AS/400 Advanced Series

System Operation

Version 3

SC41-4203-00

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First Edition (September 1995)

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About System Operation (SC41-4203)

As the system operator, you have many responsibilities. This guide provides information about day-to-day tasks, such as:

- How to work with jobs or printer output
- How to respond to messages sent to the system operator message queue (QSYSOPR), change message queues, and respond to error messages.
- How to use the support functions available on the AS/400 system.
- How to clean up your system periodically to improve performance and maintain good running condition.
- How to save and restore all of the important data that you keep on your system.

For information about other system operation tasks, see the *System Startup and Problem Handling* book, SC41-4206. It provides information about the system unit control panel and console, starting and stopping the system, tapes, diskettes and CD-ROM, program temporary fixes(PTFs), as well as problem handling.

For information about other AS/400* publications, see either of the following:

- The *Publications Reference* book, SC41-4003, in the AS/400 Softcopy Library.
- The *AS/400 Information Directory*, a unique, multimedia interface to a searchable database containing descriptions of titles available from IBM or from selected other publishers. The *AS/400 Information Directory* is shipped with your system at no charge.

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

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

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
  - Send and receive messages

For information about how to do the above tasks, see the *System Operation for New Users*, SC41-3200.

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:

- *System/36 Environment Programming*, SC41-4730
- *System/36 Environment Reference*, SC41-4730

Multiple Operating System Users

If you are using AS/400 system with multiple operating systems, see *Operator Tasks – Multiple Operating Systems*, SC21-8384

Summary of Changes

Electronic Technical Support

Information about IBMLink program has been updated in Chapter 7, “Using Electronic Customer Support” on page 7-1.

Message

Information about usage limit messages has been added to Chapter 8, “Managing Your AS/400 System Operations” on page 8-1.

System Configuration List

Information about printing system configuration list has been updated in Chapter 8, “Managing Your AS/400 System Operations” on page 8-1.

Chapter 1. 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 1-1 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 1-1. 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:

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

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

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 tasks 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 by 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 1-2 on page 1-3 shows the Select Assistance Level window.

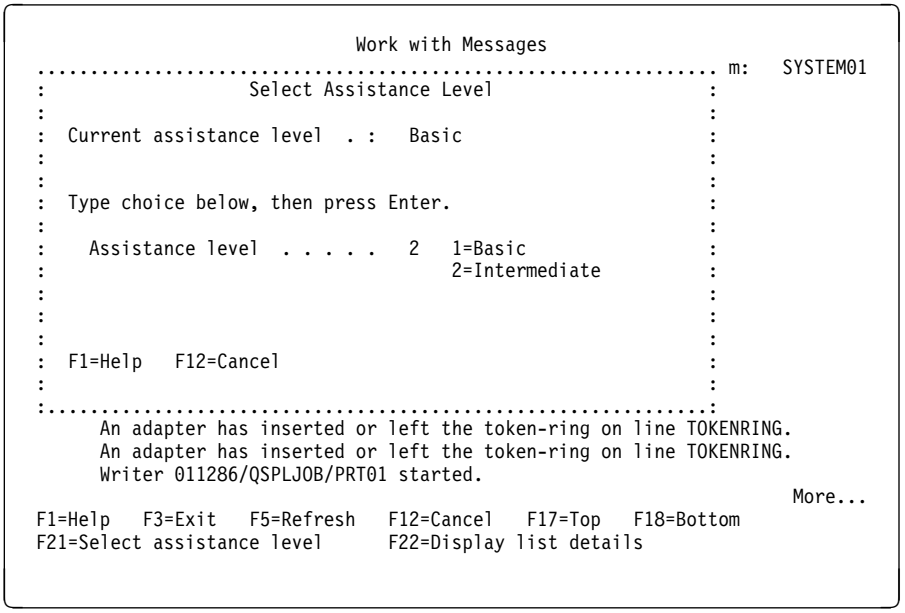

Figure 1-2. Select Assistance Level Window

2. The value in the *Assistance level* field shows the assistance level you are currently using and the assistance levels that 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 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 1-3 and Figure 1-4 on page 1-5 illustrate displays you see when you switch from the basic to the intermediate assistance level while you are displaying messages. To see Figure 1-3, 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 1-3. Work with Messages Display—Basic Assistance Level

To see Figure 1-4 on page 1-5, 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 1-4. 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 by 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 that 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 by 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 1-5 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 1-5. 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 1-6.

```
RUNBCKUP
```

Figure 1-6. 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 that are 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.

