBLEM FIXED FOR APAR SA45678:
----------------------------------------------
USERS CANNOT RECEIVE PTFS FOR PRODUCTS NOT INSTALLED
ON THEIR SYSTEMS.


CORRECTION FOR APAR SA45678:
----------------------------
ELECTRONIC CUSTOMER SUPPORT PROGRAM CODE WILL BE CHANGED SO THAT
PTFS WILL BE REQUESTED EVEN IF THE CORRESPONDING PRODUCTS ARE NOT
INSTALLED ON THE REQUESTING SYSTEM.


CIRCUMVENTION FOR APAR SA45678:
-------------------------------

NONE.


SPECIAL INSTRUCTIONS:
-------------------------------------
NONE.


DEFAULT INSTRUCTIONS :
----------------------
THIS PTF MUST BE APPLIED AT IPL TIME.

SUPERSEDES
PTF/FIX NO(S).   APAR TITLE LINE
--------------   ------------------------------------------------------
   SF04322       OSP-RSTS36F-MSGCPA2C6C RESTORING ALL FILES FROM SYSTEM/34
```

Figure 12-1. Sample PTF Cover Letter

Description

The following is a description of the information contained in a PTF cover letter:

PTF/Fix # The alphanumeric identifier for the program temporary fix (PTF) or Licensed Internal Code fix.

Licensed Program The alphanumeric identifier for the licensed program.

System The IBM system for which this PTF is valid.

Models The particular system model identifiers for which this PTF is valid.

Release The version, release, and modification number of the system for which this PTF is valid. For example, with V2R3M0, the following is true:

V2 is Version 2
R3 is Release 3
M0 is Modification 0

Recompile *Y* (Yes) means a recompile of affected objects is necessary after this PTF is applied.

N (No) means a recompile is not necessary after this PTF is applied.

Library The library the PTF is intended for.

MRI Feature The numeric identifier for the language feature of the language sensitive object affected by the PTF. *None* means language sensitive object is not affected.

APAR Fixed The number of the authorized program analysis report (APAR) for which this PTF was created.

Prerequisite PTF/Fix List
The information about the PTFs that must be applied on the system *before* this PTF can be applied.

Co-requisite PTF/Fix List
The information about other PTFs that must be installed at the same time as this PTF.

Description of Problem Fixed
A brief description of the problem this PTF fixes.

Correction A brief description of what has been done to correct the problem.

Circumvention A description, if applicable, of how to work around the problem and continue your operation without applying the PTF.

Special Instructions Any special information pertaining to this PTF.

Default Instructions Tells when the PTF can be applied; either at the next IPL (delayed) or immediately.

Supersedes PTF/Fix No(s)
The numbers of the PTFs that this PTF replaces or supersedes.

APAR Title Line The title of the authorized program analysis report (APAR) for the superseded PTF.

Printing Information APARs

Information APARs are created when there is a need to provide worldwide access to information. Typically, information APARs are created to describe pervasive user errors, provide recovery actions for non-defect situations, or explain system operation.

To print an Information APAR:

1. Type the following on any command line:

   `DSPPTF LICPGM(INFODSL) SELECT(xxxxxxx) OUTPUT(*PRINT)`

   where xxxxxxx is the name of the information APAR you are printing.
2. Press the Enter key. Your printer output will be placed in the output queue that is associated with your job.
3. On the Operational Assistant menu, select option 1 (Work with Printer Output). The Work with Printer Output display is shown.
4. Look in the Printer/Output column for the name of your spooled file or printer output. This file contains the information APAR.
5. If the file is held, you can print the information APAR by selecting option 6 (Release).

Ordering a Cumulative PTF Package

To order a cumulative PTF package electronically:

1. Identify your licensed program release level:
   a. Type `GO LICPGM` on any command line and press the Enter key.
   b. Select option 10 (Display installed licensed programs) on the Work with Licensed Programs display.
   c. The current version, release, and modification level is shown in the *Installed Release* column where **V** is the version, **R** is the release, and **M** is the modification level.

      Note: If a version number is not displayed, you are using version 1.
2. Type `SNDPTFORD SF99VRM`, where `VRM` is the version, release, and modification level you found in step 1.

   For example, for Version 2 Release 3 Modification 0, type `SNDPTFORD SF99230`.
3. Verify the shipping information on the Verify Contact Information display. If any of the information is incorrect, change it and press the Enter key.
4. Select option 1 (Send service request now) on the Select Reporting Option display. This places the PTF order.

Ordering the PTF Cross-Reference Summary List

The **PTF cross-reference summary list** itemizes PTFs from an earlier release that are included in the current release. Use this list to make sure you order any PTFs for the new release that you had at the previous release, but are not included in the list. These PTFs will not have the same number, but they correct the same problem.

To order this list electronically, select the version and release you are moving from and use the corresponding command.

Moving From	Command
Version 2 Release 1	SNDPTFORD SF97042
Version 2 Release 1.1	SNDPTFORD SF97051
Version 2 Release 2	SNDPTFORD SF97060

Ordering Preventive Service Planning (PSP) Information

Preventive service planning (PSP) information is a collection of information that is used when installing a licensed program, cumulative PTF package, or hardware. PSP information should be reviewed before installing a licensed program, a cumulative PTF package, or hardware. You should periodically order preventive service planning information and review the PTFs listed. If any of the PTFs are needed for your system, you should order and install them.

To order PSP information, use the following commands:

Licensed programs	SNDPTFORD SF98*vrm*
Licensed Internal Code	SNDPTFORD MF98*vrm*

where *vrm* is version, release, and modification level. For Version 2 Release 3 Modification 0, use 230.

To print preventive service planning (PSP) information, use the instructions for printing and displaying PTF cover letters found in "Displaying and Printing PTF Cover Letters" on page 12-5. The PSP information is placed in QAPZCOVER when it is sent to you.

Preventive service planning information is available for:

- Licensed programs installation
- Licensed Internal Code
- System equipment
- Cumulative PTF packages
- PTFs in error (PE)
- High impact or pervasive (HIPER) problems

These PSPs can be ordered through your software service provider or by using the electronic customer support function.

Preventive service planning information includes the following:

Installation Information	Information concerning upgrade and new installation, including information about cumulative PTF package installation.

General Information	Hints or tips for working with PTF packages or products.
PTFs in error	Information about all PTFs found to have a problem, the users that will be affected by the problem, and recommendations on how to avoid the problem.
Service recommendations	Detailed information about critical PTFs you need to install.

You should get this information before you install or upgrade system equipment and licensed programs to ensure that you have all the latest information that is applicable for the new program or cumulative package.

Carefully review the following sections of the PSP before installing the cumulative package:

Service Recommendations: This section lists those High Impact PERvasive (HIPER) problems that have been discovered in the base code since shipment and not included in this cumulative package. As before, these recommendations should be reviewed based on your system's setup and configuration.

PTFs in Error (PE): This section contains a list of PTFs that are included on this cumulative package that, since shipment, have been found to be defective. You have two options: decide you may not want to apply those PTFs in error or you can install the corrective PTFs, if available. This section lists the defective PTF, the users affected, the reason the PTF is defective, and the recommended action to take.

The PSP information also contains a list of PTF identifiers to order PSP information for Licensed Internal Code and system equipment, licensed programs installation, and PSPs for older cumulative packages.

Ordering the PTF Summary List

A **PTF summary list** is a cover letter that contains a list of PTFs that affect most system users. Use the PTF summary list to identify PTFs you may want to order. The PTF summary list also identifies the current PTF package and what package each PTF was included in.

To order the PTF summary list, use the following command:

```
SNDPTFORD SF97vrm
```

where `vrm` is version, release, and modification level. For Version 2 Release 3, use `230`.

Finding the Status of PTF Orders

To find the status of PTF orders:

1. Use the Work with Problem (WRKPRB) command.
2. All PTFs that you requested and have been sent (either electronically or through the mail) are identified in the *Problem Description* column as `Fix Request` on the Work with Problems display.
3. Use option 5 (Display details) for the problem with the problem description `Fix Request`.

4. Press F9 (Display PTFs) on the Display Problem Details display.

   All PTFs related to the problem you selected are shown on the Display PTF information display. This includes the PTFs you ordered, in addition to any others requested that are not already on your system.

Installing PTFs

PTF installation includes two steps: load and apply. With the following instructions, PTFs are loaded and applied for you automatically.

Before You Start

- Have a current backup of your operating system and licensed programs. If you have backed up the operating system since the last time you applied PTFs, that backup is acceptable.
- Have all users sign off the system. If you fail to have all users sign off the system and someone else is doing a PTF operation, the cumulative PTF package will not load.
- Be sure you have security officer (*SECOFR) user class. You need it to do the following steps.

Installing Licensed Internal Code Fixes

The system maintains two copies of all Licensed Internal Code on the system. One copy is considered the permanent copy and is stored on system **storage area A**. The other copy is considered the temporary copy and is stored on system **storage area B**. When the system is running, it uses the copy that was selected before the last IPL.

A **B** in the Data display on the front panel of the system unit indicates that the next system IPL will be made from the **B** or temporary storage area. The **B** storage area contains any Licensed Internal Code fixes that have been temporarily or permanently applied. Temporary Licensed Internal Code fixes can be applied permanently (copied to the **A** storage area) or be permanently removed.

For the system to use the latest Licensed Internal Code fixes that are temporarily applied, you must be running on the **B** storage area. If you are already running on the **B** storage area, you do not need to perform an IPL to the **A** storage area to temporarily apply Licensed Internal Code fixes. The system does an IPL from the **A** storage area and then to the **B** storage area automatically. This is done when Licensed Internal Code fixes are set to be temporarily applied and a normal IPL to the **B** storage area has been started. In this case, an IPL to the **B** storage area takes longer. If you are not running on the **B** storage area, type the following command on any command line and press the Enter key:

```
PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
```

To install Licensed Internal Code fixes received on tape, electronically, or previously loaded, follow the instructions below:

1. Print and read each cover letter. For information on how to do this, see "Displaying and Printing PTF Cover Letters" on page 12-5.

2. If there are any pre-installation special instructions in any of the cover letters, follow those instructions first.

   Note: Do not cancel any of the following steps once they are started. Allow each step to complete normally.

   If shipping information letters are included with the PTF tape you received, follow the instructions in the letters to install the PTFs. If the shipping information letters are not included with the tape, continue with the following instructions.

3. Determine the storage area you are currently using:

   a. Type `dspptf 5738999` on any command line and press the Enter key.

   b. On the Display PTF Status display, the storage area is identified in the *IPL source* field. ##MACH#A is the **A** storage area and ##MACH#B is the **B** storage area.

   c. If you are not running on the **B** storage area, type the following command on any command line and press the Enter key:

   ```
   PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
   ```

4. Type `go ptf` on any command line and press the Enter key.

5. Select option 8 (Install program temporary fix package) on the Program Temporary Fix (PTF) display.

6. If the PTF was delivered electronically, type `*service` in the *Device* field. If the PTF was delivered on a tape, type `tapyy`, where `yy` is the name of the tape unit (for example, `tap01`) where you loaded the PTF tape.

   - If you do not want to install certain PTFs, specify `N` (No) in the *Automatic IPL* field. To remove Licensed Internal Code fixes you do not want applied, see "Removing Licensed Internal Code Fixes and OS/400 Licensed Program PTFs" on page 12-24.
   - If you have additional PTFs to install at this time, type an `N` (No) in the *Automatic IPL* field and install the additional PTFs. If you do not have additional PTFs to install at this time, type a `Y` (Yes) in the *Automatic IPL* field.

7. Press the Enter key.

   After the IPL has finished, see "Verifying PTF Installation" on page 12-13 to verify that the PTFs are installed. If there are any post-installation special instructions in the cover letter, follow those instructions at this time.

Installing Licensed Program PTFs

To install licensed program PTFs received on tape, electronically, or previously loaded, follow the instructions below:

1. Print and read each cover letter. For information on how to do this, see "Displaying and Printing PTF Cover Letters" on page 12-5.

2. If there are any pre-installation special instructions in any of the cover letters, follow those instructions first.

   Note: Do not cancel any of the following steps once they are started. Allow each step to complete normally.

3. Type `go ptf` on any command line and press the Enter key.

4. Select option 8 (Install program temporary fix package) on the Program Temporary Fix (PTF) display.
5. If the PTF was delivered electronically, type `*service` in the *Device* field. If the PTF was delivered on a tape, type `tapyy`, where `yy` is the name of the tape unit (for example, `tap01`) where you loaded the PTF tape.
   - If you do not want to install certain PTFs, specify `N` (No) in the *Automatic IPL* field. To remove Licensed Internal Code fixes you do not want applied, see "Removing Licensed Internal Code Fixes and OS/400 Licensed Program PTFs" on page 12-24.
   - If you have additional PTFs to install at this time, type an `N` (No) in the *Automatic IPL* field and install the additional PTFs. If you do not have additional PTFs to install at this time, type a `Y` (Yes) in the *Automatic IPL* field.
6. Press the Enter key.

   After the IPL has finished, see "Verifying PTF Installation" to verify that the PTFs are installed. If there are any post-installation special instructions in the cover letter, follow those instructions at this time.

Verifying PTF Installation

You can use the history log to verify that your Licensed Internal Code and licensed program PTFs have been installed correctly. To display the history log:

1. Enter the Display Log (DSPLOG) command and press F4 (Prompt).
2. On the Display Log (DSPLOG) display, specify QHST for the Log (LOG) parameter.
3. Specify the time and date at which you want the history log to start displaying entries for the Time period for log output (PERIOD) parameter.
4. Press the Enter key. The history log is shown.
5. Look for messages regarding the PTF installation. If you have problems, see "When Your PTFs Do Not Install" on page 12-15.

Installing a Cumulative PTF Package

A cumulative PTF package is on magnetic tape and is sent by mail. Cumulative PTF packages should be installed every three to four months if there is no change to the equipment or programs on your system. If your system changes, order and install the current cumulative PTF package to keep your system at the most current PTF level.

To install cumulative PTF packages:

- Read the PTF shipping information letter thoroughly and follow the instructions contained in it.

Displaying or Printing the Cumulative PTF Package Summary

To print or display the summary of PTFs contained in a cumulative PTF package:

1. Load the cumulative PTF package tape in the tape unit and on any command line type:

```
CPYFRMTAP FROMFILE(QTAPE) TOFILE(QPRINT) FROMSEQNBR(3) FROMDEV(TAPYY)
FROMREELS(*SL)
```

where YY is the tape unit ID (for example, TAP01) in which you loaded the PTF tape.

2. A copy of the PTF summary is put into a system output queue from which you can print or display the PTF summary information.

Installing High-Impact Pervasive (HIPER) PTFs from a Cumulative PTF Package

To install both high-impact pervasive (HIPER) PTFs and HIPER Licensed Internal Code fixes, follow the PTF installation instructions in the shipping information letter. When you are on the Install Options for Program Temporary Fix display, specify 2 for the *PTF type* field. To install only HIPER Licensed Internal Code fixes, specify 3 for the *PTF type* field.

Verifying Installation of the Cumulative PTF Package

After completing the last IPL in the installation instructions, to verify that the PTF package was properly installed:

1. Type `go licpgm` on any command line and press the Enter key.
2. Select option 50 (Display log for messages) on the Work with Licensed Programs display.
3. Fill in the start date and start time on the Display Install History display and press the Enter key.
4. On the Display History Log Contents display, if the cumulative PTF package was installed successfully, you see messages like the following:

```
Licensed program or PTF installation process started.
Loading of PTFs completed successfully.
Marking of PTFs for delayed application started.
Marking of PTFs for delayed application completed successfully.
Apply PTF started.
Applying of PTFs for product 5738xxx completed successfully.
Applying of PTFs for product 5738xxx completed successfully.
Applying of PTFs for product 5738xxx completed successfully.
  :
Applying of PTFs completed.
```

If the cumulative PTF package was not installed successfully, you see error messages like the following.

```
Licensed program or PTF installation process started.
Loading of PTFs failed.
Marking of PTFs for delayed application started.
Marking of PTFs for delayed application failed.
Apply PTF started.
  :
Applying of PTFs failed for product 5738BA1.
  :
Applying PTFs failed.
```

When Your PTFs Do Not Install

To determine the cause of the failure, place the cursor on the previous message and press F10 (Display all).

Note: If F10 (Display all) is not available, switch to intermediate assistance level using F21 (Select assistance level) and try again.

A new message is shown that helps you find out what errors occurred. Use the Help key to display additional message information.

PTF activity does not occur during an unattended IPL that immediately follows an abnormal system end. For information on what causes an abnormal IPL, see "What Causes an Abnormal IPL?" on page 2-22. If an abnormal IPL occurs, and Licensed Internal Code fixes were ready to be applied, the Licensed Internal Code fixes will not be applied. Do one of the following:

- To apply the Licensed Internal Code fixes after an abnormal IPL to storage area **A**:
  1. Enter the following command:

     ```
     APYPTF LICPGM(5738999)
     ```

  2. Enter the following command to do an IPL to the **B** storage area:

     ```
     PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
     ```

     This applies to all of the remaining Licensed Internal Code fixes.
- To apply the Licensed Internal Code fixes after an abnormal IPL to storage area **B**:
  1. Enter the following command:

     ```
     PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
     ```

     The system does an IPL to the **A** storage area to temporarily apply the Licensed Internal Code fixes, then automatically does an IPL back to the **B** storage area.

Remember:

- Licensed Internal Code fixes are not applied if PWRDWNSYS RESTART(*NO) is specified.
- Use of the Power On and Off Tasks (POWER) menu to apply a PTF will not run the appropriate PWRDWNSYS command. You must specify PWRDWNSYS RESTART(*YES) IPLSRC(B) to perform an IPL to the system.
- PTFs are applied if at least one PTF has already been loaded for the licensed program. Therefore, for the Apply PTF (APYPTF) command to complete, at least one PTF must be loaded for the licensed program.
- Print the SCPF job log and keep it for reference if your PTFs do not install. For information on how to print a job log, see "Printing a Job Log" on page 4-18. Any error messages sent during the IPL are recorded in this job log.

Displaying PTF Status

To determine the status of the PTFs on your system:

1. Enter the Display PTF (DSPPTF) command and press F4 (Prompt).
2. Specify the licensed program number and PTF identifier for the product (LICPGM) parameter and for the PTF numbers to select (SELECT) parameter. If you want to see the status for all the products on the system, specify *ALL for both parameters and press the Enter key until all the licensed programs are displayed.
3. The Display Program Temporary Fix display shows the action that will be taken for a PTF at the next unattended IPL.

The status of a PTF can be:

`On order`	Ordered but not received by the system. They may reside on a tape, be sent electronically, or copied from a tape.
`Cover letter only`	A cover letter exists for the PTF.
`Save file only`	PTF exists in a save file in library QGPL.
`Not applied`	Loaded but not applied.
`Temporarily applied`	Applied temporarily
`Permanently applied`	Applied permanently
`Superseded`	PTF is replaced by another.
`Damaged`	A PTF object cannot be found (perhaps accidentally removed). The PTF must be loaded again before you can apply it or remove it.

Displaying the Cumulative PTF Package Level of Your System

The cumulative PTF package level of your system refers to the identifier of the latest cumulative PTF package installed on your system. To determine the cumulative PTF package level of your system:

1. Enter the following command:

   ```
   DSPPTF LICPGM(5738SS1)
   ```

2. The *PTF ID* column on the Display PTF Status display lists the identifiers for all of the cumulative PTF packages installed on your system. Cumulative PTF packages start with the letter T.

   The last four digits of the cumulative package ID indicate the release date of the package, using the Julian calendar. Therefore, the latest cumulative PTF package is the one where the last four digits are the highest. For example, if you are using Version 2 Release 3 Modification 0, and you have PTF TC92178 installed on your system, your cumulative PTF package level is TC2178230 (230 is added to the end of the package ID to indicate Version 2 Release 3 Modification Level 0).

   Note: PTF IDs that start with the letters TC indicate that the entire tape has been applied. PTF IDs that start with the letters TA indicate that the HIPER PTFs and HIPER Licensed Internal Code fixes have been applied. PTF IDs that start with the letters TL indicate that the HIPER Licensed Internal Code fixes have been applied. To find the level of Licensed Internal Code fixes on your system, enter `DSPPTF 5738999`.

System Storage Areas A and B

The system maintains two copies of all Licensed Internal Code on the system. One copy is considered the permanent copy and is called system storage area **A**. The other copy is considered the temporary copy and is called system storage area **B**. When the system is running, it uses the copy that was selected before the last IPL.

A **B** in the Data display on the front panel of the system unit indicates that the next system IPL will be made from the **B** or *temporary* storage area. The **B** storage area contains any Licensed Internal Code fixes that have been temporarily or permanently applied. Temporary Licensed Internal Code fixes can be applied permanently (copied to the **A** storage area) or be permanently removed.

Note: For the system to use the latest Licensed Internal Code fixes that are temporarily applied, you must be using the **B** storage area. The **B** storage area is what you normally will be using. Select the **A** storage area if the IPL to the **B** storage area fails because of a temporarily applied Licensed Internal Code fix.

Selecting the A or B Storage Area

The PTF process described in "Installing PTFs" on page 12-11 controls the storage areas for you. However, you can change the storage area on the command line or the control panel:

- Command line:

  ```
  PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(X)
  ```

  Where `X` is the storage area you want to select.

  Note: A PTF can only be applied during an IPL using the previous command. A PTF does not apply during an IPL you perform using the power on and off schedule on the Power On and Off Tasks (POWER) menu.

- Control panel:

  1. Turn the keylock switch on the control panel to the Manual position.
  2. Press the Select switch until 02 is displayed in the Function display or Function/Data display on the control panel.

     Note: There are two Select switches on the 9404 Server Series Models 135 and 140 System Units; one switch increases the values in the Function display and one decreases those values.

  3. Press the Enter button on the control panel.
  4. Press the Select switch (or switches) until the character appears (in the Data display or Function/Data display on the control panel) that represents the storage area you want to use for your IPL source (A or B).
  5. Press the Enter button on the control panel.

     Note: The character disappears from the Data display or Function/Data display when you press the Enter button.

  6. Turn the keylock switch on the control panel to the Normal position.
  7. Power off the system using option 4 (Power off the system and immediately power on) on the Power On and Off Tasks (POWER) menu.

Wait for the system to power down and automatically start an IPL. You see the Sign On display when the IPL is complete. The storage area is now changed.

Advanced PTF Topics

This section includes information on how to load and apply PTFs, remove PTFs, and distribute PTFs to remote systems.

PTF installation includes two steps: **load** and **apply**. The easiest way to install PTFs is to follow the instructions found in "Installing PTFs" on page 12-11. If you follow these instructions, the PTFs are loaded and applied for you automatically.

Occasionally, you may need to install PTFs by loading them first and applying them later. The following sections give you information on how to load and apply PTFs under special circumstances. If you do not need to use the load and apply steps separately, use "Installing PTFs" on page 12-11 to install your PTFs.

Loading PTFs

If you decide to load and apply an individual PTF from a cumulative package, be aware that there may be multiple product files on the same tape, some of which contain high-impact pervasive (HIPER) and non-HIPER PTFs and fixes. Because of this, the PTF or fix you want may not be located in the first product file on the tape. When loading individual PTFs from the package, specify ENDOPT(*LEAVE) on the Load Program Temporary Fix (LODPTF) command and repeat the command until the desired PTF is found.

The PTF packages on tape or in a save file can contain many PTFs. You can load one, some, or all of them using the Load Program Temporary Fix (LODPTF) command. As PTFs are loaded, the system verifies that the release of the product is correct. PTF status will be `Not applied` after the PTF has been loaded on the system. Use the Apply Program Temporary Fix (APYPTF) command to make the PTF active.

Loading Individual PTFs from a Cumulative PTF Package

To load one PTF from a cumulative package:

1. Enter the Load PTF (LODPTF) command and press F4 (Prompt).
2. Specify the parameter values according to the PTF you are loading.
3. Specify the PTF identifier you want to load in the PTF numbers to select (SELECT) parameter and press the Enter key.
4. Repeat the Load PTF (LODPTF) command for each PTF you want loaded from the cumulative tape.

You can also use the Load PTF (LODPTF) command to specify the PTFs by the sequence number found in the cover letter that comes with the tape. In the PTF numbers to select (SELECT) parameter, specify the PTF you want. Specify the sequence number for the sequence number (SEQNBR) parameter. You need to specify the correct sequence number for each PTF in the cumulative package.

Loading PTFs that Supersede Other PTFs

If the PTF being loaded replaces (supersedes) existing PTFs (identified in the PTF cover letter) the following considerations apply:

- If the PTF to be replaced is *not applied* to the system, the new PTF can be loaded successfully. A record is kept indicating that the replaced PTF has been superseded.
- If the PTF to be replaced is *permanently applied*, it is considered to be a part of the operating system or licensed program to which it was applied. The new PTF can be loaded successfully.
- If the PTF to be replaced is *temporarily applied*, the load operation will automatically permanently apply any replaced (superseded) PTFs. If you do not want the PTF function to permanently apply any replaced (superseded) temporarily applied PTFs automatically, specify *NOAPY for the Superseded PTFs (SPRPTF) parameter on the Load Program Temporary Fix (LODPTF) command. The PTFs to be replaced must either be permanently applied or temporarily removed before PTFs that are replacing them can be loaded.

Note: IBM service support does not support the ordering of PTFs that replace other PTFs. Use the summary list to identify a PTF you need to order. Scan the summary list for PTFs that replace the PTF in question and then order the PTF. For more information on how to order a PTF, see "Ordering PTFs and PTF Information" on page 12-2.

Applying PTFs

Some PTFs cannot be applied immediately because the operating system or licensed programs they affect are active. These PTFs are called **delayed** PTFs and can be applied at the next system initial program load (IPL). **Immediate** PTFs can be applied without doing an IPL if the licensed program they affect is not in use, or may be applied like delayed PTFs when you do the next IPL. To reset the IPL action for delayed PTFs, use the Apply PTF (APYPTF) command, specifying *YES for the Delay (DELAY) parameter.

A PTF does not apply during an IPL when you use the power on and off schedule on the Power On and Off Tasks (POWER) menu. A PTF can only be applied during an IPL when you use the following command to IPL the system:

```
PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
```

When you use the Power On and Off Tasks (POWER) menu to apply a PTF during an IPL, the system does not run the appropriate PWRDWNSYS command.

PTFs can be **applied** (made active) on either a **temporary** or **permanent** basis. If the PTF is applied temporarily, a copy of the object being changed is saved. If the PTF is applied permanently, the old object is removed. Permanently applied PTFs cannot be removed.

PTFs generally should be applied temporarily when received. Applying PTFs temporarily allows you to test them in your operational environment. You should ensure that the new PTFs operate properly on your system before applying them permanently. As long as the PTFs are applied temporarily, they can be removed. Once they have been applied permanently, they cannot be removed.

When you are sure that the PTFs work properly, you might want to apply them permanently to reduce the time required to install the next cumulative PTF package, and to make available the storage used by the temporary copy. Temporarily applied Licensed Internal Code fixes are only in effect when you use the **B** storage area to perform an IPL.

Note: You cannot apply or remove PTFs with mandatory special instructions when *ALL is specified on the PTF numbers to select (SELECT) parameter of Apply Program Temporary Fix (APYPTF) or Remove Program Temporary Fix (RMVPTF) commands. These PTFs are only applied or removed when they are specified by a number on the SELECT parameter. This protects against applying or removing PTFs without reading the mandatory special instructions.

Applying PTFs Temporarily or Permanently during an Unattended IPL

You can apply both delayed and immediate PTFs temporarily or permanently that have a status of `Not applied` during an unattended IPL.

To apply delayed PTFs temporarily, type the following command on any command line and press the Enter key: `APYPTF LICPGM(*ALL) SELECT(*ALL) APY(*TEMP) DELAYED(*YES) IPLAPY(*YES)`

To permanently apply all PTFs that are temporarily applied (status of `Temporarily applied`) during the next unattended IPL, or to permanently apply all immediate PTFs that have a status of `Not applied` during the next IPL, type the following command on any command line and press the Enter key:

```
APYPTF LICPGM(*ALL) SELECT(*ALL) APY(*PERM) DELAYED(*YES) IPLAPY(*YES)
```

Type the following command and press the Enter key to perform an IPL on the system.

```
PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
```

If you use the Power On and Off Tasks (POWER) menu to apply a PTF during an unattended IPL, the system will not run the appropriate PWRDWNSYS command. You must specify PWRDWNSYS RESTART(*YES) IPLSRC(B) to perform an IPL on the system.

Note: If you specify LICPGM(*ALL) and SELECT(*ALL), you ensure that PTF dependency checking takes place for prerequisite Licensed Internal Code fixes.

Applying PTFs Temporarily or Permanently during an Attended IPL

You can apply both delayed and immediate PTFs temporarily or permanently that have a status of `Not applied` during an attended IPL.

To apply a delayed PTF temporarily, you only need to do one IPL. To apply a delayed PTF permanently after it has been applied temporarily and tested, you need to do another IPL.

Before You Start

- Send a message to users notifying them to sign off the system.
  1. Type `go managesys` on any command line and press the Enter key.
  2. Select option 12 (Work with Signed-On Users) on the Manage Your System, Users, and Devices (MANAGESYS) menu.
  3. Press F10 (Send message to all) on the Work with Signed-On Users display.

     Note: If the Work with User Jobs display is shown, you are in the intermediate assistance level. To get to the Work with Signed-On Users display, press F21 (Select assistance level) and select the basic assistance level.
  4. Type the message in the *Message text* field and press F10 (Send).
- Use the Work with User Jobs display to determine if there are other jobs or programs running on the system.
  1. Enter the Work with User Jobs (WRKUSRJOB) command.
  2. Use option 4 (End) for the jobs you want to end on the Work with User Jobs display.

To apply a PTF temporarily or permanently during an attended IPL:

1. Move the keylock switch on the control panel of the system unit to the Manual position.

   If you are temporarily applying or permanently removing Licensed Internal Code fixes, select storage area **A**. If you are permanently applying Licensed Internal Code fixes, select storage area **B**.
2. Type `PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(x)`, where `x` is your storage area, on any command line and press the Enter key.
3. Select option 1 (Perform an IPL) on the IPL or Install the System display.
4. Type your user ID and password on the Sign On display.
5. Select the licensed program for which you want to apply the PTF on the Select Products to Work with PTFs display.
   - If PTFs are not applied or are temporarily applied, the Work with PTFs display is shown. This display is used to apply and remove PTFs and shows the current status of each PTF that you can work with.
   - If you want to keep the same status for any of the PTFs displayed, leave the *Opt* column empty.
   - PTFs that are not applied can be either temporarily applied using option 1 or permanently removed using option 4.
   - PTFs that are temporarily applied can be either permanently applied using option 2 or temporarily removed using option 3.

     Note: For an explanation of "permanently removed" and "temporarily removed" PTFs, see "Removing PTFs" on page 12-23.
6. After typing the option number you want for each of the PTFs displayed, press the Enter key.
7. Repeat step 5 and step 6 for each licensed program for which you want to apply PTFs.

8. Press the Enter key to continue with system operations.

Applying Immediate PTFs Temporarily or Permanently Without Doing an IPL

To apply immediate PTFs temporarily or permanently without doing an IPL:

1. Make sure the licensed programs to which the PTFs are being applied are not in use.
2. Enter the Apply Program Temporary Fix (APYPTF) command and press F4 (Prompt). Press F9 (All parameters) to display all of the fields on the Apply Program Temporary Fix (APYPTF) display.
3. Specify the number that corresponds to the licensed program you are applying PTFs for the Product (LICPGM) parameter.
4. Specify the release level for the Release (RLS) parameter.

   Note: The release parameter is only required if more than one release of the product is installed.
5. Select the PTFs you want applied by doing one of the following:
   - Specify the identifiers of the PTF you want to apply in the PTF numbers to select (SELECT) parameter. To apply all PTFs, specify *ALL in the PTF numbers to select (SELECT) parameter.
   - Specify *ALL for the PTF numbers to select (SELECT) parameter, and the numbers of specific PTFs you do not want to apply for the PTF numbers to omit (OMIT) parameter.
6. To temporarily apply the PTFs, specify *TEMP for the Extent of change (APY) parameter. To permanently apply the PTFs, specify *PERM.

   Note: PTFs applied temporarily can be removed; PTFs applied permanently cannot be removed (see "Removing PTFs" on page 12-23).
7. Specify *NO for the Delayed PTFs (DELAYED) parameter.
8. Press the Enter key. The system applies the PTFs to the specific licensed program.
9. Repeat steps 2 through 8 until the PTFs are applied for all the selected licensed programs.

Applying Licensed Internal Code Fixes at the Next Unattended IPL

To apply Licensed Internal Code fixes that have already been loaded at the next unattended IPL, you must be currently operating from the **B** storage area.

To determine the storage area you are currently operating from, type `DSPPTF 5738999` on any command line and press the Enter key. On the Display PTF Status display, the storage area is identified in the *IPL source* field. ##MACH#A is the **A** storage area and ##MACH#B is the **B** storage area.

1. Make sure the keylock switch is in the Normal position.
2. If you are not running on the correct storage area, type the following command on any command line and press the Enter key:

   ```
   PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
   ```

3. Type the following commands on any command line and press the Enter key after each one:

   ```
   APYPTF LICPGM(5738999) APY(*TEMP) DELAYED(*YES)

   PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
   ```

   Note: A Licensed Internal Code fix does not apply using the Power On and Off Tasks (POWER) menu. The Power On and Off Tasks (POWER) menu does not run the appropriate PWRDWNSYS command.

   The system does an IPL on the **A** storage area, applies the Licensed Internal Code fixes temporarily, then returns to the **B** storage area.

Note: While applying Licensed Internal Code fixes, it may be necessary for the system to reorganize a portion of the Licensed Internal Code storage. This reorganization can take up to 1 hour. While this reorganization is taking place, system reference codes (SRCs) C600 4400 and C600 4401 are displayed.

Applying Licensed Internal Code Fixes With No IPL

You must be operating from the **A** storage area to temporarily apply a loaded Licensed Internal Code fix without doing an IPL. You must be operating from the **B** storage area to permanently apply a temporarily applied Licensed Internal Code fix without doing an IPL.

To determine the storage area you are currently operating from, type `DSPPTF 5738999` on any command line and press the Enter key. On the Display PTF Status display, the storage area is identified in the *IPL source* field. ##MACH#A is the **A** storage area and ##MACH#B is the **B** storage area.

If you are not running on the correct storage area, type the following command on any command line and press the Enter key:

```
PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(X)
```

where `IPLSRC(X)` is `A` if you want to apply them temporarily or `B` if you want to apply them permanently.

To apply Licensed Internal Code fixes immediately, type the following on any command line:

```
APYPTF 5738999 APY(xxxxx) DELAY(*NO)
```

where `xxxxx` is `*TEMP` or `*PERM`, and press the Enter key.

Removing PTFs

You can remove PTFs that are applied temporarily. Delayed PTFs applied temporarily can be removed temporarily when you do an IPL and then removed permanently when you do an IPL again. Immediate PTFs applied temporarily can be removed either temporarily or permanently. You can also remove immediate PTFs that have been loaded but not applied. PTFs applied permanently cannot be removed.

When PTFs are removed temporarily, the original objects that were replaced by the PTF are restored to the program library. The system again verifies that the PTF being removed is not required for any other currently applied PTF. If the PTF being

removed is found to be required, the other PTF (that it is required for) must be removed first or at the same time.

Note: Before you remove a PTF, be sure that the object affected by the immediate PTF is not in use. Licensed Internal Code PTFs can only be removed permanently.

Removing Licensed Program PTFs

To remove one or more licensed program PTFs:

1. Enter the Remove Program Temporary Fix (RMVPTF) command and press F4 (Prompt).
2. On the Remove Program Temporary Fix (RMVPTF) display, type the character value of the licensed program (shown on the cover letter) for the Product (LICPGM) parameter.
3. Select the PTFs you want removed by doing one of the following:
   - Specify the numbers of the PTFs you want to remove for the PTF numbers to select (SELECT) parameter or *ALL to remove all of them.
   - Specify *ALL for the PTF numbers to select (SELECT) field and the numbers of specific PTFs you do not want to remove for the PTF numbers to omit (OMIT) parameter.
4. Specify *TEMP for the Extent of change (APY) parameter to remove the PTFs temporarily or *PERM to remove the PTFs permanently.
5. If you are removing immediate PTFs, specify *NO for the Delayed PTFs (DELAYED) parameter.
6. If you are identifying delayed or immediate PTFs that are to be automatically removed during the next unattended IPL, specify *YES for the Delayed PTFs (DELAYED) parameter and *YES for the Remove on unattended IPL (IPLRMV) parameter.
7. Press the Enter key.

The Remove Program Temporary Fix (RMVPTF) command can also be used to identify delayed or immediate PTFs that are to be removed during the next unattended IPL.

Removing Licensed Internal Code Fixes and OS/400 Licensed Program PTFs

To remove a temporarily applied Licensed Internal Code fix from your system:

1. Use the Display PTF (DSPPTF) command to find the dependent PTFs for each Licensed Internal Code fix you want to remove. Record the PTF ID and licensed program for each dependent PTF.
2. To remove licensed program or OS/400 licensed program PTFs, continue with the following steps. Otherwise, go to step 3 on page 12-25.
   - To remove any licensed program PTFs identified in step 1, type the following command on any command line and press the Enter key:

     ```
     RMVPTF LICPGM(XXXXXXX) SELECT(SFYYYYY) RMV(*PERM) DELAYED(*NO)
     ```

where XXXXXXX is the licensed program and YYYYY is the PTF identifier. Enter this command once for each licensed program with PTFs to be removed.

- To temporarily remove any OS/400 licensed program PTFs identified in step 1 on page 12-24, type the following command and press the Enter key:

  ```
  RMVPTF LICPGM(5738SS1) SELECT(SFYYYYY) RMV(*TEMP) DELAYED(*YES)
  ```

  where YYYYY is the PTF identifier.

3. Type the following command and press the Enter key to do an IPL to the **A** storage area:

   ```
   PWRDWNSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(A)
   ```

4. To remove any Licensed Internal Code fixes and any dependent Licensed Internal Code fixes, type the following command and press the Enter key:

   ```
   RMVPTF LICPGM(5738999) SELECT(MFYYYYY) RMV(*PERM) DELAYED(*NO)
   ```

   where YYYYY is the Licensed Internal Code identifier.

   Check your job log for any error messages and verify that the Licensed Internal Code fixes and dependent Licensed Internal Code fixes were removed.

5. To permanently remove any OS/400 licensed program PTFs, type the following command and press the Enter key:

   ```
   RMVPTF LICPGM(5738SS1) SELECT(SFYYYYY) RMV(*PERM) DELAYED(*YES)
   ```

   where YYYYY is the PTF identifier. This step is optional.

6. Type the following command and press the Enter key to do an IPL to the **B** storage area:

   ```
   PWRDWNSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(B)
   ```

Removing Individual PTFs in a Cumulative Package Before the Next IPL

To remove a PTF from a PTF cumulative package after you have already selected option 8 (Install program temporary fix package) on the Program Temporary Fix (PTF) menu, but before the IPL has been done, enter the following command:

```
APYPTF LICPGM(XXXXXXX) SELECT(YYYYYYY) DELAYED(*YES) APY(*TEMP) IPLAPY(*NO)
```

where XXXXXXX is the licensed program and YYYYYYY is the number of the PTF you want to omit.

This resets the IPL apply indicator to `IPL Action NONE`. If you receive an error message, check the job log. If you receive message CPF3608, this PTF has PTFs that depend on it. You must omit these dependent PTFs before omitting the original PTF. The status of the omitted PTFs will remain `Not applied` during subsequent IPLs. When you are finished omitting PTFs, enter the following command to complete the cumulative package installation:

```
PWRDWNSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(B)
```

Deleting PTF Save Files and Cover Letters

After you have permanently applied a program temporary fix (PTF), you may want to delete the PTF save file and cover letter if you do not need to distribute it to another system. By deleting the save file, you can make more room on your system for other files.

To delete a PTF save file, use the Delete Program Temporary Fix (DLTPTF) command.

Note: PTF save files and cover letters for a previous release are removed during automatic cleanup if system logs are specified. See "Cleaning Up Your System" on page 11-34 for more information on how to set up your system so they are removed automatically.

Distributing PTFs to Remote Systems

You can distribute some or all the PTFs you receive to a remote system. PTFs that are in a save file can be sent to remote systems electronically. If you have the SystemView System Manager/400 licensed program installed, see the *SystemView* System Manager/400 User's Guide* for information on how to use the Create PTF Package (CRTPTFPKG) command and the Send PTF (SNDPTF) command.

Note: When preparing a PTF package to send to a remote system, make sure that the model of the remote system unit is compatible with the model of system unit required for the PTFs (shown on the cover letter as *Models*).

PTFs that are on tape or received electronically can be packaged as follows:

- Combine some or all the PTFs you received electronically into a single PTF save file so you can send it electronically to a remote system.
- Copy one or more PTF files from tape to a PTF save file so you can send it electronically to a remote system.

If the PTFs are already in a save file, use object distribution to send the save files electronically to the remote system. See the *Distribution Services Network Guide* for more information about using object distribution.

If you ordered and received a PTF electronically for another system that has a newer release than the one on your system, you cannot load, copy, or display that PTF on your system, but you can send that PTF to the remote system using object distribution.

Loading, Applying, and Removing PTFs Automatically at Remote Systems

To load PTFs on remote systems follow the instructions in "Installing Licensed Program PTFs" on page 12-12.

To load PTFs received through the distribution services network, type the following on any command line:

```
LODPTF LICPGM(xxxxxxx) DEV(*SAVF) SELECT(nnnnnnn)
```

where `xxxxxxx` is the licensed program number and `nnnnnnn` is the PTF identifier. Next, use the Apply PTF (APYPTF) command to apply the PTFs.

To load PTFs from device *SERVICE, do the following:

1. Use the QPZGENNM application program interface (API) to generate a name for the PTF save file.
2. Store the PTF save file in the library returned from the API.
3. Once the PTF exists in the save file, use the QPZLOGFX API to store the information about the PTF in the PTF database.
4. Type the following command on any command line to load the PTF:

   ```
   LODPTF LICPGM(xxxxxxx) SELECT(nnnnnnn) FROMDEV(*SERVICE)
   ```

   where xxxxxxx is the licensed program number and nnnnnnn is the PTF identifier.

Note: See the *System Programmer's Interface Reference*, SC41-8223, for more detailed information about the QPZGENNM and QPZLOGFX APIs.

To have PTFs applied automatically at the next unattended IPL on a remote system, specify the delayed parameter value as *YES. If the next IPL at the remote system is attended, the Select Products to Work with PTFs display is shown and the operator can choose to apply or not to apply the PTFs. If the operator chooses not to apply the PTFs, they are applied automatically during the next unattended IPL.

To remove delayed PTFs from remote systems (see "Removing PTFs" on page 12-23). Specify *YES for the *Delayed PTFs* field to remove PTFs during the next unattended IPL. If the next IPL on the remote system is attended, the Work with PTFs display is shown and the operator can choose to remove or not to remove the PTFs. If the operator chooses not to remove the PTFs, they are removed automatically during the next unattended IPL.

Building a Tailored PTF Package

The following example shows you how to build your own PTF package that can be used the same way as a PTF package supplied by IBM service support. This example combines a PTF package with individual PTFs into a tailored PTF package for distribution to other AS/400 systems in your network.

If you have the SystemView System Manager/400 licensed program installed on your system, use the Create Program Temporary Fix Package (CRTPTFPKG) command instead of this procedure. See the *SystemView* System Manager/400 User's Guide* for more information on how to build your own PTF package using the SystemView System Manager/400 licensed program.

The order of a cumulative PTF package is:

1. High-impact pervasive (HIPER) Licensed Internal Code Fixes (5738999)
2. HIPER OS/400 PTFs (5738SS1)
3. HIPER licensed program PTFs (for example, OfficeVision/400 licensed program)
4. A delimiter which divides the HIPER PTFs from the non-HIPER PTFs (5738111)
5. Non-HIPER Licensed Internal Code fixes
6. Non-HIPER OS/400 PTFs
7. OS/400 online information PTFs (if any)
8. Non-HIPER licensed program PTFs

For this example, assume that you want a tape that contains all but one (SF00600) of the PTFs from the most recent PTF package on tape received from IBM service support, including the high-impact pervasive (HIPER) PTFs. In addition, you want to include four individual PTFs received electronically from service support. These four PTFs are MF00050, SF00480, SF00500, and SF00800.

Because the four individual PTFs were received from IBM service support, they already exist in save files in library QGPL. They exist in the library as object type *file, as shown below:

```
File Name  Object Type
QMF00050   *FILE
QSF00480   *FILE
QSF00500   *FILE
QSF00800   *FILE
```

1. Use the Copy Program Temporary Fix (CPYPTF) command to bring the HIPER PTFs from the cumulative PTF package into library QGPL. Two licensed programs are being used in this example (MF and SF PTFs).

```
CPYPTF   LICPGM(5738999)
         FROMDEV(TAP01)
         TODEV(*SAVF)
         FROMSEQNBR(X)
         FROMENDOPT(*LEAVE)
         TOSAVF(QGPL/PCUMH999)

CPYPTF   LICPGM(5738SS1)
         FROMDEV(TAP01)
         TODEV(*SAVF)
         FROMSEQNBR(X)
         FROMENDOPT(*LEAVE)
         TOSAVF(QGPL/PCUMHSS1)
```

   Repeat the command for each licensed program with HIPER PTFs.

   Note: When you use the CPYPTF command, the system attempts to save the objects at the earliest release possible. The following message appears when you attempt to copy a PTF that cannot be restored on a previous release:

   ```
   CPF3741 xxxxxxx yyyyyyy in zzzzzzz not saved
   ```

   where xxxxxxx is the object type, yyyyyyy is the object name, and zzzzzzz is the library. The message can be ignored if it is not followed by an escape message.

2. Copy the product delimiter into a save file.