Chapter 2. 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 2-1 provides an overview of how jobs are run.

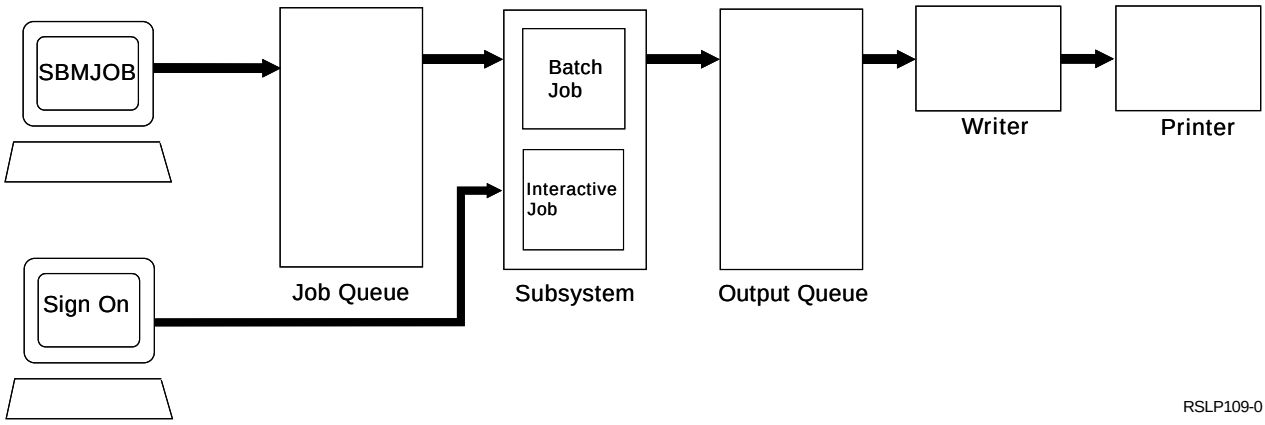

Figure 2-1. Overview of Job Processing

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 2-11 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, output queues, and how to manage any of these, see the *Work Management* book.

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 Chapter 2 of the *System Startup and Problem Handling* book.

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
01/26/94	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.

Changing a Job Schedule

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.

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 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 *Work Management* book for complete and detailed information about the job scheduling function and working with the job schedule entries.

Figure 2-2 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 2-2. 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.

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 2-3 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 2-3. 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 2-4 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 2-4. 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 2-5 shows the Select Other Jobs window.

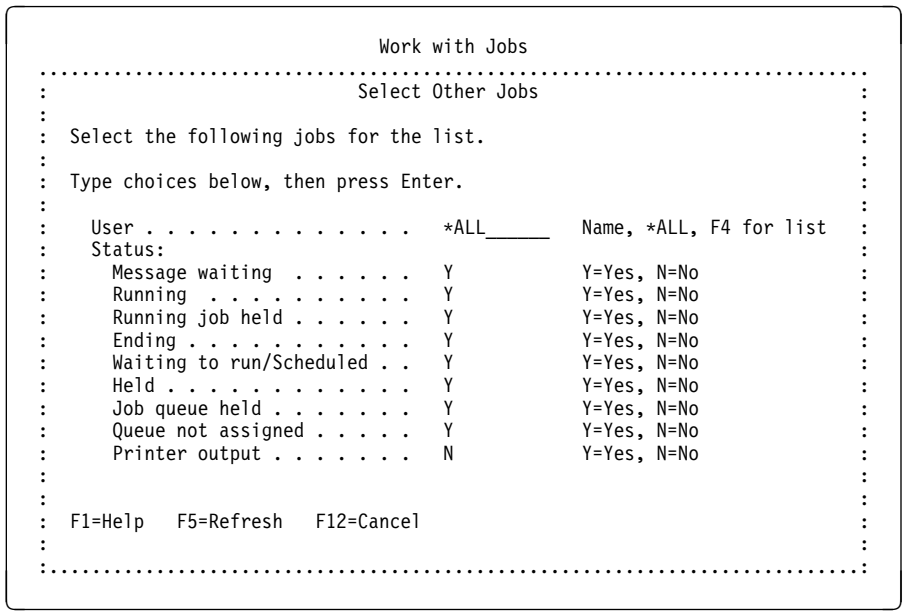

Figure 2-5. Select Other Jobs Window

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 2-6 shows an overview of a subsystem processing jobs from a job queue.

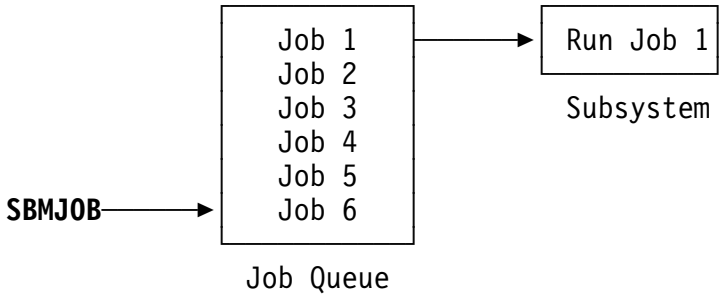

Figure 2-6. Overview of Job Queue Processing

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 2-7 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 2-7. 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 know that the job queue is empty and choose to hold it so you can stop all future jobs from coming into the system.

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 do not run if the job queue is not assigned to a subsystem. 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 2-15 for instructions on how to do this.
- Start the subsystem to which the job queue is assigned. See Chapter 2 of the *System Startup and Problem Handling* book for information on how to start a subsystem.

  Note: To determine which subsystem uses the job queue, display the subsystem description. See Chapter 2 of the *System Startup and Problem Handling* book 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.

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 2-8 on page 2-12 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 2-8. 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” 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 2-9 shows how job priorities work when selecting jobs to run:

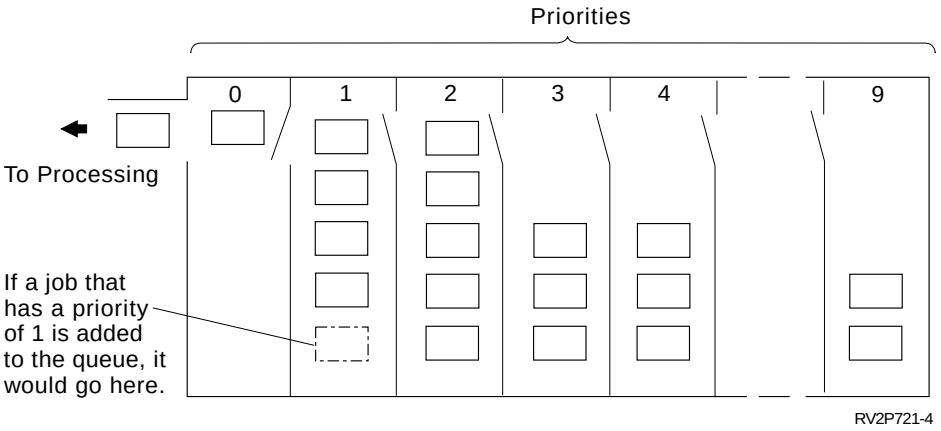

Figure 2-9. Job Queue Priority

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 2-9 on page 2-15).

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 3, “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 8-37 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 3. 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 3-1 shows the basic pieces required to create and print a report:

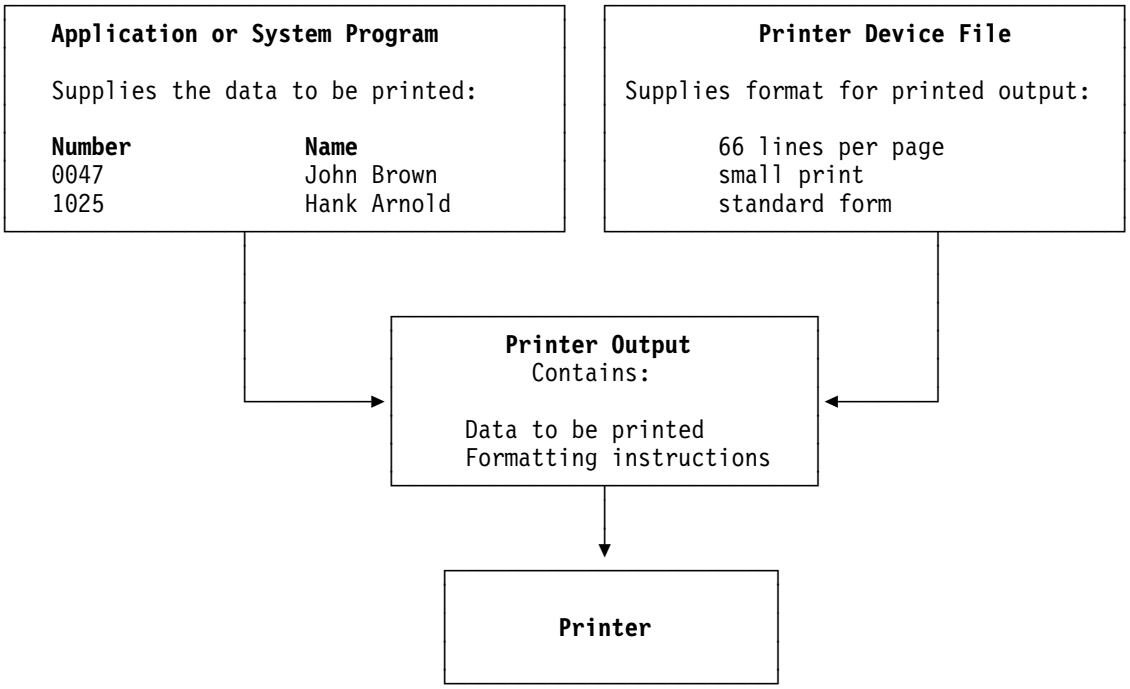

Figure 3-1. How a Report Is Created

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 3-12.

Additional reading: For detailed information about printing elements, printer device support, printer spooling support, and Advanced Function Printing* (AFP*), see the *Printer Device Programming* book, SC41-3713.

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 3-6 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 3-2 on page 3-3 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 3-2. 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 3-3 on page 3-4 shows the Select Other Printer Output window.

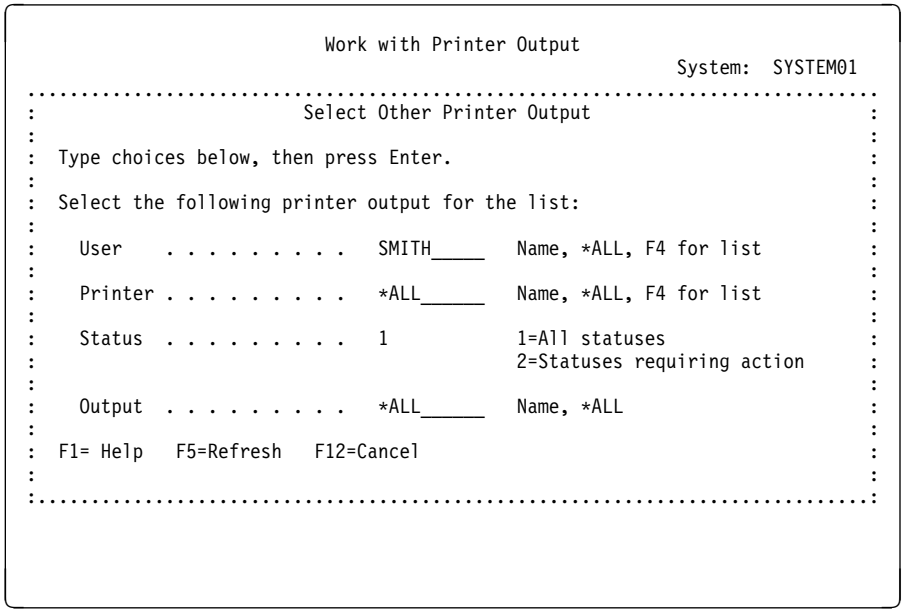

Figure 3-3. Select Other Printer Output Window

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 8, “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 3-4 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 3-4. 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 3-2. 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 3-1 lists some of the most common problems that prevent or delay output from printing and some suggested solutions:

Table 3-1. 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 cannot 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. It is also possible that the printer's message queue has been cleared. In this case, check to see if the printer is ready.