```
CPYPTF   LICPGM(5738111)
         FROMDEV(TAP01)
         TODEV(*SAVF)
         SELECT(*ALL)
         FROMSEQNBR(X)
         FROMENDOPT(*LEAVE)
         TOSAVF(QGPL/PCUMH111)
```

3. Copy the non-HIPER PTFs from the cumulative package into a save file omitting the unwanted PTFs.

```
CPYPTF   LICPGM(5738999)
         FROMDEV(TAP01)
         TODEV(*SAVF)
         FROMSEQNBR(X)
         FROMENDOPT(*LEAVE)
         TOSAVF(QGPL/PCUMP999)

CPYPTF   LICPGM(5738SS1)
         FROMDEV(TAP01)
         TODEV(*SAVF)
         OMIT((SF00600)
         FROMSEQNBR(X)
         FROMENDOPT(*LEAVE)
         TOSAVF(QGPL/PCUMPSS1)
```

Repeat the command for each licensed program with non-HIPER PTFs. The OMIT parameter was used to identify the PTF not included in the tailored package. The TOSAVF name must be 8 characters in length and must start with the letter P. You can choose the remaining seven characters. The TOSAVF library must be QGPL.

Library QGPL now contains:

```
File Name  Object Type
QMF00050   *FILE
QSF00480   *FILE
QSF00500   *FILE
QSF00800   *FILE
PCUMH999   *FILE
PCUMHSS1   *FILE  (plus more for HIPERs of licensed programs)
PCUMH111   *FILE
PCUMH999   *FILE
PCUMPSS1   *FILE  (plus more for non-HIPERs of licensed programs)
```

4. Initialize the tape for the tailored cumulative package.

```
INZTAP   DEV(TAP01)
         NEWVOL(CUMPKG)
```

5. Copy the Licensed Internal Code HIPER PTFs into one file and place it first on the tape.

```
CPYPTF   LICPGM(5738999)
         FROMDEV(*SERVICE)
         TODEV(TAP01)
         SELECT(CUMH999)
         TOENDOPT(*LEAVE)
```

The TOENDOPT(*LEAVE) parameter is used to maintain tape position.

6. Copy the OS/400 HIPER PTFs onto the tape.

```
CPYPTF   LICPGM(5738SS1)
         FROMDEV(*SERVICE)
         TODEV(TAP01)
         SELECT(CUMHSS1)
         TOENDOPT(*LEAVE)
```

Repeat for each licensed program with HIPER PTFs.

7. Copy the delimiter to the tape.

```
CPYPTF   LICPGM(5738111)
         FROMDEV(*SERVICE)
         TODEV(TAP01)
         SELECT(CUMH111)
         TOENDOPT(*LEAVE)
```

8. Copy the non-HIPER Licensed Internal Code fixes into one file and place on the tape.

```
CPYPTF   LICPGM(5738999)
         FROMDEV(*SERVICE)
         TODEV(TAP01)
         SELECT(CUMP999 MF00050)
         TOENDOPT(*LEAVE)
```

9. Copy the non-HIPER OS/400 PTFs into one file and place on the tape.

```
CPYPTF   LICPGM(5738SS1)
         FROMDEV(*SERVICE)
         TODEV(TAP01)
         SELECT(CUMPSS1 SF00480 SF00500 SF00800)
         TOENDOPT(*LEAVE)
```

   Repeat for each licensed program with non-HIPER PTFs.

The tape cartridge now contains the tailored PTF package. It can be used in the same way that your service support PTF packages are used.

PTFs can now be loaded on, applied to, or removed from a remote system.

Chapter 13. Handling and Reporting System Problems

When you are analyzing your problem, in many cases you will be able to solve the problem yourself. Other times, you may need the help of a technical support person or a service representative. When you do need outside help, it is important for you to collect as much information about the problem as you can by following the steps in this chapter. For more information on how to report a detected problem, see "Reporting Hardware and Software Problems" on page 13-9.

Before You Begin

Ask yourself the following questions:

- Has there been an external power outage or momentary power loss?
- Has the hardware configuration changed?
- Has system software been added?
- Have any new programs or program changes been recently installed?

  To make sure your licensed programs and products have been properly installed, use the Check Product Option (CHKPRDOPT) command.
- Have any program temporary fixes (PTFs) been applied recently?

  Some problems can be corrected by installing cumulative PTF packages. Even if there is no change activity to the equipment or programs on your system, you should install cumulative PTF packages every three or four months. If you are experiencing changes to your system, you should order and install the current cumulative PTF package and keep your system at the most current PTF level. See Chapter 12, "Working with Program Temporary Fixes (PTFs)" on page 12-1 for information on PTFs.
- Have any system values changed?
- Has any system tuning been done?

Keep these questions in mind while you are diagnosing the problem.

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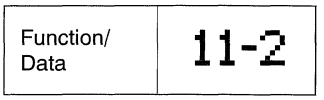
Does the display on the system control panel start with Function 11 or 11-2, or is the System Attention light on?

No **Yes**

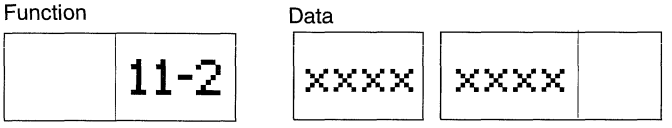
↓ Go to step 15 on page 13-7.

AS/400 System Unit Function/Data Displays



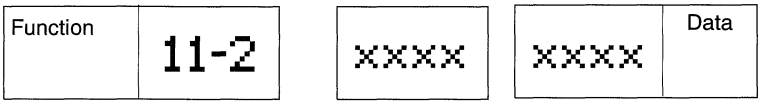
9402 System Unit

Note: To verify which function is being displayed on an AS/400 9402 System Unit, press the Enter button to alternate between function and data.



9404 System Unit

9404 Server Series Models 135 and 140 System Units



9406 System Unit

RV2P700-2

2

Does the display station that was in use when the problem occurred (or any display station) still appear to be operational?

Yes **No**

↓ Go to step 14 on page 13-6.

The display station is not operational if there is no sign-on display or menu with a command line. If another display station is operational, use that display station to solve the problem.

3

Is there a message related to this problem shown on the display station?

Yes **No**

↓ Go to step 8 on page 13-4.

4

Is this a system operator message?

Yes **No**

↓ Go to step 6.

A message is a system operator message if the display indicates that the message is in the QSYSOPR message queue.

5

Is the system operator message either highlighted or does it have an asterisk (*) by it?

No Go to step 10 on page 13-4.

Yes Go to step 13 on page 13-6.

6

Move the cursor to the message line and press the Help key. Does the Additional Message Information display appear?

Yes **No**

↓ Go to step 8 on page 13-4.

See Chapter 6, "Handling Messages" for information about messages.

7

Record the message information shown on the problem summary form in Appendix B, "Problem Summary Forms." If possible, follow the recovery instructions on the Additional Message Information display. Did this solve the problem?

No **Yes**

↓ **End of procedure**.

8

Type `dspmsg qsysopr` on any command line and press the Enter key to display system operator messages.

Did you find a message that is highlighted or has an asterisk (*) by it?

No **Yes**

↓ Go to step 13 on page 13-6.

System Operator Messages

To determine the time a message occurred, display additional information about the message using option 5 (Display details and reply) on the Work with Messages display. The time that the message was sent is shown on the Additional Message Information display.

If the problem seems to affect only one display station, you might be able to use information from the Job (JOB) menu to diagnose and solve the problem. Type `go job` on any command line and press the Enter key to find this menu. See "Displaying Detailed Job Information" on page 4-13 for information on the Job menu.

9

Did you find a message at or near the time the problem occurred?

Yes **No**

↓ Go to step 12 on page 13-5.

10

Use option 5 (Display) for the message to display additional information about the message; otherwise, move the cursor to the message line and press the Help key. Record the message information shown on the problem summary form in Appendix B, "Problem Summary Forms." If possible, follow any recovery instructions shown. Did this solve the problem?

No **Yes**

↓ **End of procedure.**

If the additional message information tells you to run problem analysis, go to step 13 on page 13-6.

11

Were you instructed by the message information to look for additional messages in the system operator's message queue (QSYSOPR)?

No **Yes**

↓ Press F12 (Cancel) to return to the list of messages, then look for other related messages. Go to step 8 on page 13-4.

12

To describe the problems that you have observed:

1. Type `go userhelp` on any command line and press the Enter key.
2. Select option 10 (Save information to help solve a problem) on the Information and Problem Handling (USERHELP) menu.
3. Type a brief description of the problem and press the Enter key on the Save Information to Help Resolve a Problem display.
4. Type notes about the problem on the blank lines provided on the Enter Notes display.
5. Report the problem. See "Reporting Problems Detected by the System" on page 13-10 for information about using the problem log to report a problem electronically.

End of procedure.

Note

Use the Analyze Problem (ANZPRB) command if you suspect you are having a input/output device problem and know the device name. See "Analyzing a New Problem" on page 13-15 for information on how to use the Analyze Problem (ANZPRB) command.

Creating Your Own Problem Record

This step helps you isolate and describe the problems that you observed.

You can store system and job-related information in spool files and create an entry (identified by the problem ID) in the system problem log. This information can be used to assist your technical support representative in solving the problem.

Note: Using this method, you can create a brief note describing the problem you observed. To describe your problem in greater detail, use the Analyze Problem (ANZPRB) command. Using the Analyze Problem (ANZPRB) command may also run a test to further isolate the problem.

See "Adding Notes to Your Problem Record" on page 13-16 for additional information about analyzing and reporting problems.

13

Use option 5 (Display) for additional information about the message. Or, move the cursor to the message line and press the Help key.

Press the F14 key or the F15 key, or run the Analyze Problem (ANZPRB) command as instructed.

If this does not solve the problem, report the problem by preparing and sending a service request using electronic customer support. See "Reporting Problems Detected by the System" on page 13-10 for information on how to send a service request.

Running Problem Analysis

With problem analysis you can gather more information about the problem to either solve it or report it without the help of a service representative. You can run problem analysis on messages that are highlighted (basic assistance level) or have an asterisk (*) next to them (intermediate assistance level). If you do not see any of these messages, you may not be authorized to the Work with Problem (WRKPRB) command or the message does not support additional problem analysis.

Note: Use F14 (Run problem analysis) if it is available on your display; if F14 is not available, use the Analyze Problem (ANZPRB) command to run problem analysis.

For messages that are highlighted or have asterisk (*) next to them, you can also use the F15 (Work with problem) key. On the Display Messages display, press the Help key on a highlighted message or on any message that has an asterisk (*) next to it. The second level text of the message is displayed and the F15 (Work with problem) key appears. Pressing F15 (Work with problem) will take you directly to the Work with Problems (WRKPRB) display. From this display, you can display the details of the problem and work directly with the problem.

See "Adding Notes to Your Problem Record" on page 13-16 for additional information about analyzing and reporting problems.

14

If a system reference code is not displayed on the control panel and the system attention light is not on, go to "Analyzing Problems with a Symptom" on page A-21. Locate the problem in the *Symptom* column and follow the directions in the *What You Should Do* column.

15

Record the system reference codes on the problem summary form in Appendix B, "Problem Summary Forms." Make sure that you have collected all of the codes.

Look for the system reference code in Table A-1 on page A-1. Follow the instructions in the *What You Should Do* column.

Collecting System Reference Codes

If 11 or 11-2 is shown in the Function display (Function/Data display for the AS/400 9402 System Unit) on the control panel, then the numbers that follow are the system reference code.

If a number other than 11 or 11-2 is shown in the Function or Function/Data display, the number may not indicate a problem with the system. These codes may indicate functions you select from the control panel. For example, function 01 displays the type of IPL you did as follows:

Function	Description
01 ..A.	The last IPL of the system did not include the installation of temporary program temporary fixes (PTFs).
01 ..B.	The last IPL of the system included the installation of temporary program temporary fixes (PTFs).

See "System Unit Control Panels" on page 1-4 for more information about the system unit control panel. See page 1-9 for information about the Function/Data display of the AS/400 9402 System Unit.

Note: If you have a display with *Type* and *Reference Code* columns on it, record the data under the *Type* column as the first 4 characters of function 11 on the problem summary form in Appendix B, "Problem Summary Forms." If an A, B, C, or D is displayed as the first digit in the *Type* column, use the data in the *Reference Code* column as the last four characters of function 11.

Getting Help with Problems

The following table shows an overview of the AS/400 system support structure and gives you guidelines on who to call for your specific problem:

Type of Problem	Call	People/Areas That Can Help
Question • Advice • Migrating • "How to" • Operating • Configuring • Ordering • Performance • General information	IBM Marketing Team or IBM Business Partner	• Marketing Representative • Systems Engineer (SE) • SE Technical Support - Local • SE Support Center
Software • PTF fix information • OS/400 problem • IBM application program • Loop, hang, or message	IBM Software Service	• Customer Services Coordinator • Level 1 Software Service • Level 2 Software Service • Programming Lab Change Team
Hardware • IBM system hardware broken • Hardware system reference code (SRC) • IBM input/output (I/O) problem • Upgrade	IBM Hardware Service	• Dispatch • Customer Assistance Group (CAG) • Your Customer Engineer (CE) • Support Customer Engineer (CE) • Support Center • Product Engineering

Call your IBM Marketing Team or IBM Business Partner:

Questions

Name: _____

Phone: _____

Calling Your Software Service Representative

Call your software service representative if you have not reported the problem.

Your software service representative is:

_____

System Software

Name: _____

Phone: _____

Customer #: _____

Application Programs

Name: _____

Phone: _____

Record the service request number (sometimes called program management record or PMR) on the problem summary form in Appendix B, "Problem Summary Forms."

Calling Your Hardware Service Representative

Call your hardware service representative if you have not reported the problem.

Your hardware service representative is:

_____

System Hardware

Name: _____

Phone: _____

Customer #: _____

Device or Other Equipment Manufacturer (OEM)

Name: _____

Phone: _____

Communications Network

Telephone Company Name: _____

Phone: _____

Record the service request number (sometimes called program management record or PMR) on the problem summary form in Appendix B, "Problem Summary Forms."

Reporting Hardware and Software Problems

For hardware failures that do not disable system operation, AS/400 electronic customer support provides a fast, electronic method for requesting the service of an IBM service representative with replacement parts. Using this method, you may report failures occurring on your AS/400 system and selected input or output devices.

For software or Licensed Internal Code problems, notification of the failure and related symptoms can be sent to the IBM service system. A file of known problems is searched and, if available, a program temporary fix (PTF) is sent to your system for installation.

If a problem is new, a problem management record (PMR) is created by the IBM service system. The PMR number is returned to your AS/400 system. IBM service center personnel will contact you and work with you to resolve the problem.

Reporting Problems Detected by the System

The system **problem log** allows you to display a list of all the problems that have been recorded on the system. You can also display detailed information about a specific problem, such as the product type and serial number of the device that had the problem, the date and time of the problem, the part that failed, where the part is found, and the problem status. You can also analyze and report a problem, or determine any service activity that was done.

To report a problem which has an entry created in the problem log:

1. Type `go techhelp` on any command line and press the Enter key.
2. Select option 10 (Work with problems with the system) on the Technical Support Tasks (TECHHELP) menu or use the Work with Problems (WRKPRB) command to find the Work with Problems display. Figure 13-1 shows a typical Work with Problems display.

```
                              Work with Problems
                                                              System:   SYSTEM01
Position to . . . . . .  _________      Problem ID

Type options, press Enter.
  2=Change   4=Delete   5=Display details    6=Print details
  8=Work with problem   9=Work with alerts   12=Enter notes

Opt  Problem ID  Status         Problem Description
8_   9033830106  READY          User detected a software problem
__   9033829765  PREPARED       User detected a hardware problem on this AS/40
__   9033756158  OPENED         System cannot call controller . No lines avail
__   9033745219  OPENED         System cannot call controller . No lines avail
__   9033456125  READY          User detected a hardware problem on this AS/40
__   9033455845  READY          User detected a hardware problem on a differen
__   9033455436  READY          User detected a hardware problem not related t
__   9033447351  OPENED         System cannot call controller . No lines avail
__   9033447270  OPENED         No cable was detected on communications port  o
__   9033446191  READY          Test detected a hardware problem on a differen
__   9033445335  READY          User detected a hardware problem not related t
                                                                        More...
F3=Exit      F5=Refresh   F6=Print list     F11=Display dates and times
F12=Cancel   F16=Report prepared problems   F24=More keys
```

Figure 13-1. Work with Problems Display

Note: In Figure 13-1, the selections shown are based on the problem attributes. Other Work with Problems displays may look slightly different.

3. If you have a problem ID, look for an entry with the same ID on the Work with Problems display. Select option 8 (Work with problem) for that problem you want to work with. Figure 13-2 shows the Work with Problem display that is shown after you press the Enter key.

```
                          Work with Problem
                                                          System:   SYSTEM01
Problem ID . . . . . :   9033830106
Current status . . . . . :   READY
Problem  . . . . . :   User detected a software problem


Select one of the following:

     1. Analyze problem
     2. Report problem

     4. Verify problem corrected
     5. Answer problem

    20. Close problem

    30. Save APAR data to APAR library
                                                                      Bottom
Selection
     2

F3=Exit   F12=Cancel
```

Figure 13-2. Work with Problem Display

Note: The options on your Work with Problems display may not look exactly as they look in this example. The options displayed depend on the status of the problem, the contents of the data in the problem log, and your security level.

4. Select option 2 (Report problem) on the Work with Problem display. Figure 13-3 shows the Verify Contact Information display.

```
                       Verify Contact Information
                                                          System:   SYSTEM01
Type changes, press Enter.

  Company . . . . . .   New Market RPL
  Contact . . . . . .   John Smith
  Mailing address:
    Street address  . . . . .   IBM Rochester
                                Hwy 52 and 37th Street

    City/State  . . . . . .   Rochester, MN
    Country . . . . . .   USA
    Zip code  . . . . . .   55901
  Telephone numbers:
    Primary . . . . . .   3-0000
    Alternative . . . . . .
  Language code . . . . . .   2924   F4 for list


                                                                      Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel

(C) COPYRIGHT IBM CORP. 1980, 1991.
```

Figure 13-3. Verify Contact Information Display

5. To change any fields that appear on the Verify Contact Information display, type over the current information and press the Enter key. The new information is included in the service request.

To permanently change your default service support contact information, see "Changing Your Default Service Support Contact Information" on page 10-9.

6. Select the severity level that closely relates to the severity of your problem on the Select Problem Severity display shown in Figure 13-4.

```
                          Select Problem Severity
                                                              System:   SYSTEM01
Problem ID . . . . . . . . . :   9033830106
Current status . . . . . . . :   READY
Problem  . . . . . . . . . . :   User detected a software problem



Select one of the following:

     1. High   - Requires immediate solution
     2. Medium - Restricts function
     3. Low    - Limits function
     4. None   - Operates with full function



Selection
     2

F3=Exit   F12=Cancel
```

Figure 13-4. Select Problem Severity Display

The severity levels are:

Severity	Meaning
1	Inability to use the program resulting in a critical affect on operations. The condition requires an immediate solution that is not already available.
2	The program is usable but severely restricted.
3	The program is usable without some functions which are not critical to the overall operation.
4	A circumvention to the problem has been found.

7. Select who should receive and process your request on the Select Service Provider display shown in Figure 13-5.

```
                          Select Service Provider
                                                          System:   SYSTEM01
Position to . . . . . .                 Control point
  Network ID  . . . . . .

Type option, press Enter.
  1=Select

       Control
Opt    Point        Network ID     Description
       *IBMSRV                     IBM Service Support
 1_    SOMEBODY     QAUSER1        Some provider
 __    RCHASL1C     RPC            System L1C
 __    RCHAS110     RPC            System 110

                                                                      Bottom
F5=Refresh   F12=Cancel
(C) COPYRIGHT IBM CORP. 1980, 1992.
```

Figure 13-5. Select Service Provider Display

8. Select when and how you want to send the service request on the Select Reporting Option display as shown in Figure 13-6.

```
                          Select Reporting Option
                                                          System:   SYSTEM01
Problem ID . . . . . . . . . :   9202829127
Current status . . . . . . . :   OPENED
Problem  . . . . . . . . . . :



Select one of the following:

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



Selection
   __

F3=Exit   F12=Cancel
```

Figure 13-6. Select Reporting Option Display

If you want to send the service request now, see "Sending a Service Request Immediately" on page 13-14. To send the service request later, see "Sending a Service Request Later" on page 13-15. To report the problem by voice (telephone), see "Reporting Problems by Voice" on page 13-15.

Sending a Service Request Immediately

If you decide to send the service request now, select option 1 (Send service request now) on the Select Reporting Option display. The problem log entry is packaged as a service request, your AS/400 system automatically dials the IBM service provider system, and the problem is transmitted to the service provider.

Note: Service requests can also be sent to other AS/400 systems that have the SAA SystemView System Manager/400 licensed program installed.

The service provider determines whether the request is for hardware or software service.

Hardware Service:

If the service provider is IBM, if no PTFs are found that match your problem symptoms, and if the request is for hardware service, one of the following happens:

- Your request is sent to an IBM service representative.
- An IBM Customer Assistance Group representative calls you to assist in further problem definition.

The connection to the service provider system ends and the status of the problem in the problem log is changed to SENT.

Software Service:

- A search is performed against the database of PTFs using the symptom string you created during problem analysis.
- If the service provider is IBM, a match is found, and a PTF is available, the PTF is transmitted to you electronically or a PTF tape is ordered and sent to you through normal mail channels. The size of the PTF and its requisites determine whether the PTF is sent electronically or mailed.

  PTFs that you receive electronically are placed in QGPL library with a file name of the PTF number preceded by a Q and a file type of SAVF.
- If a match is not found or the PTF is not available, you see the Save APAR Data display, which saves the following information about your problem:
  - History log
  - Job information
  - Hardware and software resources
  - Error log entries
  - Vertical Licensed Internal Code log entries
  - Problem log entries
  - Pictures of displays

  This information is forwarded to the IBM Software Support Center to help you solve your problem.

The connection to the service provider ends when you receive a PTF or when your problem is opened for further investigation. The status of the problem is changed to SENT or ANSWERED in the problem log.

Sending a Service Request Later

If you decide to send a service request later, select option 2 (Do not send service request) on the Select Reporting Option display. The status of the problem in the problem log changes to PREPARED.

To submit a problem with PREPARED status follow the directions in "Reporting Problems Detected by the System" on page 13-10. When the problem is reported, the problem log entry is packaged as a service request, your AS/400 system automatically dials the service provider system, and the problem is transmitted to the service provider.

To report all problems in the problem log that have a status of PREPARED, do one of the following:

- On the Work with Problems display, press F16 (Report prepared problems).
- On any command line, type `sndsrvrqs *prepared` and press the Enter key.

The connection to the service provider system ends when you receive a PTF or when your problem is opened for further investigation. The status of the problem is changed to SENT or ANSWERED in the problem log.

Reporting Problems by Voice

If you find that you are not connected to a telephone line, or your communications lines are down, you can report the problem by voice (telephone).

To report the problem by telephone, follow the directions in "Reporting Problems Detected by the System" on page 13-10. When you get to the Select Reporting Option display, select option 3 (Report service request by voice). The Report Service Request by Voice display gives you the telephone number of the service provider for your specific problem.

Note: If the service provider is IBM, IBM assigns a service number to the problem. To put this number in the problem log, press F14 (Specify service-assigned number) on the Report Service Request by Voice display.

Analyzing a New Problem

A new problem is one that you detect while using the system and has not been recorded in the problem log or one that is in the problem log with a status of OPEN.

To analyze a new problem that has not been recorded in the problem log:

1. Use the Analyze Problem (ANZPRB) command.
2. Select the option that most closely corresponds to the problem you have encountered on the Analyze a New Problem display. A series of steps then guides you through problem analysis. As you progress through problem analysis, a symptom string is built from your responses.
3. When you complete problem analysis, the collected information is placed in the problem log.

To analyze a problem that has been recorded in the problem log with OPEN status:

1. Type `dspmsg qsysopr` on any command line and press the Enter key to see the system operator messages.

- If the message is highlighted, use option 5 (Display details and reply) for the message. On the Additional Message Information display, press F14 (Run problem analysis).
- If the message has an asterisk (*) next to it, press F14 (Run problem analysis) on the Display Messages display.

2. A series of steps then guides you through problem determination. As you progress through problem analysis, a symptom string is built from your responses.
3. When you complete problem analysis, the collected information is placed in the problem log.

To analyze a problem that has a status of OPEN in the problem log, select option 8 (Work with problem) for the problem and then select option 1 (Analyze problem) on the Work with Problem display. See "Reporting Problems Detected by the System" on page 13-10 for information on how to report the problem.

Adding Notes to Your Problem Record

To attach a note or add to an existing note in the problem record:

1. Use the Work with Problem (WRKPRB) command.
2. Select option 12 (Enter notes) on the Work with Problems display for the problem ID you want to add notes to.

   If there is an existing note, press F6 (Insert lines) on the Enter Notes display.
3. Press the Enter key to leave the Enter Notes display. In the Exit Notes window, select option 1 (Save notes and exit).

Notes should be done in the following format to keep a chronological record of events.

- On the first line, type a brief description of the problem.
- On the second line, type the current date.
- On the third line, type in the note that you want to send.

  Use as many additional lines (up to 20) as you need.

Include in your notes:

- Any recent release update that you have applied to the system.
- Any changes you made in the system configuration.
- Any new program or feature that you are using.
- Anything that may be different since the last time the program was run.

Finding a Previously Reported Problem

To find a previously reported problem, you need to know the IBM Service-assigned number, also known as the problem management record (PMR). Once you have this number, type the following on any command line:

```
WRKPRB SRVID(XXXXX)
```

where XXXXX is the PMR number and press the Enter key.

If you do not have the PMR number, use the Work with Problem (WRKPRB) command and search the list for the problems with a status of SENT, VERIFIED, ANSWERED, and CLOSED.

Appendix A. Problem Handling Tables and Procedures

Analyzing Problems with a System Reference Code

In the table, xxxx can be any number 0 through 9 or letter A through F. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

Table A-1 (Page 1 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
0000 000C 0000 0003 0000 0006	System power failure. For the 9406 System Unit: 1. Go to "Getting Help with Problems" on page 13-8. For the 9404 System Unit and AS/400 9402 System Unit: 1. Turn the Unit Emergency switch to the On position. 2. Turn the Power switch off and on and then do the IPL again (see "Starting the System" on page 2-1). 3. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
0000 AABB 0000 AACC	You attempted a timed, remote, or automatic IPL with the keylock switch on the system control panel in the Secure or Manual position. 1. Set the keylock switch to the Normal or the Auto position and do the IPL again. 2. If you are still not able to do an IPL, go to "Calling Your Hardware Service Representative" on page 13-9.
0000 AADD	You attempted a manual IPL with the keylock switch on the system control panel in the Secure or Auto position. 1. Set the keylock switch to the Normal or the Manual position and try the operation again. 2. If you are still not able to do an IPL, go to "Calling Your Hardware Service Representative" on page 13-9. **Note:** If automatic IPL is not expected, see "System Values that Control IPL" on page 2-13.
0000 xxxx	The control panel detected an error. Go to "Calling Your Hardware Service Representative" on page 13-9.
1xxx xxxx	System power failure (SPCN). Go to "Calling Your Hardware Service Representative" on page 13-9.
2440 xxxx 3422 xxxx 3430 xxxx 3480 xxxx 3490 xxxx	Tape error on the 2440, 3422, 3430, 3480, or 3490 tape unit. See "Procedure 1–Recovering from a Tape Error or Tape Unit Failure" on page A-10. **Note:** If 2440 xxxx is displayed and you have a 3995 Optical Dataserver that has failed, see the service information manual for the 3995 model installed on your system.

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Table A-1 (Page 2 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
2507 xxxx 2600 xxxx 2604 xxxx 2608 xxxx 2615 xxxx 2621 xxxx 2622 xxxx 2624 xxxx 2642 xxxx 2643 xxxx 2644 xxxx 2662 xxxx 2663 xxxx 9143 xxxx 9144 xxxx 9145 xxxx 9146 xxxx	An input/output processor reported an error, possible tape problem. • If function 01 on the control panel shows a **D** (IPL from tape), go to "Procedure 1–Recovering from a Tape Error or Tape Unit Failure" on page A-10. • If function 01 on the control panel shows an **A** or **B** (IPL from disk), go to "Calling Your Hardware Service Representative" on page 13-9. • If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
2638 xxxx 2661 xxxx 6040 xxxx 6140 xxxx 6050 xxxx 6050 xxxx	Failure detected by the twinaxial work station controller. See "Procedure 2–Recovering from an Error Detected by the Work Station Controller" on page A-11.
2637 xxxx 6041 xxxx 6141 xxxx	Failure detected by the ASCII work station controller. See "Procedure 3–Recovering from an Error Detected by the Work Station Controller" on page A-12.
61xx xxxx 6603 xxxx	Failure detected by storage device controller card. 1. If function 01 on the control panel shows a **D** (IPL from tape), go to "Procedure 1–Recovering from a Tape Error or Tape Unit Failure" on page A-10. 2. If function 01 on the control panel shows an **A** or **B** (IPL from disk), go to "Calling Your Hardware Service Representative" on page 13-9. 3. Check the disk units to make sure they are powered on and ready. If they are and the problem is not solved, see "Calling Your Hardware Service Representative" on page 13-9.
6341 xxxx 6342 xxxx 6343 xxxx 6346 xxxx 6348 xxxx 6347 xxxx 6366 xxxx 6367 xxxx 6368 xxxx	The tape unit failed. 1. Make sure the tape cartridge is inserted in the tape slot correctly. As the tape slot cover closes completely, you hear a click. 2. Clean the tape path (see the maintenance information for the tape unit.) **Note:** For 1/4-inch tape units, see "Cleaning the 1/4-Inch Tape Unit" on page 8-5. 3. Load the first tape cartridge of the set of cartridges you are using. 4. Turn the Power switch off and on and then do an IPL with a **D** shown in the Data display on the system unit control panel. 5. Was the IPL successful? **Yes** End of procedure. **No** If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
9331 xxxx 9332 xxxx	A 9331 Diskette Unit or 9332 Storage Unit failed. 1. Make sure the power is turned on for the diskette unit or storage unit. 2. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.

Table A-1 (Page 3 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
9335 xxxx	A 9335 Disk Unit failed. 1. Make sure the power is turned on for each 9335 Disk Unit. 2. Make sure the Enable/Disable switch on each 9335 Disk Unit is set to the Enable position. 3. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
9336 xxxx 9337 xxxx	A 9336 or 9337 Storage Unit failed. 1. Make sure the power is turned on for the storage unit. 2. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
9346 xxxx 9347 xxxx 9348 xxxx	Tape error or the 9346, 9347, or 9348 tape unit failed. See "Procedure 1–Recovering from a Tape Error or Tape Unit Failure" on page A-10.
A1xx 1933 A1xx 1934 A1xx 1938 A1xx 2A33 A1xx 2A38	IPL load device failure. 1. Make sure the device (tape or disk) that you are loading from is turned on and ready to use. 2. If you are loading from tape, make sure the correct tape is loaded. 3. Wait for 15 minutes to see if a new system reference code appears on the system control panel. 4. If you get a new reference code, find it in this table and follow the instructions. 5. If you do not get a new system reference code, power down and power back up first, then go to "Calling Your Hardware Service Representative" on page 13-9.
A1xx 300x	Main storage stand-alone dump is complete. 1. Turn the Power switch off and on and then do an initial program load (IPL). 2. Go to "Calling Your Hardware Service Representative" on page 13-9.
A600 5060	Incompatible version of the OS/400 licensed program has been installed. Install Version 2 Release 2.0 of the OS/400 licensed program. If this does not solve the problem, see "Calling Your Software Service Representative" on page 13-8.
A6xx 0244 A6xx 0255	A disk unit is not operating. For the 9406 System Unit: 1. Do not power off the system. 2. Make sure the power is turned on for each disk unit on the system. 3. If you have 9335 Disk Units, make sure the Enable/Disable switch on each disk unit is set to the Enable position. If the disk unit is in an error state, power it off then on again. 4. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9. For the 9404 System Unit and AS/400 9402 System Unit, go to "Getting Help with Problems" on page 13-8.
A6xx 0266	A disk unit failed. For the 9406 System Unit: 1. Do not power off the system. 2. Go to "Calling Your Hardware Service Representative" on page 13-9. For the 9404 System Unit and AS/400 9402 System Unit, go to "Getting Help with Problems" on page 13-8.
A6xx 5001	Work station controller failure. See "Procedure 5–Recovering from a Work Station Controller Failure" on page A-15.
A6xx 5002	Work station controller failure. See "Procedure 6–Recovering from a Work Station Controller Failure" on page A-16.
A6xx 5003	Work station controller failure. See "Procedure 3–Recovering from an Error Detected by the Work Station Controller" on page A-12.
A6xx 5004	Work station controller failure. See "Procedure 2–Recovering from an Error Detected by the Work Station Controller" on page A-11.

Table A-1 (Page 4 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
A6xx 5005	Work station controller failure. See "Procedure 4–Recovering from an Error Detected by the Work Station" on page A-13.
A6xx 5010	Service program failure. 1. Do an initial program load again. 2. If the same problem occurs, go to "Calling Your Software Service Representative" on page 13-8.
A6xx 5082 A6xx 5083	Work station controller failure. See "Procedure 6–Recovering from a Work Station Controller Failure" on page A-16.
A6xx 5090	IPL failure. For the 9406 System Unit: 1. Make sure the power is turned on for each disk unit on your system. 2. If you have 9335 Disk Units, make sure the Enable/Disable switch on each disk unit is set to the Enable position. 3. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9. For the 9404 System Unit and AS/400 9402 System Unit, go to "Getting Help with Problems" on page 13-8.
A900 2000	Console did not vary on, but the system is still operational. See "Procedure 7–Recovering when the Console Does Not Vary On" on page A-17.
B006 xxxx	Failure detected by common Licensed Internal Code. 1. Make sure the latest PTF package is installed. 2. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
B0xx xxxx	Failure detected by communication Licensed Internal Code. 1. Make sure the latest PTF package is installed. 2. If this does not solve the problem, see "Calling Your Software Service Representative" on page 13-8. **Note:** B006 xxxx is not part of B0xx xxxx.
B1xx 1800	Failure detected by the service processor during IPL. 1. Make sure the power is turned on for all devices in the rack or racks. 2. Turn the Power switch off and on to do the IPL again. 3. If you have 9335 Disk Units, make sure the Enable/Disable switch on each of these units is set to the Enable position. 4. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
B1xx 1803 B1xx 1806 B1xx 1933 B1xx 1934 B1xx 1938 B1xx 2A33 B1xx 2A38 B119 2B02	IPL load device failure. 1. Make sure the device (tape or disk) from which you are loading is turned on and ready to use. 2. If you are loading from tape, make sure the correct tape is loaded. 3. Power down and power back up to do an IPL. 4. See "IPL Overview" on page 2-20 to make sure the correct SRCs for IPL are being displayed. 5. If you get a different system reference code, find it in this table and follow the instructions. 6. If you did not get a different system reference code or are unable to solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
B1xx B940	Second IPL started while the first IPL was in progress. 1. Power down the system. 2. Turn the Power switch off and on to do the IPL again. 3. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
B3xx 3xxx	System processor has detected a severe error condition. To resume system operation (with reduced performance) see "Procedure 15–Recovering from a System Processor Error" on page A-20.

Table A-1 (Page 5 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
B600 0204	Machine addresses used up. 1. Turn the Power switch off and on to do the IPL again. This is the normal consequence of the system running for a long period of time. 2. If this does not solve the problem, go to "Calling Your Software Service Representative" on page 13-8.
B600 0615	Not enough auxiliary storage. 1. Ensure enough auxiliary storage to avoid this condition. 2. If this does not solve the problem, go to "Calling Your Software Service Representative" on page 13-8.
B610 698C B610 6984	Expansion unit power failure on the AS/400 9402 and 9404 System Units. 1. Turn the Unit Emergency switch on the expansion unit to the On position. **Notes:** a. There is no Unit Emergency switch on the 9404 Server Series Model 135 and Model 140 System Units or expansion units. b. The plug on the power supply cord serves as the emergency disconnect and the service disconnect device. Because of this requirement, ensure that the power outlet is near the equipment and is easily accessible. 2. Turn the Power switch off and on to do the IPL again. 3. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
B610 698F	Expansion unit power failure (on the AS/400 9402 System Unit or 9404 System Unit). 1. Make sure that the expansion unit is plugged in. 2. Locate the three signal cables and make sure they are properly connected. • AS/400 9402 System Unit – 1 cable (part 85F9842) and 2 cables (part 72X6348). • 9404 System Unit – 1 cable (part 72X5638) and 2 cables (part 72X6348). 3. If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.
B6xx 0237	Not able to allocate space during directory recovery. 1. Turn the Power switch off and on to do a manual IPL from the disk unit and sign on to dedicated service tools (DST). 2. If the DST main menu appears, select the *Work with disk device* option. Then add disk space to the system auxiliary storage pool. For more information, see the *Advanced Backup and Recovery Guide*. If the DST main menu does not appear, go to "Calling Your Software Service Representative" on page 13-8. 3. Select the *IPL the system* option from the DST main menu. 4. If the same reference code appears, go to "Getting Help with Problems" on page 13-8. If the same reference code does not appear, this procedure is completed.
B900 3000	Unknown failure during OS/400 installation. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.
B900 3001	Screen input/output failure during OS/400 installation. See "Procedure 8–Recovering from an Operating System Installation Failure" on page A-17.
B900 3002	Tape not ready at beginning of OS/400 installation (message CPZ2004). 1. Ensure that the tape drive being used for the installation is turned on and ready (online). 2. Restart the OS/400 installation. 3. Ensure that the tape drive is not taken offline or powered off during the installation.

Table A-1 (Page 6 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
B900 3004	Screen input/output failure during OS/400 installation. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.
B900 3005	Screen I/O failure during OS/400 installation. See "Procedure 8–Recovering from an Operating System Installation Failure" on page A-17.
B900 3006	Object load failure during OS/400 installation. This SRC should have been preceded by a message (CPZ20xx). Follow the instructions in the recovery text for the message.
B900 3007	Unknown failure during OS/400 installation. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.
B900 3008	The end installing option was selected for an informational message during OS/400 installation. Restart the OS/400 installation and select the continue option for information messages.
B900 3010	System user profile not found or damaged. Restart the OS/400 installation. This should not occur during the next installation.
B900 3011	OS/400 licensed program not found or damaged. Restart the OS/400 installation. This should not occur during the next installation.
B900 3012	Damage to system libraries, user profiles, or authorized user table. Restart the OS/400 installation (this problem should not occur during the next installation).
B900 3013	Unknown failure during OS/400 installation. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.
B900 3014	Unknown failure while attempting to initiate OS/400 IPL. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.
B900 3015	General failure during OS/400 installation. This SRC should have been preceded by a message (CPZ20xx). Follow the instructions in the recovery text for the message.
B900 3016	Software failure during OS/400 installation. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.
B900 3017	Failure during link/load of Vertical Licensed Internal Code textual information. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.
B900 308D	Failure while handling unknown failure during OS/400 installation. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.

Table A-1 (Page 7 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
B900 308F	Software failure during OS/400 installation. Record all SRC data (functions 11 through 20) from the control panel on the appropriate form in Appendix B, "Problem Summary Forms" and go to "Calling Your Software Service Representative" on page 13-8.
B900 3130 through B900 3269	Operating system IPL failure. 1. Turn the Power switch off and on to do the IPL again. 2. If the same problem occurs again, go to "Calling Your Software Service Representative" on page 13-8.
B900 3310 through B900 33x0	Operating system IPL failure. 1. Turn the Power switch off and on to do the IPL again. 2. If the same problem occurs again, go to "Calling Your Software Service Representative" on page 13-8.
B900 3400 B900 3121	System unit key in wrong position. The system unit key is in the Normal position during installation. Move the key to the Manual position and try the installation again.
B900 34B0	Operating system IPL failure. 1. Use the correct user ID on the Sign On display to complete the system IPL. 2. If you still cannot do an IPL, go to "Calling Your Software Service Representative" on page 13-8.
B900 3530	Operating system IPL failure. Configuration menu error. 1. On the IPL Options display, specify the following: **No** for *Define or change the system at IPL* 2. Turn the Power switch off and on to do the IPL again. 3. If the same problem occurs again, set the keylock switch to the Normal position, then go to "Calling Your Software Service Representative" on page 13-8.
B900 3560	Operating system IPL failure. See SRC B900 3130.
B900 3590	Operating system IPL failure. See "Procedure 9–Recovering from an Operating System IPL Failure" on page A-18.
B900 35B0	Operating system IPL failure. See "Procedure 10–Recovering from an Operating System IPL Failure" on page A-18.
B900 3600	Operating system IPL failure. See "Procedure 11–Recovering from an Operating System IPL Failure" on page A-19.
B900 3630 through B900 36D0	Operating system IPL failure. See SRC B900 3130.
B900 3700	Operating system IPL failure. See "Procedure 10–Recovering from an Operating System IPL Failure" on page A-18.
B900 3730	Operating system IPL failure. 1. When using the Sign On display, enter a user ID that has authority to the controlling subsystem to complete the IPL. 2. If you still cannot do an IPL, go to "Calling Your Software Service Representative" on page 13-8.
B900 3760	Operating system IPL failure. See "Procedure 10–Recovering from an Operating System IPL Failure" on page A-18.
B900 3790	Operating system IPL failure. See SRC B900 3130.

Table A-1 (Page 8 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
B900 37B0	Operating system IPL failure. See "Procedure 12–Recovering from an Operating System IPL Failure" on page A-19.
B900 37C0 through B900 37FF	Operating system IPL failure. 1. Turn the Power switch off and on to do the IPL again. 2. If the same problem occurs again, go to "Calling Your Software Service Representative" on page 13-8.
B900 3810	Operating system IPL failure. See "Procedure 13–Recovering from an Operating System IPL Failure" on page A-19.
B900 3870	Operating system IPL failure. 1. Turn the Power switch off and on to do the IPL again. 2. If the same problem occurs again, go to "Calling Your Software Service Representative" on page 13-8.
B900 38E0 through B900 38F0	Operating system IPL failure. See "Procedure 12–Recovering from an Operating System IPL Failure" on page A-19.
B900 3C10 through B900 3C50	Operating system IPL failure. See "Procedure 13–Recovering from an Operating System IPL Failure" on page A-19.
B900 3C60	Single device not usable while controlling subsystem is in restricted condition. 1. Turn the Power switch off and on to do an IPL. 2. Make sure the console or display station is turned on. 3. Start the controlling subsystem when the restricted condition is no longer needed. 4. When the IPL or Install the System display appears, select the option to do an IPL. 5. Sign on the system when the Sign On display appears. 6. On the IPL Options display, specify the following: **No** for *Clear output queues* **No** for *Clear job queues* **No** for *Incomplete job logs* 7. Continue the IPL. If the same failure occurs, set the keylock switch to the Normal position, then go to "Getting Help with Problems" on page 13-8.
B900 3C80	Operating system IPL failure. See "Procedure 13–Recovering from an Operating System IPL Failure" on page A-19.
B900 3CF0	Operating system IPL failure. 1. Use the correct user ID on the Sign On display to complete the system IPL. 2. If you still cannot do an IPL, go to "Calling Your Software Service Representative" on page 13-8.
B900 3CFF	Operating system IPL failure. See "Procedure 13–Recovering from an Operating System IPL Failure" on page A-19.
B900 3Exx	Message handler ended. 1. Turn the Power switch off and on to do an IPL. 2. If the same problem occurs, go to "Calling Your Software Service Representative" on page 13-8.
B900 3F10	Operating system IPL failure. See "Procedure 14–Recovering from an Operating System IPL Failure" on page A-20.
B900 3F40	Operating system IPL failure. See "Procedure 12–Recovering from an Operating System IPL Failure" on page A-19.

Table A-1 (Page 9 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
B900 3F60 through B900 3F70	Operating system IPL failure. 1. Turn the Power switch off and on to do the IPL again. 2. If the same problem occurs again, go to "Calling Your Software Service Representative" on page 13-8.
B900 3FA0 through B900 3FFE	Operating system IPL failure. See "Procedure 12–Recovering from an Operating System IPL Failure" on page A-19.
B900 3FFF	Operating system IPL failure. Do not start an IPL. Go to "Calling Your Software Service Representative" on page 13-8.
C1xx 1008	IPL status. This is a normal load source search during IPL with xx changing. If the IPL is from a disk unit (IPL mode A or B) you may suspect a problem if the reference code 1008 does not advance after 5 minutes. 1. Record the reference code. 2. Move the keylock switch to the Manual position and select function 03. Press the Enter switch 3. Move the keylock switch back to the Normal position when the first display appears. If the IPL is successful, see "Calling Your Hardware Service Representative" on page 13-9 and report the problem as an intermittent IPL failure. 4. If you get a different error, follow the instructions for the error. 5. If you get the same error, see "Calling Your Hardware Service Representative" on page 13-9. 6. If the IPL failure occurs again, contact your hardware support for assistance.
C1xx 202E	IPL status. This is a normal indication during the IPL. A change in the system configuration or a failure on the system can cause this indication to remain longer than normal. If, after approximately 5 minutes, you determine that the system is not running correctly, do the following: 1. Record the system reference code on the problem summary form in Appendix B, "Problem Summary Forms." 2. Go to "Calling Your Hardware Service Representative" on page 13-9. 3. If a different problem occurs, find the system reference code and follow the instructions.
C1xx xxxx C3xx xxxx	IPL status. This is a normal indication during the IPL. The IPL is not advancing correctly when the six farthest right characters do not change for a period of two minutes. You may suspect a problem if the SRC does not change during the two-minute period. The IPL takes long with more I/O units and storage. If you suspect a problem: 1. Look at the four farthest right characters of the Data display for Function 11. These four characters are the reference code. 2. Record the system reference code on the problem summary form in Appendix B, "Problem Summary Forms." 3. Do an IPL. 4. If you get a different system reference code, find it in this table and follow the instructions. Keep the problem summary form for this error to report in addition to the new system reference code. 5. If you get the same system reference code, go to "Calling Your Hardware Service Representative" on page 13-9. 6. If you are able to solve the problem, use the problem summary form from step 2 to report this as an intermittent problem and go to "Calling Your Hardware Service Representative" on page 13-9.

Table A-1 (Page 10 of 10). List of System Reference Codes. If you cannot find the system reference code in this table, go to "Getting Help with Problems" on page 13-8.

System Reference Code Starting with 11 or 11-2	What You Should Do
C6xx xxxx C9xx xxxx	IPL status. This is a normal indication during the IPL. The IPL is not advancing correctly when the processor activity light does not blink for 30 minutes. The IPL takes longer with more I/O units and storage. If you suspect a problem: 1. Look at the four farthest right characters of the Data display for Function 11. These four characters are the reference code. 2. Record the system reference code on the problem summary form in Appendix B, "Problem Summary Forms." 3. Go to "Calling Your Software Service Representative" on page 13-8.
D1xx xxxx	Diagnostic status. This is a normal indication while the system main storage is being saved to disk. If the system is still not running correctly after 30 minutes, go to "Calling Your Hardware Service Representative" on page 13-9.
D6xx xxxx	Diagnostic status. This is a normal indication while the system is being powered down. If the system does not start normally after 30 minutes, go to "Calling Your Software Service Representative" on page 13-8.
D6xx 0298	System is shutting down. The system is attempting to power down after you used the Power Down System (PWRDWNSYS) command. If your system has an uninterruptible power supply installed, the system may also have sensed a loss of power and is attempting to power down. If the system does not power down within 20 minutes: 1. Turn the power off manually. 2. Turn the Power switch off and on to do an IPL after power is restored. If this system reference code appears without a power problem, go to "Calling Your Software Service Representative" on page 13-8.

Procedure 1–Recovering from a Tape Error or Tape Unit Failure

To recover from a tape error or tape unit failure:

1. Is system reference code (SRC) 2644 3136 displayed?

   Yes The tape drive is assigned to another system. The system that the tape drive is assigned to must vary off (make unavailable) the tape drive before continuing.

   No Continue with step 2.

2. Does the tape density and the tape drive bits per inch (BPI) match?

   Yes Continue with step 3.

   No Ensure that the tape unit and tape you are using have the same BPI and try again.

3. Make sure the power is turned on for the tape units.
4. Clean the tape path (see the operator information for the tape unit.)
5. Load the first tape of the set of tapes you are using.

6. Turn the Power switch off and on to do the IPL again with a **D** shown in the Data display on the system unit control panel.
7. Set the keylock switch to the Normal position when the first display appears.
8. Was the IPL successful?

   Yes End of procedure.

   No If this does not solve the problem, go to "Calling Your Hardware Service Representative" on page 13-9.

Procedure 2–Recovering from an Error Detected by the Work Station Controller

1. Make sure the display stations you are using as the console and alternative consoles have the power turned on.

   Note: On a AS/400 9402 System Unit this may be the first work station attachment feature that has the display set at address 0 and connects to port 0. The first work station attachment feature consists of the following:

   - The system first work station attachment plate
   - A monochrome or color display
   - A keyboard and keyboard extension cable
   - An optional ASCII parallel-attached printer

   Console: The console is the display station that is:

   - Set to address 0
   - Connected to port 0 of the first work station controller

   Alternative console 1: The first alternative console is the display station that is:

   - Set to address 0
   - Connected to port 1 of the first work station controller

   Alternative console 2: The second alternative console is the display station that is:

   - Set to address 0
   - Connected to port 0 of the *second* work station controller (if installed) on bus 0 (card address of 00xx, where x is a number 0 through 9 or a letter A through F).

   Notes:

   a. See the manual for the display station for instructions to check the address setting.
   b. See the configuration list located in this binder to find the physical location of the card.

2. Do an IPL from the system unit control panel as follows:

   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 03.
   c. Push the Enter switch to start an IPL.

3. Does a display appear on the console?

   Yes Continue the IPL. End of procedure.

   No Go to step 4 in this procedure.

4. Is the same system reference code displayed on the system unit control panel?

   Yes Do the following from the system control panel:

   a. Use the Select switch to display function 21.
   b. Push the Enter switch.
   c. Go to step 5 in this procedure.

   No If a new system reference code is displayed, go back to "Analyzing Problems with a System Reference Code" on page A-1 and do problem analysis using this new system reference code.

5. Does a display appear on the console or an alternative console?

   Yes Continue the IPL. End of procedure.

   No Go to step 6 in this procedure.

6. Find any other work stations that are connected to the same ports as the console and alternative consoles (use your local work station diagrams to locate the work stations). Check the following and correct if needed:

   - Each work station connected to the port is set to the correct address as shown on your local work station diagram and no two addresses are the same.
   - The signal should be ended only at the last work station on the port cable.

7. Did you find a problem with any of the ports?

   Yes Do the following from the system unit control panel:

   a. Use the Select switch to display function 21.
   b. Push the Enter switch.
   c. Go to step 8 in this procedure.

   No Go to "Getting Help with Problems" on page 13-8.

8. Set the keylock switch to the Normal position.

9. Does a display appear on the console or an alternative console?

   Yes Continue the IPL. End of Procedure.

   No Go to "Calling Your Hardware Service Representative" on page 13-9.

Procedure 3–Recovering from an Error Detected by the Work Station Controller

1. Check the following and correct if needed for the display station you are using as the console:

   Note: The console is the display station that is connected to port 0 of the first work station controller

   - The power is turned on.
   - The console is an IBM 315X, 316X, or equivalent.
   - The console setup values are set for the console as defined in the *ASCII Work Station Reference and Example* for your system.