If you have followed all of these suggestions and still have printing problems, see the information on getting help with problems in Chapter 13 of the *System Startup and Problem Handling* book.

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 3-5 on page 3-9 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 3-5. 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 3-6 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 3-6. 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 4, "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. Two messages that you may see frequently are:

- `Load form type` (CPA3394 or CPA3395)
- `Verify alignment on printer` (CPA4002)

Load Form Type Message: The most common replies to the `load form type` message (CPA3394 or CPA3395) are G, B, or I.

Verify Alignment on Printer Message: The most common reply to the `Verify alignment on printer` message (CPA4002) is I.

For more information about responding to printer messages, see the *Getting Started with AS/400* booklet.

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 3-7 on page 3-13 shows how a job moves through an output queue to a printer.

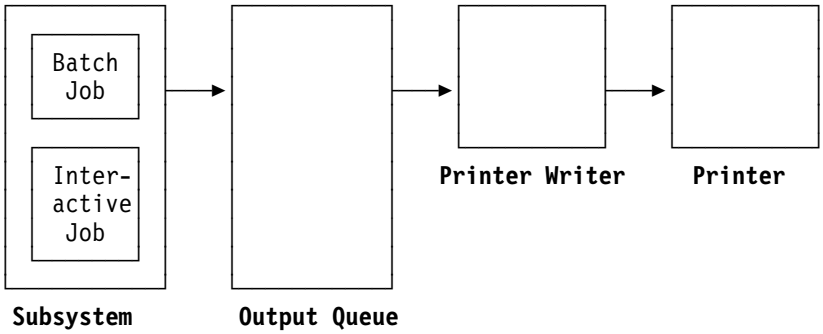

Figure 3-7. Overview of Output Queue Processing

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: Both you and 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 a 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 2-19 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" 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, and specify the name of the 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.

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

- The Maximum spooled file size (MAXPAGES) parameter controls which spooled files can be selected to print during a specified time interval. The spooled files that contain more pages than the number of pages specified in this parameter do not print until the specified time interval has passed.
- 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 4, “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 *Printer Device Programming* book, SC41-3713, 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 4. 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 *System Operation for New Users*.

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 4-1 on page 4-2) is shown automatically.

```
                              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 4-1. 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 4-2 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 4-2. 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 4-3 shows additional information about the first inquiry message in Figure 4-2 on page 4-2:

```
                        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   F9=Display message details   F12=Cancel
F21=Select assistance level
```

Figure 4-3. 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 F9 (Display message details). Figure 4-4 on page 4-4 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
CCSID  . . . . . . . :   65535

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 4-4. 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 4-5.

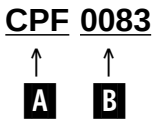

Figure 4-5. Example of a Message ID

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 4-1 shows the different severity codes of the messages and the types they are associated with.

Table 4-1. 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 4-6 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 4-6. System Operator Message Queue

You can work with the system operator messages exactly as you would any other messages. See “Displaying Messages” on page 4-1 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 4-7 shows the Display List Details display.

```
                          Display List Details

Message queue . . . . . :   SMITHS1
  Library . . . . . :     QSYS
Delivery  . . . . . :   *NOTIFY
Program . . . . . :   *DSPMSG
Severity  . . . . . :   0
Allow alerts. . . . . :   *YES
CCSID . . . . . :
Description . . . . . :   Work Station Message Queue

Message queue . . . . . :   SMITH
  Library . . . . . :     QUSRSYS
Delivery  . . . . . :   *NOTIFY
Program . . . . . :   *DSPMSG
Severity  . . . . . :   0
Allow alerts. . . . . :   *NO
CCSID . . . . . :   65535
Description . . . . . :   Jim Smith

Press Enter to continue.

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

Figure 4-7. 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.

Allow alerts
This value indicates whether messages sent to this message queue might also generate an alert.

CCSID
This is the coded character set identifier associated with the message queue.

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 4-5 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. Specify the value you want to use for the allow alerts (ALWALR) parameter:
    - *SAME uses the value specified in the identified message queue.
    - *NO specifies that this message queue does not allow alerts to be generated from messages sent to it.
    - *YES specifies that this message queue does allow alerts to be generated from messages sent to it.
11. Specify the character value you want to use for the coded character set identifier (CCSID) parameter:
    - *SAME uses the value specified in the identified message queue.