2. Make sure that the console display station (and the auxiliary printer, if one has been configured on the system) are properly initialized by doing the following:

   - Turn the console display station (and printer, if appropriate) power off and then back on again.

3. Do an IPL from the system control panel as follows:
   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 03.
   c. Push the Enter switch to start an IPL.
4. Does a display appear on the console?

   Yes Continue the IPL. End of procedure.

   No Go to step 5 in this procedure.
5. Is the same system reference code displayed on the system control panel?

   Yes Go to step 6 in this procedure.

   No If a new system reference code is displayed, go back to "Analyzing Problems with a System Reference Code" on page A-1 and do problem analysis using this new system reference code.
6. Do you have an alternative console?

   Alternative console: The alternative console is the display station that is connected to port 0 of the *second* work station controller (if installed) on bus 0 (card address of 00xx, where x is a number 0 through 9 or a letter A through F).

   Notes:

   a. See the configuration list to find the physical location of the card.
   b. For an ASCII display station used as the console, check that:
      - The display station is an IBM 315X, 316X, or equivalent.
      - The display station setup values are set for the console as defined in the *ASCII Work Station Reference and Example* for your system.
   c. Make sure that the console display station (and the auxiliary printer, if one has been configured on the system) are properly initialized by turning the console display station (and printer, if appropriate) power off and then back on again.

   Yes Make sure the alternative console power is turned on. Do the following from the system control panel:

   a. Use the Select switch to display function 21.
   b. Push the Enter switch.
   c. Go to step 7 in this procedure.

   No Go to "Calling Your Hardware Service Representative" on page 13-9.
7. Set the keylock switch to the Normal position.
8. Does a display appear on the alternative console?

   Yes Continue the IPL. End of procedure.

   No Go to "Calling Your Hardware Service Representative" on page 13-9.

Procedure 4–Recovering from an Error Detected by the Work Station

1. Select the icon on the workstation to make it the console.

   Note: See your Apple** workstation device documentation for more information.

2. Press the Select switch on the control panel to display function 21. Sign on to the system and perform an IPL. If reference code A600 5005 still appears on your control panel, go to step 4 of this procedure.
3. If no reference code appears and the workstation does not work following the IPL, isolate one AS/400 system and one workstation or console. To do this, perform the following:
   a. Power off the system and disconnect the power cable from the workstation.
   b. Disconnect all workstations, cabling, and connector boxes from the network with the exception of one AS/400 system, one console, two connector boxes, and one cable.
   c. Make sure the cables connected to the console, keyboard, and AS/400 system are connected correctly and are not damaged.
4. Set the Power switch on the console to the On position.
5. Select the SNA*PS icon on the console.

   Note: See your Apple workstation device documentation for more information.
6. Set the Keylock switch on the control panel of the AS/400 system to the Manual position. Power on the system and wait for a display to appear on the console or a reference code to appear on the control panel.

   Does a display appear on the console?

   Yes The problem is in a cable, connector box, or device you disconnected in step 3 of this procedure.

   This ends the procedure.

   No Go to step 7 of this procedure.
7. Does the reference code A600 5005 appear on the control panel?

   No If a new reference code is displayed on the system unit control panel, go back to "Analyzing Problems with a System Reference Code" on page A-1 and do problem analysis using the new reference code.

   Yes Go to step 8 of this procedure.
8. Repeat steps 3 through 7 of this procedure using a different workstation, cable, and connector box.

   Note: If you do not have a workstation, cable, or connector box to repeat this procedure, one of the following is causing the problem:

   - Workstation adapter Licensed Internal Code
   - Workstation adapter configuration
   - Workstation
   - Cable
   - Connector

   Go to "Calling Your Hardware Service Representative" on page 13-9.

   After repeating steps 3 through 7, do you still have a problem?

   No The problem is in a cable, connector box, or workstation you disconnected.

   This ends the procedure.

   Yes Go to step 9 of this procedure.
9. One of the following is causing the problem:

- Workstation adapter Licensed Internal Code
- Workstation adapter configuration
- Workstation adapter
- Communications I/O processor

To verify that the workstation adapter and communications I/O processor are not failing, do the following:

a. Connect a workstation to another address
b. Set the Keylock switch on the control panel to the Normal position
c. Perform an IPL to the system

If a sign on display appears, it is not the communications I/O processor or workstation adapter that is causing the problem.

10. If the problem still exists, go to "Calling Your Hardware Service Representative" on page 13-9.

Procedure 5–Recovering from a Work Station Controller Failure

1. If you have an alternative console, make sure the power is turned on.

   Alternative console: The alternative console is the display station that is:

   - Set to address 0 (twinaxial display station only)
   - Connected to port 0 of the *second* work station controller (if installed) on bus 0 (card address of 00xx, where x is a number 0 through 9 or a letter A through F).

   Notes:

   a. See the manual for the twinaxial display station for instructions to check the address setting.
   b. See the configuration list located in this binder to find the physical location of the card.
   c. For an ASCII display station used as an alternative console, check that:
      - The display station is an IBM 315X, 316X, or equivalent.
      - The display station setup values are set for the console as defined in the *ASCII Work Station Reference and Example* for your system.

2. Do the following from the system unit control panel:

   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 21.
   c. Push the Enter switch.

3. Does a display appear on the alternative console?

   Yes Continue the IPL. End of procedure.

   No Go to step 4 in this procedure.

4. Is the same system reference code displayed on the system unit control panel?

   Yes Go to "Calling Your Hardware Service Representative" on page 13-9.

   No If a new system reference code is displayed, go back to "Analyzing Problems with a System Reference Code" on page A-1 and do problem analysis using this new system reference code.

5. Set the keylock switch to the Normal position.

6. If this does not solve the problem, go to "Getting Help with Problems" on page 13-8.

Procedure 6–Recovering from a Work Station Controller Failure

1. Make sure the display stations you are using as the console and alternative consoles have the power turned on.

   Console: The console is the display station that is:

   - Set to address 0 (twinaxial display station only)
   - Connected to port 0 of the first work station controller

   Alternative console 1 (twinaxial display station only): The first alternative console is the display station that is:

   - Set to address 0
   - Connected to port 1 of the first work station controller

   Alternative console 2 (twinaxial display station only): The second alternative console is the display station that is:

   - Set to address 0
   - Connected to port 0 of the *second* work station controller (if installed) on bus 0 (card address of 00xx, where x is a number 0 through 9 or a letter A through F).

   Notes:

   a. See the manual for the twinaxial display station for instructions to check the address setting.
   b. See the configuration list located in this binder to find the physical location of the card.
   c. For an ASCII display station used as the console, check that:
      - The display station is an IBM 315X, 316X, or equivalent.
      - The display station setup values are set for the console as defined in the *ASCII Work Station Reference and Example* for your system.

2. Do the following from the system unit control panel:

   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 21.
   c. Push the Enter switch.

3. Does a display appear on the alternative console?

   Yes Continue the IPL. End of procedure.

   No Go to step 4 in this procedure.

4. Is the same system reference code displayed on the system unit control panel?

   Yes Go to "Calling Your Hardware Service Representative" on page 13-9.

   No If a new system reference code is displayed, go back to "Analyzing Problems with a System Reference Code" on page A-1 and do problem analysis using this new system reference code.

5. Set the keylock switch to the Normal position.

6. If this does not solve the problem, go to "Getting Help with Problems" on page 13-8.

Procedure 7–Recovering when the Console Does Not Vary On

1. Locate the display station used as a console and ensure it is powered on and working.

   Note: If the console is not working, find another display station that is working.

2. If possible, sign on to a work station and do the following:

   - If automatic configuration is off, make sure that a console controller description and device description have been created or restored.
   - If the descriptions exist, use the Display Message (DSPMSG) command to check the system operator (QSYSOPR) message queue to see why the console failed to vary on.
   - Take corrective action.

3. If you cannot sign on to a work station, do the following:

   a. Set the keylock switch to the Manual position.
   b. Press the Delayed Off switch, then press the Power On switch to start an IPL. If you get a new system reference code after the IPL, follow the recovery procedure for the new code.
   c. If your IPL progresses past the IPL or Install the System display to the IPL Options display, specify the following on the IPL Options display:

      Yes for the *Define or change the system at IPL* field.

   d. On the Define or Change the System display, select the Configuration commands option so that the Configuration Commands display appears. Select option 2 (Controller description commands) and option 3 (Device description commands) on the Configuration Commands display and display the controller and device descriptions for CTL01 and DSP01 to see if they were created correctly.
   e. If you are unable to solve the problem, set the keylock switch to the normal position, and go to "Calling Your Software Service Representative" on page 13-8.

Procedure 8–Recovering from an Operating System Installation Failure

1. Make sure the display station you are using for the console is turned on.

   Console: The console is the display station that is:
   - Set to address 0 (twinaxial display station only)
   - Connected to port 0 of the first work station controller

   Notes:
   a. See the manual for the twinaxial display station for instructions to check the address setting.
   b. See the configuration list located in this binder to find the physical location of the card.

2. Do the following for the type of display station you are using as the console.

   Twinaxial display station: Check that the signal is ended at the last work station on the port cable. Use your local work station diagrams to locate the work stations.

   ASCII display station: Check that:
   - The display station is an IBM 315X, 316X, or equivalent.
   - The display station setup values are set for the console as defined in the *ASCII Work Station Reference and Example* for your system.

3. If a problem was discovered, solve the problem and restart installing the OS/400 licensed program.
4. If no problem was discovered, go to "Calling Your Software Service Representative" on page 13-8.

Procedure 9–Recovering from an Operating System IPL Failure

1. Do an IPL from the system unit control panel as follows:
   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 03.
   c. Push the Enter switch to start an IPL.
2. When the IPL/Install the System display appears, select the option to do an IPL.
3. Sign on the system when the Sign On display appears.
4. On the IPL Options display, specify the following:

   Yes for *Define or change the system at IPL*

5. Select the system value commands option from the Define or Change the System menu.
6. Display the system value for QMCHPOOL and record the value.
7. Change the system value for QMCHPOOL to a smaller value.
8. Continue the IPL. If the same failure occurs, set the keylock switch to the Normal position, then go to "Calling Your Software Service Representative" on page 13-8.

Procedure 10–Recovering from an Operating System IPL Failure

The system cannot find the controlling subsystem. The name could be spelled wrong or the library object could be spelled wrong or damaged.

1. Do an IPL from the system unit control panel as follows:
   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 03.
   c. Push the Enter switch to start an IPL.
2. When the IPL/Install the System display appears, select the option to do an IPL.
3. Sign on the system when the Sign On display appears.
4. On the IPL Options display, specify the following:

   Yes for *Define or change the system at IPL*

5. Select the system value commands option from the Define or Change the System menu.
6. Display the system value for QCTLSBSD and record the value.
7. Change the system value for QCTLSBSD either to correct the spelling or to change the value to an alternative controlling subsystem.
8. Continue the IPL. If the same failure occurs, set the keylock switch to the Normal position, then go to "Calling Your Software Service Representative" on page 13-8.

Procedure 11–Recovering from an Operating System IPL Failure

1. Do an IPL from the system unit control panel as follows:
   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 03.
   c. Push the Enter switch to start an IPL.
2. When the IPL/Install the System display appears, select the option to do an IPL.
3. Sign on the system when the Sign On display appears.
4. On the IPL Options display, specify the following:

   Yes for *Clear output queues*

   Yes for *Clear job queues*

   Yes for *Clear incomplete job logs*

5. Continue the IPL. If the same failure occurs, set the keylock switch to the Normal position, then go to "Calling Your Software Service Representative" on page 13-8.

Procedure 12–Recovering from an Operating System IPL Failure

1. Do an IPL from the system unit control panel as follows:
   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 03.
   c. Push the Enter switch to start an IPL.
2. When the IPL/Install the System display appears, select the option to do an IPL.
3. Sign on the system when the Sign On display appears.
4. On the IPL Options display, specify the following:

   No for *Clear output queues*

   No for *Clear job queues*

   No for *Clear incomplete job logs*

5. Continue the IPL. If the same failure occurs, set the keylock switch to the Normal position, then go to "Calling Your Software Service Representative" on page 13-8.

Procedure 13–Recovering from an Operating System IPL Failure

1. Do an IPL from the system unit control panel as follows:
   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 03.
   c. Push the Enter switch to start an IPL.
2. When the IPL/Install the System display appears, select the option to do an IPL.
3. Sign on the system when the Sign On display appears.
4. On the IPL Options display, specify **Yes** for *Define or change the system at IPL*.
5. Select the system value commands option from the Define or Change the System menu.
6. Display the system value for QCTLSBSD and record the value.
7. Change the system value for QCTLSBSD to an alternative controlling subsystem.

8. Continue the IPL. If the same failure occurs, set the keylock switch to the Normal position, then go to "Calling Your Software Service Representative" on page 13-8.

Procedure 14–Recovering from an Operating System IPL Failure

1. Do an IPL from the system unit control panel as follows:
   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 03.
   c. Push the Enter switch to start an IPL.
2. When the IPL/Install the System display appears, select the option to do an IPL.
3. Sign on the system when the Sign On display appears.
4. On the IPL Options display, specify **Yes** for *Define or change the system at IPL*.
5. Select the system value commands option from the Define or Change the System menu.
6. Display the system value for QPWRDWNLMT and record the value.
7. Change the system value for QPWRDWNLMT to a larger value.
8. Continue the IPL. If the same failure occurs, set the keylock switch to the Normal position, then go to "Calling Your Software Service Representative" on page 13-8.

Procedure 15–Recovering from a System Processor Error

1. Do not turn the system power off.
2. Record the system reference code on the problem summary form in Appendix B, "Problem Summary Forms" and go on to the next step.
3. Do an IPL from the system unit control panel as follows:
   a. Set the keylock switch to the Manual position.
   b. Use the Select switch to display function 3.
   c. Push the Enter switch to start an IPL.
4. Does IPL stop with the System Attention indicator lit?

   Yes System operation cannot be restored with this error condition. Record the system reference code on the problem summary form in Appendix B, "Problem Summary Forms." Make sure you have collected all of the codes and go to "Calling Your Hardware Service Representative" on page 13-9.

   No When the IPL/Install the System display appears, select the option to do an IPL.
5. Sign on the system when the Sign On display appears.
6. If error messages appear after the IPL is complete, go to "Handling Error Messages" on page 6-9. Information obtained by running problem analysis, where possible, can be useful to your service representative.
7. Set the keylock switch to the Normal position.

Analyzing Problems with a Symptom

Symptom	What You Should Do
You cannot turn power on to the system (or one or more racks will not power on).	1. Make sure the AC power cord was placed in an electrical outlet. If AC power is not available to the primary rack, the Function and Data displays are dark. This can be due to an unplugged power cord, turned off rack EPO switch, or rack sequencing cabling problem. When AC power is available, the Function and Data displays are lit (yellow background with digits) on the system control panel. The AS/400 9402 System Unit may have a power cord that disconnects from the system unit. 2. Manually turn on the power to the system (see "Changing Your System during IPL (Attended IPL)" on page 2-9). The power light should be lit. 3. Is a system reference code shown on the system control panel? **Yes** Go to "Analyzing Problems with a System Reference Code" on page A-1. **No** Go to "Getting Help with Problems" on page 13-8.
A switch on the control panel is not working.	Go to "Getting Help with Problems" on page 13-8. Report that the system control panel is not working.
You cannot do an IPL or there is no power when you try to do an IPL.	1. If there is more than one work station controller, check the display stations attached to the other controllers for a Sign On display. Refer to the local work station planning diagrams for the location of the controllers and attached devices. Is a Sign On display shown? **Yes** Sign on the system. **No** Go to step 2. 2. Do an IPL from the system control panel as follows: a. Set the keylock switch to the Normal position. b. Push the Enter pushbutton to start an IPL. 3. Is a different system reference code shown on the system control panel or is the Display Missing Disk Units display shown? **Yes** Go to "Analyzing Problems with a System Reference Code" on page A-1 and use the information on the display to solve the problem. **No** Go to "Getting Help with Problems" on page 13-8.
You cannot install the OS/400 licensed program.	Look for the SRC shown on the control panel in "Analyzing Problems with a System Reference Code" on page A-1 and follow the instructions in the *What You Should Do* column.

Symptom	What You Should Do
One or all work stations are not working (for example, input inhibited or No Sign On display appears).	1. Make sure the display station you are using for the console is turned on. **Console:** The console is the display station that is: • Set to address 0 (twinaxial display station only) • Connected to port 0 of the first work station controller or connected to port 0 at the back of the AS/400 9402 System Unit. **Notes:** a. See the manual for the twinaxial display station for instructions to check the address setting. b. See the configuration list located in this binder to find the physical location of the card. 2. Do the following for the type of display station you are using as the console. **Twinaxial display station:** Check that the signal is ended only at the last work station on the port cable. Use your local work station diagrams to locate the work stations. **ASCII display station:** Check that: • The display station is an IBM 315X, 316X, or equivalent. • The display station setup values are set for the console as defined in the *ASCII Work Station Reference and Example* for your system. • The work station is connected to port 0. 3. Make the controller unavailable (vary it off) and then make it available again (vary it on) using the Vary Configuration (VRYCFG) command. When you do this, use *YES in the *Reset* field. 4. Fill in the problem summary form found in Appendix B, "Problem Summary Forms" and get a printout of your system's storage. Do an IPL and copy the storage information to a tape. Also, save the job logs and Vertical Licensed Internal Code logs. Go to "Getting Help with Problems" on page 13-8.
Device hardware problem	1. Use your device documentation to ensure that the device is operating properly. 2. Go to "Getting Help with Problems" on page 13-8.
The system is powered on, but the system stops running.	Go to "Getting Help with Problems" on page 13-8.
The Operational Assistant automatic power schedule is not working.	See "Solving Problems with the Automatic Power Schedule" on page 2-8.
You cannot find the symptom in this chart.	Go to "Getting Help with Problems" on page 13-8. If possible, use the Analyze Problem (ANZPRB) command to report the problem.

Appendix B. Problem Summary Forms

The Problem Summary Form is used to record information displayed on the system unit control panel. When you perform problem analysis in Chapter 13, "Handling and Reporting System Problems" you may be instructed to fill out this form so your service representative can further analyze the problem. The form should be removed from the binder when used.

There are three forms, one for each of the following:

1. AS/400 9402 System Unit
2. 9404 and 9404 Server Series Model 135 and 140 System Units
3. 9406 System Units

The reason for the three forms is to show the difference in the control panels. Use the form that matches the control panel for your system.

Make copies of a blank form to use if you need more forms.

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Problem Summary Form – AS/400 9402 System Unit

Date and time that the problem occurred:____/____/____ ____:____:____

PMR or service request number: _____

Describe the problem: _____

_____

Message ID	Message Text	From/Send Program	Instruction Number	To/Receive Program	Instruction Number
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

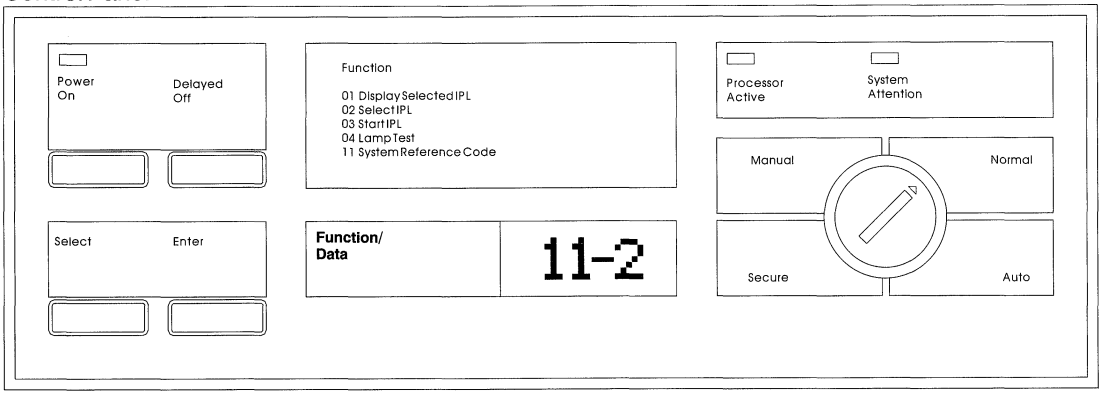
1 Record the position of the keylock switch.

2 Set the keylock switch to the Manual position.

3 Place a check on the line below to indicate which lights on the control are on.

__ Power On
__ Processor/Active/Activity
__ System Attention

Control Panel



RV2P713-3

4 Press the Selection switch until 11 or 11-2 is shown in the Function display. Press the Enter key.

5 Record the 8 characters shown in the Data display for Function 11 or 11-2. If 11-2 is displayed, enter -2 in the box on the left.

11XX	
12XX	
13XX	
14XX	
15XX	
16XX	
17XX	
18XX	
19XX	
20XX	

6 Press the Selection switch. This action steps the function display to the next higher number (12, 13, and so on) and blanks the Data display.

7 Press the Enter switch. This action shows a new set of 8 characters in the Data display. Record this data on the form.

8 Repeat steps 6 and 7 until all data has been recorded through Function 20. All functions may not be displayed, depending on the failure.

9 Return the keylock switch to the position recorded in step 1 of this form. Press the Selection switch until the number 11 or 11-2 is shown in the Function display. Press the Enter switch. The original system reference code (SRC) appears.

10 Return to the step that sent you here.

Comments: _____

_____

Problem Summary Form – 9404 System Unit and 9404 Server Series Model 135 and 140 System Units

Date and time that the problem occurred:___/___/___ ___:___:___

PMR or service request number: _____

Describe the problem: _____

_____

Message ID	Message Text	From/Send Program	Instruction Number	To/Receive Program	Instruction Number
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

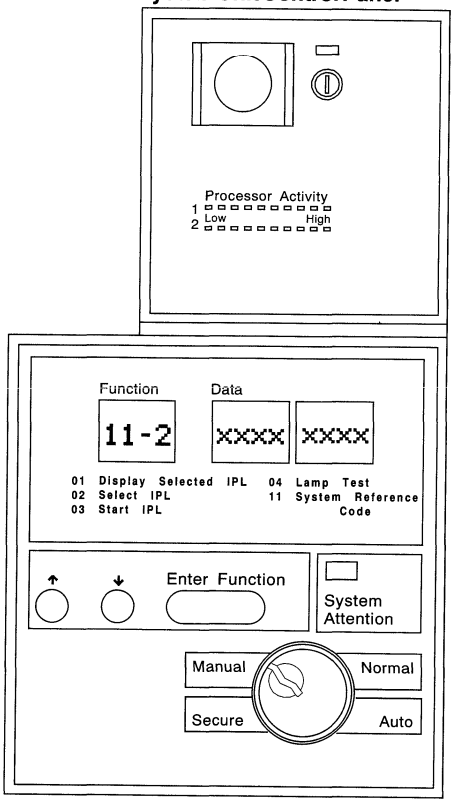
1 Record the position of the keylock switch.

2 Set the keylock switch to the Manual position.

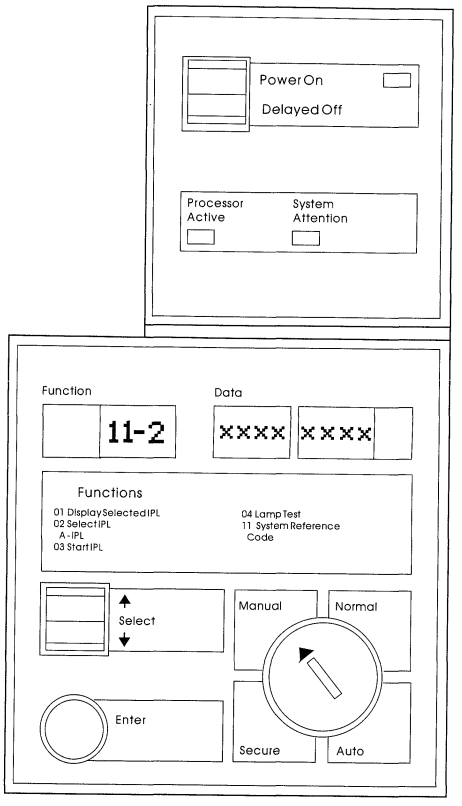
3 Place a check on the line below to indicate which lights on the control panel are on.

__ Power On
__ Processor/Active/Activity
__ System Attention

9404 Server Series Model 135 and 140 System Unit Control Panel



9404 System Unit Control Panel



RV2P991-1

4 If 11 or 11-2 is shown in the Function display, go to step 6.

5 If something other than 11 or 11-2 is shown in the display, press the Selection switch until 11 or 11-2 are shown in the Function display and press the Enter key.

6 Record the 8 characters shown in the Data display for Function 11 or 11-2. If 11-2 is shown in the Function display, enter -2 in the box on the left.

11XX	
12XX	
13XX	
14XX	
15XX	
16XX	
17XX	
18XX	
19XX	
20XX	

7 Press the upper part of the Selection switch. This action steps the Function display to the next higher number (12, 13, and so on) and blanks the Data display.

8 Press the Enter switch. This action shows a new set of 8 characters in the Data display. Record this data on the form.

9 Repeat steps 7 and 8 until all data has been recorded through Function 20. All functions may not be displayed, depending on the failure.

10 Return the keylock switch to the position recorded in step 1 of this form.

11 Press the upper part of the Selection switch until the number 11 or 11-2 is shown in the Function display. Press the Enter switch. This action shows the original system reference code (SRC).

12 Return to the step that sent you here.

Comments: _____

Problem Summary Form – 9406 System Unit

Date and time that the problem occurred:____/____/____ ____:____:____

PMR or service request number: _____

Describe the problem: _____

_____

Message ID	Message Text	From/Send Program	Instruction Number	To/Receive Program	Instruction Number
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

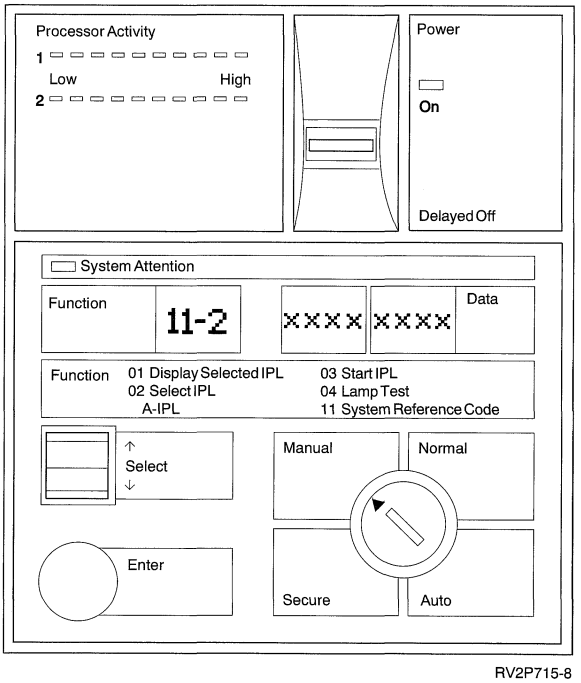
1 Record the position of the keylock switch.

2 Set the keylock switch to the Manual position.

3 Place a check on the line below to indicate which lights on the control panel are on.

__ Power On
__ Processor/Active/Activity
__ System Attention

9406 System Unit Control Panel



RV2P715-8

4 If 11 or 11-2 is shown in the Function display, go to step 6.

5 If something other than 11 or 11-2 is shown in the display, press the Selection switch until 11 or 11-2 are shown in the Function display and press the Enter key.

6 Record the 8 characters shown in the Data display for Function 11 or 11-2. If 11-2 is shown in the Function display, enter -2 in the box on the left.

11XX	
12XX	
13XX	
14XX	
15XX	
16XX	
17XX	
18XX	
19XX	
20XX	

7 Press the upper part of the Selection switch. This action steps the Function display to the next higher number (12, 13, and so on) and blanks the Data display.

8 Press the Enter switch. This action shows a new set of 8 characters in the Data display. Record this data on the form.

9 Repeat steps 7 and 8 until all data has been recorded through Function 20. All functions may not be displayed, depending on the failure.

10 Return the keylock switch to the position recorded in step 1 of this form.

11 Press the upper part of the Selection switch until the number 11 or 11-2 is shown in the Function display. Press the Enter switch. This action shows the original system reference code (SRC).

12 Return to the step that sent you here.

Comments: _____

Appendix C. Control Panel Status Forms

The System Control Panel Status form is used for you to keep all of your important control panel information in one place, should you need to call for assistance. There is a separate form for the AS/400 9402 System Unit, 9404 System Unit, 9404 Server Series Models 135 and 140 System Units, and 9406 System Unit.

Fill out one of the forms and post it near your system unit or keep it in an accessible place. If you have problems with your system, refer to this sheet for information on what the different problem signals are and the phone number to call if you are having problems. For information on the different types of problems and who to call for them, see "Getting Help with Problems" on page 13-8.

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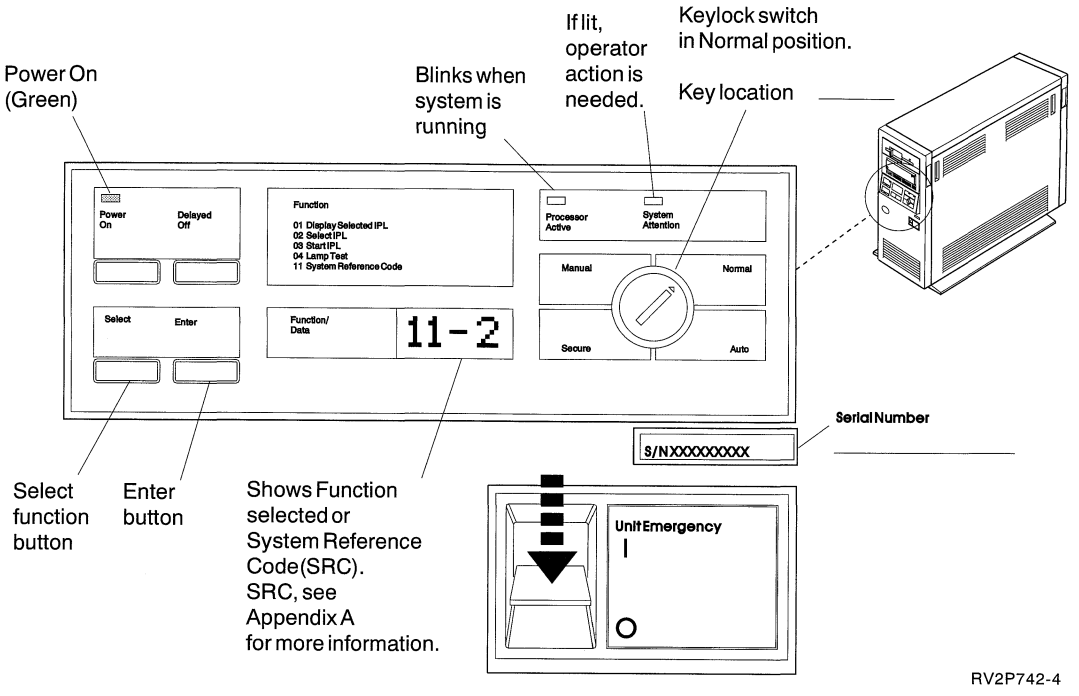
AS/400 9402 System Unit Control Panel Status Form



RV2P742-4

IBM Customer Number: _____

Computer Serial Number: _____

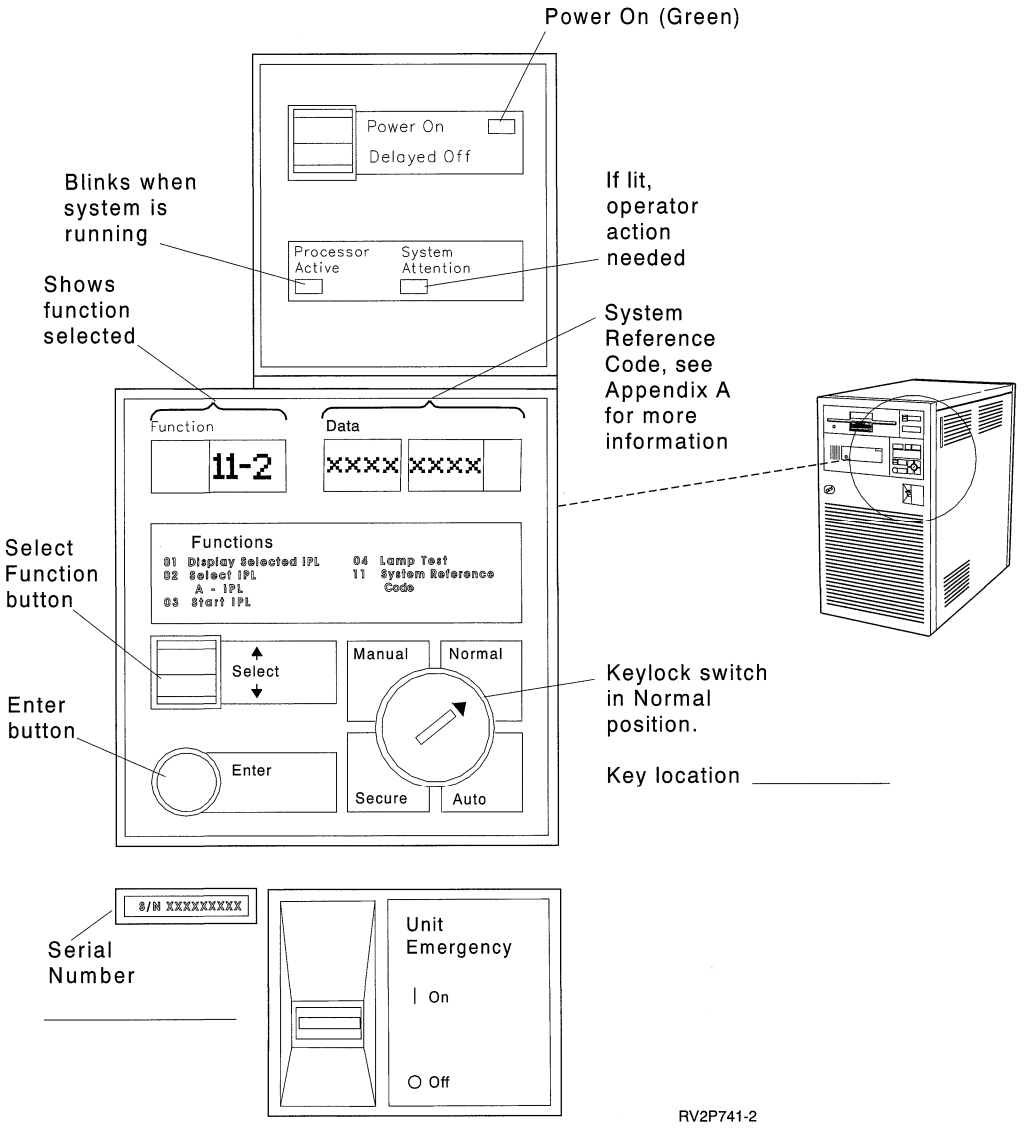
AS/400 Model 9402- _____

IBM Business Partner/Marketing Team Number: _____

IBM Software Service Number: _____

IBM Hardware Service Number: _____

9404 System Unit Control Panel Status Form



IBM Customer Number: _____

Computer Serial Number: _____

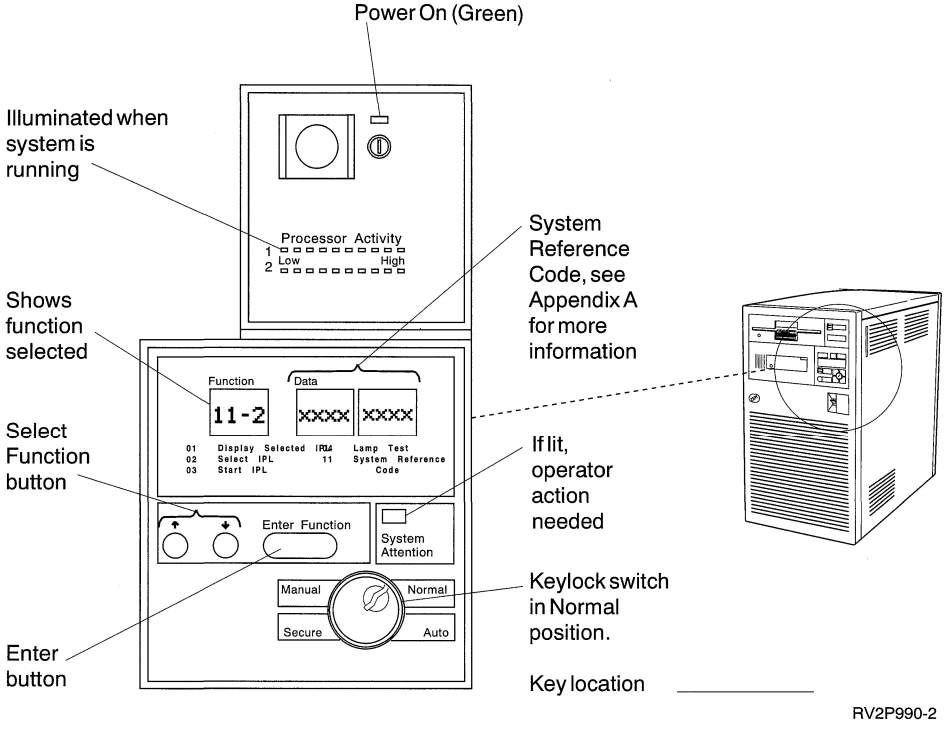
AS/400 Model 9404- _____

IBM Business Partner/Marketing Team Number: _____

IBM Software Service Number: _____

IBM Hardware Service Number: _____

9404 Server Series Models 135 and 140
System Unit Control Panel Status Form



IBM Customer Number: _____

Computer Serial Number: _____

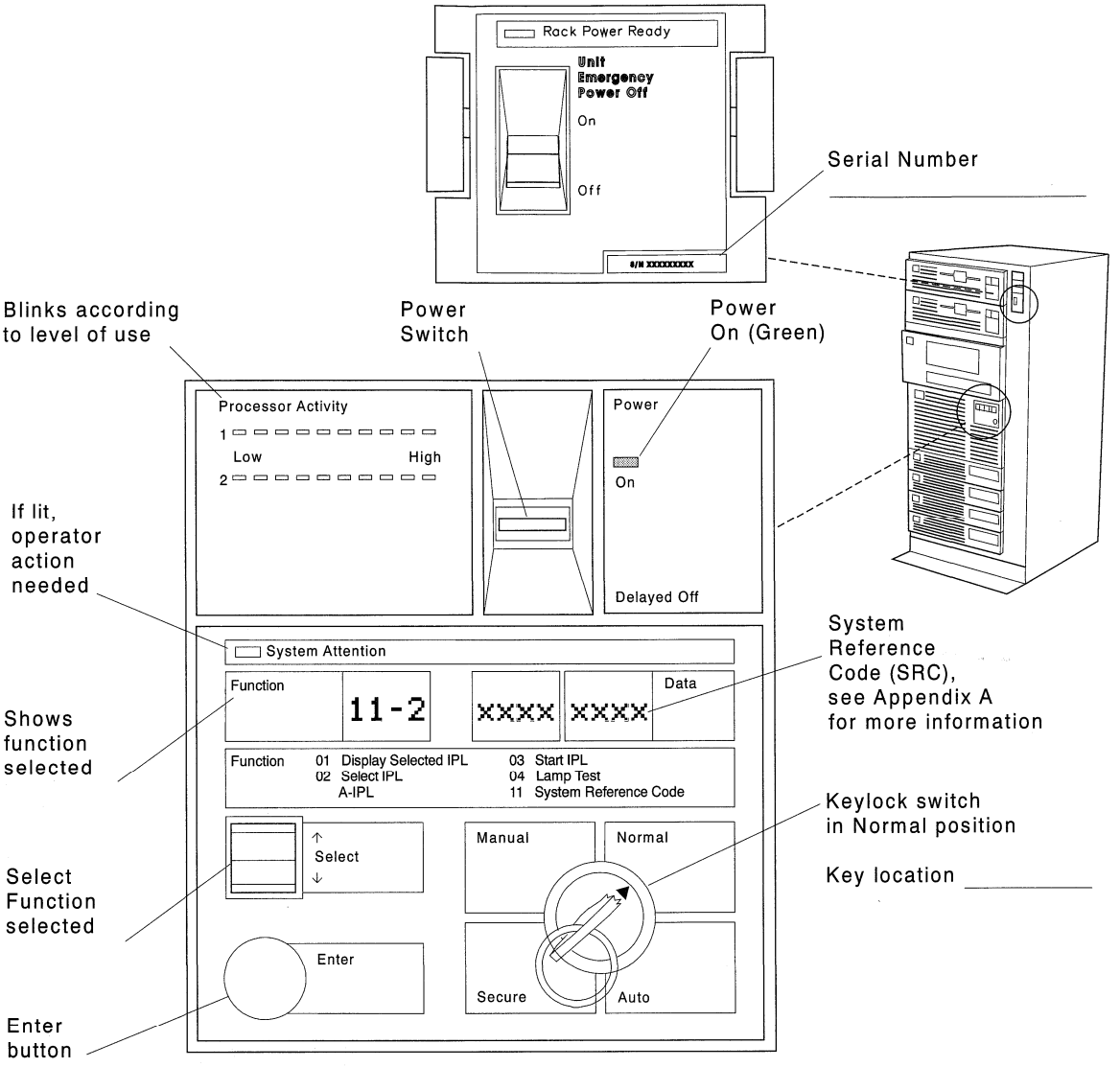
AS/400 Model 9404- _____

IBM Business Partner/Marketing Team Number: _____

IBM Software Service Number: _____

IBM Hardware Service Number: _____

9406 System Unit Control Panel Status Form



RV2P740-1

IBM Customer Number: _____

Computer Serial Number: _____

AS/400 Model 9406- _____

IBM Business Partner/Marketing Team Number: _____

IBM Software Service Number: _____

IBM Hardware Service Number: _____

Appendix D. Operational Assistant Callable Programs

Table D-1 shows the Operational Assistant function, CL command, menu option, and callable program. See the *System Programmer's Interface Reference* for more information on how to use Operational Assistant application program interfaces (APIs).

Table D-1. Operational Assistant Callable Programs

Function	CL Command	Menu Option	Callable Program
Work with Printer Output	WRKSPLF	ASSIST (1) MANAGESYS (10)	QEZOUTPT
Work with Jobs	WRKUSRJOB JOBTYPE(*BATCH)	ASSIST (2) MANAGESYS (11)	QEZBCHJB
Work with Messages	WRKMSG or DSPMSG	ASSIST (3)	QEZMSG
Send Message	See Note.	ASSIST (4)	QEZSNDMG
Clean up the system		CLEANUP (2 and 3)	QEZUSRCLNP
Power off the system	PWRDWNSYS OPTION(*IMMED)	POWER (3)	QEZPWROFFP
Operational Assistant attention-key-handling (with group jobs)	See Note.		QEZMAIN
Operational Assistant attention-key-handling (without group jobs)	See Note.		QEZAST
Save information to solve a problem	See Note.		QEZSAVIN

Note:
These programs can only be used for an interactive job.

Disk Space Data Output Files

All information is placed in a physical file that is created if the file does not exist. The file containing the data is QAEZDISK and exists in library QUSRSYS. The following table shows the field specifications of the disk space data output file for disk space utilization.

Table D-2 (Page 1 of 2). Disk Space Utilization

Field Name	Description	Attributes
DIOBLI	Library name.	C (10)
DIOBNM	Object name.	C (12)
DIPRFL	Parent folder.	C (12)

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Table D-2 (Page 2 of 2). Disk Space Utilization

Field Name	Description	Attributes
DIOBTP	Object type.	C (7)
DIOBAT	Object attribute.	C (9)
DIOBSZ	Object size.	PD (15,0)
DIOBTX	Object text description.	C (50)
DICCEN	Last changed century.	C (1)
DICDAT	Last changed date.	C (6)
DICTIM	Last changed time.	C (6)
DIOBUS	Last use indicator.	C (1)
DIUCEN	Last used century.	C (1)
DIUDAT	Last used date.	C (6)
DIUTIM	Last used time.	C (1)
DISTIN	Status indicator.	C (1)
DIOBOW	Object owner.	C (10)
DIOBAS	Object ASP.	C (2)
DIFLPT	Folder path.	C (64)

Glossary

This glossary includes terms and definitions from:

- The *American National Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018. Definitions are identified by the symbol (A) after the definition.
- The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Committee (ISO/IEC JTC1/SC1). Definitions of published parts of this vocabulary are identified by the symbol (I) after the definition; definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T) after the definition, indicating that final agreement has not yet been reached among the participating National Bodies of SC1.

access. (1) To read. (2) The ability to use or read.

activation group. A substructure of a run-time job. An activation group consists of system resources (storage for program or procedure variables, commitment definitions, and open files) allocated to one or more programs. An activation group is like a miniature job within a job.

activity level. A characteristic of a subsystem that specifies the maximum number of jobs that can compete at the same time for the processing unit.

adapter. (1) A part that electrically or physically connects a device to a computer or to another device. (2) A device for attaching parts, for example, parts having different diameters or voltages.

address. (1) The location in the storage of a computer where particular data is stored. Also, the numbers that identify such a location. (2) In data communications, the unique code assigned to each device or system connected in a network. (3) The second part of a two-part user identification used to send distributions. See also *user ID/address*.

adjacent destination node. In OSI, a destination node that is also an adjacent node—that is, attached to the same subnetwork as the local node. See also *adjacent node* and *destination node*. Contrast with *nonadjacent destination node* and *relay open system*.

adjacent node. In OSI, a node that is attached to the same subnetwork as the local node. An adjacent node can be either a destination node or a relay node.

advanced assistance level. The type of displays that provide the same functions as the intermediate assistance level. However, the displays contain as much information as possible by not displaying the allowed function keys and options.

alert. In SNA, a record sent to a focal point to identify a problem or an impending problem.

alert controller description. A controller description that defines the system to which alerts will be sent on an alert controller session. See also *alert controller session*.

alert controller session. A type of SSCP-PU session on which alerts can be sent to a system that is designated as an alert focal point.

allocate. To reserve a resource for use in performing a specific task. Contrast with *deallocate*.

alphanumeric. Pertaining to the letters A through Z or a through z; numbers 0-9; and special symbols $, #, @, ., or _.

alternative console. A display device assigned by the operating system to function as the console if the console is not working.

American National Standard Code for Information Interchange (ASCII). The code developed by the American National Standards Institute for information exchange among data processing systems, data communications systems, and associated equipment. The ASCII character set consists of 7-bit control characters and symbolic characters, plus one parity bit.

APAR. See *authorized program analysis report (APAR)*.

application. A particular business task, such as inventory control or accounts receivable.

application program. A program used to perform a particular data processing task, such as inventory control or payroll.

ASCII. See *American National Standard Code for Information Interchange (ASCII)*.

ASP. See *auxiliary storage pool (ASP)*.

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assignment. The process of giving a value to a variable.

assistance level. The type of displays that a user selects to interact with the system. The three levels of assistance available are basic, intermediate, and advanced.

asynchronous. Not occurring in a regular or predictable pattern.

asynchronous communications. A method of communications supported by the operating system that allows an exchange of data with a remote device, using either a start-stop line or an X.25 line. Asynchronous communications includes the file transfer support and the interactive terminal facility support.

attribute. A characteristic or trait of one or more items.

authorization list. A list of two or more user IDs and their authorities for system resources. The system-recognized identifier for the object type is *AUTL.

authorized program analysis report (APAR). A request for correction of a defect in a current release of an IBM-supplied program.

automatic cleanup. The system process of automatically deleting items, such as old job logs, history log messages, system journals, and system logs, from the system on a daily basis.

automatic configuration. A function that names and creates the descriptions of network devices and controllers attached to a preexisting line. The objects are also varied on at a user's request.

automatic dial. A function of the system that allows a system to automatically dial a remote station over a switched line without the assistance of an operator.

autostart job. A batch job doing repetitive work or one-time initialization work that is associated with a particular subsystem. The autostart jobs associated with a subsystem are automatically started each time the subsystem is started.

auxiliary storage. All addressable disk storage other than main storage. See also *control storage*. Contrast with *main storage*.

auxiliary storage pool (ASP). One or more storage units defined from the disk units or disk unit subsystems that make up auxiliary storage. ASPs provide a means of isolating certain objects on specific disk units to prevent the loss of data due to disk media failures on other disk units. See also *unit*, *system ASP*, and *user ASP*.

available. In the basic assistance level of the Operational Assistant function, to make a device, controller, line, or network interface accessible for its normal, intended use. Synonymous with *vary on*.

back up. To save some or all of the objects on a system to tape or diskette, for safe keeping.

backup. Pertaining to an alternative copy used as a substitute if the original is lost or destroyed, such as a backup log.

base pool. A storage area that contains all unassigned main storage on the system and whose minimum size is specified in the system value QBASPOOL. The system-recognized identifier is *BASE.

basic assistance level. The type of displays that provides the most assistance. Basic assistance level supports the more common user and operator tasks, and does not use computer terminology.

batch. Pertaining to a group of jobs to be run on a computer sequentially with the same program with little or no operator action. Contrast with *interactive*.

batch job. A predefined group of processing actions submitted to the system to be performed with little or no interaction between the user and the system. Contrast with *interactive job*. See also *autostart job*, *communications job*, *prestart job*, *scheduled job*, *spooling job*, and *system job*.

break delivery. The method of delivering messages to a message queue in which the job associated with that message queue is interrupted as soon as the message arrives.

call stack. The ordered list of all programs or procedures currently started for a job. The programs and procedures can be started explicitly with the CALL instruction, or implicitly from some other event.

card. A plug-in circuit assembly.

carrier. A continuous frequency that can be varied with a second signal to send information.

Celsius. Pertaining to a particular temperature scale.

character key. A keyboard key that allows the user to type into the system the character shown on the key. See also *function key*.

CL. See *control language (CL)*.

CLEAR. In SNA, a command used to delete all requests and responses related to the active session.

common carrier. In data communications, any government-regulated company in the United States or Canada that provides communications services to the general public. Examples are: the government-regulated telephone and telegraph companies in the United States, the General Post Office in the United Kingdom, the Bundespost in Germany, and Nippon Telephone and Telegraph Public Corporation in Japan.

common user identification (common user ID). In PC Support/400, the user identification of a PC Support/400 user that is used by the router when establishing a communications connection with a host system if a user ID is not specified in either the CONFIG.PCS file or in an alternative configuration file. The router uses this common user ID when connecting the personal computer to each additional host system. See also *user identification (user ID)*.

communications configuration. The physical placement of communications controllers, the attachment of communications lines, and so forth; and the configuration descriptions that describe the physical configuration to the system and describe how the configuration will be used by the system. See also *line configuration*, *controller configuration*, and *device configuration*.

communications job. A batch job that is started by a program start request from a remote system.

communications line. The physical link (such as a wire or a telephone circuit) that connects one or more work stations to a communications controller, or connects one controller to another. Contrast with *data link protocol*.

communications type. A method for application programs to communicate on a local AS/400 system, or between a local AS/400 system and a remote system using the intersystem communications function (ICF). Examples of these communications methods include (a) asynchronous communications, (b) binary synchronous communications (BSC), (c) finance communications. (d) intrasystem communications, (e) retail communications, and (f) Systems Network Architecture (SNA), such as advanced program-to-program communications (APPC) and SNA upline facility (SNUF).

configuration. The physical and logical arrangement of devices and programs that make up a data processing system. See also *communications configuration*, *line configuration*, *controller configuration*, and *device configuration*.

configuration list. A list of local or remote locations, network addresses, or pass-through device descriptions used by some types of communications descriptions. The system-recognized identifier for the object type is *CFGL.

console. A display station from which an operator can control and observe the system operation. For example, an operator can install the operating system, do an attended IPL, or sign on the system after using the End System (ENDSYS) command.

control language (CL). The set of all commands with which a user requests system functions.

control language (CL) program. A program that is created from source statements consisting entirely of control language commands.

control panel. A panel located on the processing unit on the front of the rack that contains lights and switches to operate or service the system.

control storage. Storage in the computer that contains the programs used to control input and output operations and other machine operations. See also *auxiliary storage*. Contrast with *main storage*.

controller. A device that coordinates and controls the operation of one or more input/output devices (such as work stations) and synchronizes the operation of such devices with the operation of the system as a whole.

controller configuration. The process of creating configuration descriptions for the local (device configuration) and remote (communications configuration) controllers that make up a data processing system. See also *line configuration* and *device configuration*.

controller description. An object that contains a description of the characteristics of a controller that is either directly attached to the system or attached to a communications line. The system-recognized identifier for the object type is *CTLD.

controlling subsystem. The interactive subsystem that is automatically started first when the system is started and through which the system operator controls the system.

creation date. The system date when an object is created. See also *job date*, and *system date*.

cumulative PTF package. A tape containing the program temporary fixes (PTFs) for an AS/400 system that have been accumulated from the start of the current release. PTFs requiring special handling are not included in a cumulative PTF package.

current form. In query management, the form being applied against the data to produce the report being displayed or printed.

current library. The library that is specified to be the first user library searched for objects requested by a user. The name for the current library can be specified on the Sign-On display or in a user profile. When you

specify an object name (such as the name of a file or program) on a command, but do not specify a library name, the system searches the libraries in the system part of the library list, then searches the current library before searching the user part of the library list. The current library is also the library that the system uses when you create a new object, if you do not specify a library name.

current release. The latest available release of the system that replaced the Licensed Internal Code, operating system, or both.

data circuit-terminating equipment (DCE). The equipment installed at the user's premises that provides all the functions required to establish, maintain, and end a connection, and the signal conversion and coding between the data terminal equipment and the line. See also *data terminal equipment (DTE)* and *modem*.

data link. The physical connection (communications lines, modems, controller, work stations, other communications equipment), and the rules (protocols) for sending and receiving data between two or more locations in a data network.

data link protocol. The rules that govern control of the physical connection for sending and receiving data between two or more locations in a network. Examples of data link protocols include (a) asynchronous, (b) binary synchronous communications (BSC), (c) Ethernet, (d) synchronous data link control (SDLC), (e) token-ring network, and (f) X.25. Contrast with *communications line*.

data terminal equipment (DTE). That part of a data link that sends data, receives data, and provides the data communications control function according to protocols.

database. All the data files stored in the system.

database file. One of several types of the system object type *FILE kept in the system that contains descriptions of how input data is to be presented to a program from internal storage and how output data is to be presented to internal storage from a program. See also *physical file* and *logical file*.

deallocate. To release a resource that is assigned to a specific task. Contrast with *allocate*.

dedicated service tools (DST). The part of the service function used to service the system when the operating system is not working.

default. A value that is automatically supplied or assumed by the system or program when no value is specified by the user.

default printer. A printer that is assigned to a system or user and accepts all the printed output from that system or user, if no other printer is specified.

device class. The generic name for a group of device types. For example, all display stations belong to the same device class. Contrast with *device type*.

device configuration. The physical placement of display stations, printers, and so forth; and the configuration descriptions that describe the physical configuration to the system and describe how the configuration will be used by the system. See also *line configuration* and *controller configuration*.

device description. An object that contains information describing a particular device or logical unit (LU) that is attached to the system. A device description is a description of the logical connection between two LUs (local and remote locations). The system-recognized identifier for the object type is *DEVD.

device file. One of several types of the system object type *FILE. A device file contains a description of how data is to be presented to a program from a device or how data is to be presented to the device from the program. Devices can be display stations, printers, diskette units, tape units, or remote systems.

device name. The symbolic name of an individual device.

device type. The generic name for a group of devices. For example, 5219 for IBM 5219 Printers. Contrast with *device class*.

diagnostic. Pertaining to the detection and isolation of an error.

dialog. In an interactive system, a series of related inquiries and responses similar to a conversation between two people.

disk unit. A physical enclosure containing one or more disk drives.

diskette. A thin, flexible magnetic disk permanently stored in a semirigid protective jacket.

diskette unit. A physical enclosure containing one or more diskette drives.

diskette writer. A system program that writes spooled files to a diskette unit. See also *printer writer* and *spooling writer*.

display file. A device file to support a display station.

display station. A device that includes a keyboard from which an operator can send information to the system and a display screen on which an operator can

see the information sent to or the information received from the system.

display station pass-through. A communications function that allows a user to sign on to one system (either an AS/400 system, System/38, or System/36) from another system (either an AS/400 system, System/38, or System/36) and use that system's programs and data. Sometimes called pass-through or 5250 pass-through.

distribution services. The support provided by the operating system to receive, forward, and send electronic mail in an SNA network.

Document Interchange Architecture (DIA). The rules and structure for the exchange of information between office applications. Document Interchange Architecture includes document library services and document distribution services.

document library. The entire collection of documents and folders on a system.

document library object (DLO). Any system object that resides in the document library, such as RFT and FFT documents, folders, and PC files.

document library services. The service defined by the Document Interchange Architecture (DIA) to work with objects filed in the DIA document library. On the AS/400 system, it is the support that lets office users work with the contents of the document library.

dump. In problem analysis and resolution, to write, at a particular instant, all or part of the contents of main or auxiliary storage onto another data medium for the purpose of protecting the data or collecting error information.

EBCDIC. See *extended binary-coded decimal interchange code (EBCDIC)*.

emulation. Imitation of one system or device by another.

end node. In SNA, a node in an APPN network that can be a source or target node, but does not provide any routing or session services to any other node.

error log. A record of machine checks, device errors, and media statistics.

expansion unit. A feature that can be connected to a system unit to provide additional storage and processing capacity.

expiration date. The date after which the file on the diskette or tape volume is no longer protected from being automatically deleted by the system.

extended binary-coded decimal interchange code (EBCDIC). A coded character set consisting of 8-bit coded characters.

file. A generic term for the object type that refers to a database file, a device file, or a save file. The system-recognized identifier for the object type is *FILE.

file description. The description of a file and its contents.

file name. The name used by a program to identify a file. See also *label*.

folder. A directory for documents. A folder is used to group related documents and to find documents by name. The system-recognized identifier for the object type is *FLR. See also *document library object*. Compare with *library*.

form type. A 10-character identifier, assigned by the user, that identifies each type of form used for printed output.

function key. A keyboard key that allows the user to select keyboard functions or programmer functions. Contrast with *character key*.

general-purpose library. The library shipped with the system that contains IBM-provided objects required for many system functions and user-created objects that are not explicitly placed in a different library when they are created. Named QGPL.

generic name. The characters common to object names that can be used to identify a group of objects. A generic name ends with an asterisk (*). For example, ORD* identifies all objects whose names begin with the characters ORD.

group job. One of up to sixteen interactive jobs that are associated in a group with the same work station device and user.

hardware. Physical equipment, rather than programs, procedures, rules, and associated information.

history log. A summary of the system activities, such as system and job information, device status, system operator messages, and a record of program temporary fix (PTF) activity on the system. The history log is identified by the name QHST, and the system-recognized identifier for the object type is *MSGQ.

I/O. See *input/output*.

IBM Operating System/400 Version 2 (OS/400). Pertaining to the IBM licensed program that can be used as the operating system for the AS/400 system.

IBM SAA AD/Cycle* RPG/400* Version 2 (RPG/400). The IBM licensed program that is the Systems Application Architecture platform RPG programming language available on the AS/400 system, including system-specific functions.

IBM SAA OfficeVision/400 Version 2. The IBM licensed program that allows users to prepare, send, and receive mail; schedule items on calendars; maintain directories of names and addresses; file and retrieve documents; and create and maintain distribution lists. SAA OfficeVision/400 also provides word processing functions and the capability to work on behalf of other users.

information display. A display that presents information to a user, such as the status of the system, but that rarely requests a response.

informational message. A message that provides information to the user about the system as compared with a completion message, which indicates success, and escape or diagnostic messages, which indicate failure.

InfoSeeker. An information retrieval function of the online system information that provides how-to and explanatory topics through search indexes that supplement the online help. The topics can be browsed through a hierarchical organization or searched directly.

initial program load (IPL). The process that loads the system programs from the system auxiliary storage, checks the system hardware, and prepares the system for user operations.

initialize. To set the addresses, switches, or the contents of storage to zero, or to the starting value set by the manufacturer.

input/output. Data provided to the computer or data resulting from computer processing.

input/output processor (IOP). A functional unit or the part of an I/O controller that processes programmed instructions and controls one or more input/output devices or adapters.

inquiry message. A message that gives information and requests a reply.

interactive. Pertaining to the dialog-like exchange of information between people and a computer. Contrast with *batch*.

interactive job. A job started for a person who signs on to a work station. Contrast with *batch job*.

interactive subsystem. A subsystem in which interactive jobs are processed.

interface. A shared boundary. An interface might be the hardware to connect two devices or it might be a part of main storage, or registers used by two or more computer programs.

intermediate assistance level. The type of displays that supports all system tasks and uses computer terminology. Complicated tasks can be done using the intermediate assistance level.

IPL. See *initial program load (IPL)*.

job. A unit of work to be done by a computer.

job accounting. A system function that collects information about a job's use of system resources and records that information in a journal.

job date. The date associated with a job. The job date usually assumes the system date, but it can be changed by the user. See also *creation date* and *system date*.

job description. A system object that defines how a job is to be processed. The system-recognized identifier for the object type is *JOBD.

job log. A record of requests submitted to the system by a job, the messages related to the requests, and the actions performed by the system on the job. The job log is maintained by the system program.

job name. The name of the job as identified to the system. For an interactive job, the job is assigned the name of the work station at which the job was started; for a batch job, the name is specified in the command used to submit the job. Contrast with *qualified job name*.

job queue. An object that contains a list of batch jobs waiting to be processed by the system. The system-recognized identifier for the object type is *JOBQ.

job schedule. An object that contains entries for jobs to be submitted at a specified time and date. These job schedule entries can also be used to schedule recurring jobs. The system-recognized identifier for the object type is *JOBSCD.

job schedule entry. An entry in the job schedule object that describes the job to be submitted. The user can specify attributes of the job and when the job will be submitted.

job schedule function. A function of the operating system that allows time-dependent scheduling for batch jobs.

join logical file. A logical file that combines (in one record format) fields from two or more physical files. See also *logical file*.

journal. A system object that identifies the objects being journaled, the current journal receiver, and all the journal receivers on the system for the journal. The system-recognized identifier for the object type is *JRN. See also *journal receiver*.

journal receiver. A system object that contains journal entries added when changes are made to an object, for example, when an update is made to a file being journaled. The object type is *JRNRCV. See also *journal*.

Julian date. A date format that contains the year in positions 1 and 2, and the day in positions 3 through 5. The day is represented as 1 through 366, right-adjusted, with zeros in the unused high-order positions. For example, the Julian date for April 6, 1987 is 87096.

keylock switch. A switch on the control panel that can be set to one of four different positions to establish the power-on and power-off modes allowed for the system.

keyword. A mnemonic (abbreviation) that identifies a parameter in a command.

label. The name of a file on a diskette or tape.

leader. The blank section of tape at the beginning of a reel.

library. A system object that serves as a directory to other objects. A library groups related objects, and allows the user to find objects by name. The system-recognized identifier for the object type is *LIB. Compare with *folder* and *document library*.

library list. A list that indicates which libraries are to be searched and the order in which they are to be searched. The system-recognized identifier is *LIBL.

library name. A user-defined word that names a library.

Licensed Internal Code. The layered architecture below the machine interface (MI) and above the machine, consisting of the model-independent and the model-unique Licensed Internal Code. The Licensed Internal Code is a proprietary system design that carries out many functions, including, but not limited to storage management, pointers and addressing, program management functions, exception and event management, data functions, I/O managers, and security. See also *model-unique Licensed Internal Code*.

Licensed Internal Code fix. A temporary solution to, or bypass of, a defect in a current release of the Licensed Internal Code. Contrast with *program temporary fix (PTF)*.

line configuration. The process of creating configuration descriptions for the lines that make up a data processing system. See also *controller configuration* and *device configuration*.

line description. An object that contains information describing a particular communications line that is attached to the system. The system-recognized identifier for the object type is *LIND.

line number. The number that precedes a line of information in a printout or on a display. This number can be up to 5 digits long, from 00001 through 99999.

local system. For interactive jobs, the system to which the display device is directly attached. For batch jobs, the system on which the job is being processed.

local work station. A work station that is connected directly to the system without a need for data transmission functions. Contrast with *remote work station*.

logical file. A description of how data is to be presented to or received from a program. This type of database file contains no data, but it defines record formats for one or more physical files. See also *join logical file* and *database file*. Contrast with *physical file*.

main storage. All addressable storage where programs are run. Synonymous with *memory*. See also *control storage*. Contrast with *auxiliary storage*.

manual answer. In data communications, a line type that requires operator actions to receive a call over a switched line. Contrast with *automatic answer*.

member. Different sets of data, each with the same format, within one database file. See also *source member*.

memory. In PC Support/400, program-addressable storage from which instructions and other data can be loaded directly into registers for subsequent processing. See also *main storage*.

menu. A displayed list of items from which a user can make a selection. The system-recognized identifier for the object type is *MENU.

message. A communication sent from a person or program to another person or program.

message description. Information describing a particular message.

message file. An object that contains message descriptions. The system-recognized identifier for the object type is *MSGF.

message identifier. A seven-character code that identifies a predefined message, and is used to get the message description from a message file. See *predefined message*.

message line. An area on the display where messages are displayed.

message queue. A list on which messages are placed when they are sent to a user ID or device description. The system-recognized identifier for the object type is *MSGQ.

model-unique Licensed Internal Code (MULIC). The Licensed Internal Code shipped with the system hardware that provides support for that model. See also *Licensed Internal Code*.

modem (modulator/demodulator). A device that converts data from the computer to a signal that can be sent over a communications line (modulator), and converts the communications signal received to data for the computer (demodulator). See also *data circuit-terminating equipment (DCE)*.

module. In online education, a unit of instruction that is part of an education course.

monochrome. Consisting of a single color.

network. A collection of data processing products connected by communications lines for exchanging information between stations.

network architecture. The logical structure and operating principles of a computer network. (T) The operating principles of a network include those of services, functions, and protocols.

network attribute. Control information about the communications environment. System name and default local location name are examples of network attributes. Contrast with *system value*.

network node. A node that can define the paths or routes, control route selection, and handle directory services for the APPN function.

node. One of the systems or devices in a network.

nonadjacent destination node. In the OSI Communications Subsystem/400 licensed program, a destination node that is connected to a different subnetwork from the local node. To communicate with a nonadjacent destination node requires the use of a relay node. See also *destination node* and *open system*. Contrast with *adjacent destination node*.

nonswitched line. A connection between computers or devices that does not have to be made by dialing. Contrast with *switched line*.

notify delivery. The method of delivering messages to a message queue in which the work station user is notified that a message arrived. The signal is a light or an audible alarm.

object description. The characteristics (such as name, type, and owner name) that describe an object.

object distribution. A function that allows a user to send source and data files, save files, job streams, spooled files, and messages to another user, either locally or on an SNADS network.

object owner. A user who creates an object or to whom the ownership of an object was reassigned. The object owner has complete control over the object.

object type. In query management, the substring following the query command name that specifies the type of query object to be processed.

Office. See *IBM SAA OfficeVision/400 Version 2*.

offline. Pertaining to the operation of a functional unit that is not under the continual control of the system. Contrast with *online*.

online. Pertaining to the operation of a functional unit that is under the continual control of the system. Contrast with *offline*.

operating system. A collection of system programs that control the overall operation of a computer system.

Operational Assistant. Pertaining to a part of the operating system that provides a set of menus and displays for end users to do commonly performed tasks, such as working with printer output, messages, and batch jobs.

OS/400. See *IBM Operating System/400 Version 2 (OS/400)*.

output queue. An object that contains a list of spooled files to be written to an output device, such as a printer or a diskette. The system-recognized identifier for the object type is *OUTQ.

override. (1) To specify attributes at run time that change the attributes specified in the file description or in the program. (2) The attributes specified at run time that change the attributes specified in the file description or in the program.

paging. To move a page of data between main and auxiliary storage.

panel. In UIM, a visual presentation of data on the screen.

parameter. A value supplied to a command or program that is used either as input or to control the actions of the command or program.

pass-through. See *display station pass-through*.

performance monitor. A function of the operating system that observes system and device activity, and records these observations in a database file.

physical file. A description of how data is to be presented to or received from a program and how data is actually stored in the database. A physical file contains one record format and one or more members. See also *database file*. Contrast with *logical file*.

physical file member. A named subset of the data records in a physical file. See also *member*.

pool. A division of main or auxiliary storage. See also *base pool*, *storage pool*.

port. System hardware where the I/O devices are attached.

power cord. The electrical connection between the AC power source and the computer.

power down. An AS/400 command to turn the power off and bring an orderly end to system operation.

printer file. A device file that determines what attributes printed output will have. A particular printer may or may not support all of the attributes specified in a printer file.

printer writer. A system program that writes spooled files to a printer. See also *diskette writer* and *spooling writer*.

problem analysis. The process of finding the cause of a problem. For example, a program error, device error, or user error.

problem log. A record of problems and of the status of the analysis of those problems.

processing unit. The part of the system that performs instructions and contains main storage.

processor. A device for processing data from programmed instructions. It may be part of another unit.

profile. Data that describes the characteristics of a user, program, device, or remote location.

program temporary fix (PTF). A temporary solution to or bypass of a problem diagnosed by IBM as resulting from a defect in a current unaltered release of a licensed program. Contrast with *Licensed Internal Code fix*.

prompt. A reminder or a displayed request for information or user action. The user must respond to allow the program to proceed.

PTF. See *program temporary fix*.

QCMD. The IBM-supplied control language processor that interprets and processes CL commands for the system.

QGPL. See *general-purpose library*.

QSYS. See *system library*.

qualified job name. A job name and its associated user name and a system-assigned job number. Contrast with *job name*.

Query. The shortened name for the Query/400 licensed program.

query definition. In Query/400, information about a query that is stored in the system. The system-recognized identifier for the object type is *QRYDFN.

queue. A list of messages, jobs, files, or requests waiting to be read, processed, printed, or distributed in a predetermined order.

rack. A free-standing framework that holds the devices and card enclosure.

rack configuration list. A list of all of the equipment within the rack and the logic cards within the card enclosure.

read/write head. The data sensing and recording unit of the diskette drive or tape drive.

receiver. See *journal receiver*.

record format. A named part of a file that identifies records of a specified record format description.

recovery library. The library containing information related to recovery of database operations from system failures. Named QRECOVERY.

reference code. The four-character name of a status or error condition.

remote system. Any other system in the network with which your system can communicate.

remote work station. A work station that is connected to the system by data communications. Contrast with *local work station*.

restore. To copy data from tape, diskette, or a save file to auxiliary storage. Contrast with *save*.

restricted state. The status in which a user places a system (by ending all subsystems) to do a specific function, such as saving storage, saving the system, or restoring user profiles. Other jobs cannot be active on the system while it is in a restricted state.

rewind. To move tape from the take-up hub to the supply hub.

save file. A file allocated in auxiliary storage that can be used to store saved data on disk (without requiring diskettes or tapes), to do I/O operations from a high-level language program, or to receive objects sent through the network. The system-recognized identifier for the object type is *FILE.

scheduled job. A batch job that becomes eligible to run at a specified date and time.

sector. (1) An area on a disk track or a diskette track to record information. (2) The smallest amount of information that can be written to or read from a disk or diskette during a single read or write operation.

secure. Controlling who can use and to what extent an object can be used by controlling the authority given to the user.

security officer. A person assigned to control all of the security authorizations provided with the system. A security officer can, for example, remove password or resource security; or add, change, or remove security information about any system user.

sequence number. (1) The number of a record that identifies the record within the source member. (2) A field in a journal entry that contains a number assigned by the system. This number is initially 1 and is increased by 1 until the journal is changed or the sequence number is reset by the user. See also *line number*.

service processor. The logic that contains the processor function to start the system processor and handle error conditions. See also *system processor*.

severity code. A number that indicates how important a message is. The higher the number, the more serious the condition.

SNA distribution services (SNADS). An IBM asynchronous distribution service that defines a set of rules to receive, route, and send electronic mail in a network of systems.

SNADS. See *SNA distribution services (SNADS)*.

source file. A file of programming code that is not compiled into machine language. A source file can be created by the specification of FILETYPE(*SRC) on the Create command. A source file can contain source statements for such items as high-level language programs and data description specifications. Contrast with *data file*.

source member. A member of a database source file that contains source statements, such as AS/400 BASIC, AS/400 PL/I, SAA C/400, SAA COBOL/400, SAA FORTRAN/400, SAA RPG/400, or DDS statements. See also *member*.

spool. The system function of putting files or jobs into disk storage for later processing or printing.

spooled file. A file that holds output data waiting to be processed, such as information waiting to be printed. Also known as *spooled output file*.

spooled output file. See *spooled file*.

spooling job. A batch job that is started by the spooling subsystem.

spooling subsystem. A part of the system that provides the operating environment for the programs that read jobs onto job queues to wait for processing and write files from an output queue to an output device. IBM supplies one spooling subsystem: QSPL.

spooling writer. The general name to refer to the function of the diskette writer and printer writer.

SRC. See *system reference code (SRC)*.

storage pool. A logical division of storage reserved for processing a job or group of jobs.

subsystem. An operating environment, defined by a subsystem description, where the system coordinates processing and resources.

subsystem description. A system object that contains information defining the characteristics of an operating environment controlled by the system. The system-recognized identifier for the object type is *SBSD.

switched line. In data communications, a connection between computers or devices that is established by dialing. Contrast with *nonswitched line*.

switched network backup (SNBU). A modem feature that allows a nonswitched line to be used alternatively as a switched line or allows a switched line to be used as a nonswitched line depending on the characteristics of the modem.

syntax. The rules for constructing a command or statement.

system ASP. The auxiliary storage pool where system programs and data reside. The system ASP (ASP1) always exists. See also *auxiliary storage pool (ASP)* and *user ASP*.

system configuration list. A list of devices that are provided with the system.

system date. The date assigned in the system values when the system is started. See also *creation date* and *job date*.

system library. The library shipped with the system that contains objects, such as authorization lists and device descriptions created by a user, and the system commands and other system objects required to run the system. The system identifier is QSYS.

system name. (1) An IBM-supplied name that uniquely identifies the system. It is used as a network value for certain communications applications such as APPC. (2) An IBM-defined name that has a predefined meaning to the COBOL compiler. System names include computer names, language names, device names, and function names.

system processor. The logic that contains the processor function to translate and process the OS/400 control language commands and programming language statements. See also *service processor*.

system reference code (SRC). The characters that identify the name of the unit that detected the condition and the reference code that describes the condition.

system resources. Those items controlled by the system, such as programs, devices, and storage areas that are assigned for use in jobs.

system service tools (SST). The part of the service function used to service the system while the operating system is running.

system time. The elapsed time from the point where the system was started to the current time. If the system time is changed to the local time when the system is started, the current system time is the local time of day.

system unit. A part of a computer that contains the processing unit, and may contain devices such as disk units and tape units.

system value. Control information for the operation of certain parts of the system. A user can change the system value to define his working environment. System date and library list are examples of system values. Contrast with *network attribute*.

System/36 environment. A function of the operating system that processes most of the System/36 operator control language (OCL) statements and procedure statements to run System/36 application programs and allows the user to process the control language (CL) commands. Contrast with *System/38 environment*.

System/38 environment. A function of the operating system that processes most of the System/38 control language (CL) statements and programs to run System/38 application programs. Contrast with *System/36 environment*.

tape cartridge. A case containing a reel of magnetic tape that can be put into a tape unit without stringing the tape between reels.

tape drive. A device used to move the tape and read and write information on magnetic tapes.

tape reel. A round device on which magnetic tape is wound.

tape unit. The physical enclosure containing the tape drive.

tape volume. A single reel of magnetic tape.

throughput. The measure of the amount of work performed by a computer over a period of time, for example, number of jobs per day.

time slice. The amount of processor time (specified in milliseconds) allowed for a job before other waiting jobs of equal priority are allowed to process data.

track. A circular path on the surface of a disk or diskette on which information is magnetically recorded and from which recorded information is read.

Tutorial System Support. An education course, supplied with the operating system licensed program, that provides introductory education for a variety of computer users, including system operators and business and data processing professionals. Tutorial System Support is part of the total IBM curriculum for the AS/400 system, which consists of classroom training and other methods of self-study.

unavailable. In the basic assistance level of the Operational Assistant function, to make a device, controller, line, or network interface inaccessible for its normal, intended use. Synonymous with *vary off*.

uninterruptible power supply. A source of power from a battery installed between the commercial power and the system that keeps the system running, if a commercial power failure occurs, until it can complete an orderly end to system processing.

unit. The defined space within disk units that is addressed by the system.

user ID. See *user identification (user ID)*.

user identification (user ID). The name used to associate the user profile with a user when a user signs on the system. See also *user profile name*.

user profile. An object with a unique name that contains the user's password, the list of special authorities

assigned to a user, and the objects the user owns. The system-recognized identifier for the object type is *USRPRF.

user profile name. The name or code that the system associates with a user when he or she signs on the system. Also known as user ID. See also *user identification (user ID)*. For SQL, see also *authorization ID*.

variable. A name used to represent data whose value can be changed while the program is running by referring to the name of the variable.

vary off. To make a device, controller, line, or network interface unavailable for its normal, intended use.

vary on. To make a device, controller, line, or network interface available for its normal, intended use.

Vertical Licensed Internal Code (VLIC). Programming that defines logical operations on data. The Vertical Licensed Internal Code translates the machine interface (MI) instructions.

virtual device. A device description that does not have hardware associated with it. It is used to form a connection between a user and a physical work station attached to a remote system. A virtual device can be a virtual display station or a virtual printer. See also *virtual work station controller*.

virtual work station controller. A work station controller description that has the characteristics of a locally attached work station controller but does not exist as hardware. See also *virtual device*.

VLIC. See *Vertical Licensed Internal Code (VLIC)*.

volume statistics. Statistical information about the activity on a tape, diskette, or cartridge volume including statistics about the session (such as the number of read, write, and retry operations), and "lifetime" (accumulated) statistics (such as the number of read and write errors and the number of bytes read and written).

window. A part of the display screen with visible boundaries in which information is displayed.

work station. A device used to transmit information to or receive information from a computer, for example, a display station or printer.

work station controller (WSC). An I/O controller card in the card enclosure that provides the direct connection of local work stations to the system.

writer. The part of the operating system spooling support that writes spooled files to an output device independently of the program that produced the output.

X.21bis. In data communications, an interim specification of the CCITT that defines the connection of data terminal equipment (DTE) to an X.21 (public data) network using V-series interchange circuits such as those defined by CCITT V.24 and CCITT V.35.

Bibliography

You may need to refer to other IBM manuals for more specific information about a particular topic. The following IBM AS/400 manuals contain information that you may need.

For information about installing your IBM-supplied programs and features and configuring your system:

- *Device Configuration Guide*, SC41-8106, provides information about how to do an initial configuration and how to change that configuration. It also contains conceptual information about device configuration.

  Short title: *Device Configuration Guide*

- *Licensed Programs and New Release Installation Guide*, SC41-9878, provides step-by-step procedures for initial install, installing licensed programs, program temporary fixes (PTFs), and secondary languages from IBM.

  Short title: *Licensed Programs and New Release Installation Guide*

For more information about AS/400 communications:

- *Communications and Systems Management Guide (Alerts and Distributed Systems Node Executive)*, SC41-9661, provides information about configuring the system to use the remote management support (distributed host command facility), the change management support (distributed systems node executive), and the problem management support (alerts).

  Short title: *Alerts and DSNX Guide*

- *Communications: Distribution Services Network Guide*, SC41-9588, provides information about administering data communications applications on an AS/400 system.

  Short title: *Distribution Services Network Guide*

- *Communications: Management Guide*, SC41-0024, provides information on how to start, stop, verify, and test communications, handle communications errors, and work with communications status.

  Short title: *Communications Management Guide*

- *Communications: Operating System/400* Communications Configuration Reference*, SC41-0001, provides information on how to configure the communications functions available with the OS/400 licensed program, including detailed descriptions of network interface, line, controller, device, mode, and class-of-service descriptions; configuration lists; and connection lists.

  Short title: *OS/400* Communications Configuration Reference*

For more information about AS/400 programming:

- *ASCII Work Station Reference and Example*, SA41-9922, provides information on how to use ASCII work stations attached to the AS/400 system. It describes how to adjust the settings of ASCII work stations and provides information on keyboard mappings and character code mappings.

  This manual also describes the process of ASCII device setup and provides examples about ASCII device setting adjustments. It also contains information on special considerations for personal computer setting adjustments, and auxiliary printer setting adjustments.

  Short title: *ASCII Work Station Reference and Example*

- *Guide to Programming for Printing*, SC41-8194, provides information on printing elements and concepts of the AS/400 system, printer file and print spooling support for printing operation, and printer connectivity.

  Short title: *Guide to Programming for Printing*

- *Programming: Concepts and Programmer's Guide for the System/36 Environment*, SC41-9663, provides information identifying the differences in the applications process in the System/36 environment on the AS/400 system. It helps the user understand the functional and operational differences (from a System/36 perspective) when processing in the System/36 environment on the AS/400 system. This includes an environment functional overview, considerations for migration, programming, communications, security, and coexistence.

  Short title: *Concepts and Programmer's Guide for the System/36 Environment*

- *Programming: Performance Tools/400 Guide*, SC41-8084, provides information about what Performance Tools/400 are, gives an overview of the tools, and tells how the tools can be used to help manage system performance. The manual gives instructions on how to approach the analysis of system performance and how to do system performance measurement, reporting, capacity planning, and application analysis. This manual also includes information about additional functions and related commands for further analysis. provides information on AS/400 Performance Tools and how they can help manage system performance.

  Short title: *Performance Tools/400 Guide*

- *Programming: System Reference for the System/36 Environment*, SC41-9662, provides information

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about using System/36 procedure control expressions, procedures, operation control language (OCL) statements, control commands, and utilities on the AS/400 system.

Short title: *System Reference for the System/36 Environment*

- *Programming: Work Management Guide*, SC41-8078, provides information about how to create and change a work management environment. Other topics include a description of tuning the system, collecting performance data including information on record formats and contents of the data being collected, working with system values to control or change the overall operation of the system, and a description of how to gather data to determine who is using the system and what resources are being used.

  Short title: *Work Management Guide*

- *System Programmer's Interface Reference*, SC41-8223, provides information on how to create, use, and delete objects that help manage system performance, use spooling efficiently, and maintain database files efficiently. This manual also includes information on creating and maintaining the programs for system objects and retrieving OS/400 information by working with objects, database files, jobs, and spooling.

  Short title: *System Programmer's Interface Reference*

- *Systems Application Architecture* SystemView* System Manager/400 User's Guide*, SC41-8201, provides information about the commands and functions available when the SAA SystemView System Manager/400 licensed program is installed on one or more AS/400 systems in a network. This manual also provides setup procedures and information for maintaining a network of AS/400 systems.

  Short title: *SystemView* System Manager/400 User's Guide*

For more information about general system operations:

- *Advanced Backup and Recovery Guide*, SC41-8079, provides information about planning a backup and recovery strategy, the different types of media available to save and restore system data, as well as a description of how to record changes made to database files using journaling and how that information can be used for system recovery. This manual describes how to plan for and set up user auxiliary storage pools (ASPs), mirrored protection, and checksums along with other availability recovery topics. It also describes how to install the system again from backup.

  Short title: *Advanced Backup and Recovery Guide*

- *Basic Backup and Recovery Guide*, SC41-0036, contains information about planning a backup and recovery strategy, the different types of media available to save and restore system data, save and restore procedures, and disk recovery procedures. It also describes how to install the system again from backup.

  Short title: *Basic Backup and Recovery Guide*

- *Basic Security Guide*, SC41-0047, explains why security is necessary, defines major concepts, and provides information on planning, implementing, and monitoring basic security on the AS/400 system.

  Short title: *Basic Security Guide*

- *New User's Guide*, SC41-8211, provides beginner information about how to sign on and off; send and receive messages; respond to keyboard error messages; use function keys; use display, command, and help information; and control and manage jobs.

  Short title: *New User's Guide*

- *Systems Application Architecture* OfficeVision/400*: Managing OfficeVision/400*, SC41-9627, provides information on how to manage the day-to-day activities of OfficeVision/400. It also includes information on maintaining office enrollment and creating and managing office objects.

  Short title: *Managing OfficeVision/400**

- *Question-and-Answer Database Coordinator's Guide*, SC41-8086, describes how to use Question-and-Answer (Q & A) to search through questions and answers stored in a Q & A database on the system. This manual also includes information about creating a Q & A database.

  Short title: *Q & A Database Coordinator's Guide*

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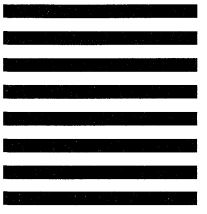

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