- *HEX specifies that messages on this message queue cannot be converted.
- *MSG specifies that the CCSID of a message on this message queue is to be determined from the message.
- *JOB specifies that the CCSID of all messages on this message queue are to be considered in the CCSID of the job.
- Any valid job CCSID specifies that the CCSID of all messages on this message queue are to be considered in this CCSID.

12. Press the Enter key to change the message queue.

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, the system operator message queue, and other message queues specified by the users.

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 *CL Programming* book.

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 *CL Programming* book.

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).

Note: Messages about critical system errors or conditions are reverse-imaged (intermediate assistance level), or highlighted (basic assistance level). For these messages, you can run problem analysis on the ones with an asterisk (*) in front of them.

To run the Work with Problems (WRKPRB) command, move your cursor to the message with an asterisk and press F14. The Additional Message Information display is shown. Press the F14 (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 the Work with Problem (WRKPRB) command for messages that are highlighted, select option 5 (Display details and reply) for that message and press F14 (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 6 of the *System Startup and Problem Handling* book.

Chapter 5. 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 *Local Device Configuration*. For information on how to do a remote configuration, see the *Communications Configuration*.

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 1-2.

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

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 do not have to make a virtual device available.
   - A virtual device is made available by the pass-through function unless you reach the limit specified for the QAUTOVRT system value. To display the QAUTOVRT system value, enter `DSPSYSVAL QAUTOVRT` at any command line. To change the system value, use the Work with System Value (WRKSYSVAL) command. You must have *ALLOBJ authority to change this system value.

For information on activating communications lines and controllers, see "Activating Communications Lines and Controllers" on page 5-3.

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 named QPDCDEVA and follow the instructions on the display to make sure it is printing.

Activating Communications Lines and Controllers

Figure 5-1 on page 5-4 illustrates how communications lines and controllers are connected to enable the devices to communicate with each other.

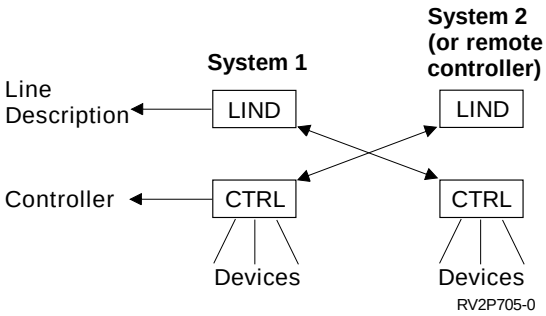

Figure 5-1. Relationship Between Controllers and Lines in Communications

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 5-2) 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 5-2. 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 *Communications Configuration*.

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 on page 5-6. 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 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 6. 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 that may be available on the AS/400 system:

IBM Online Education

IBM produces a series of education courses known as **Discover/Education*** for the AS/400 system, which you can order separately. These courses cover many aspects of the AS/400 system. They provide education for all types of AS/400 users including operators, managers, and business and technical professionals.

For some of these courses, you need a personal computer with Client Access for OS/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: To start using online education, use the Start Education (STREDU) command or select option 21 (Start online education) on the Information Assistant Options (INFO) menu. Then, select option 3 (Work as a student) on the Start Education Administration (STREDU) menu.

Administering Online Education

As an education administrator, your role is to provide online education to the students. When you start online education, you see a display that is different from the one students see. This display gives you the option to study a course just like a student, or to perform administrative tasks.

To administer online education, you must have a valid user ID for the AS/400 system and be authorized to do these tasks. Your profile must contain one of the following user classes:

- *SECOFR
- *SECADM

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

To install online education courses, 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)

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.

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 *Backup and Recovery – Basic* book.

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)

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 7. 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 the information on reporting problems that are detected by the system in Chapter 6 of the *System Startup and Problem Handling* book.

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
- Work with Order Requests (WRKORDRQS) command
- Request Order Assistance (RQSORDAST) command

Figure 7-1 on page 7-2 shows how AS/400 electronic customer support is organized to accommodate your needs for problem reporting and response.

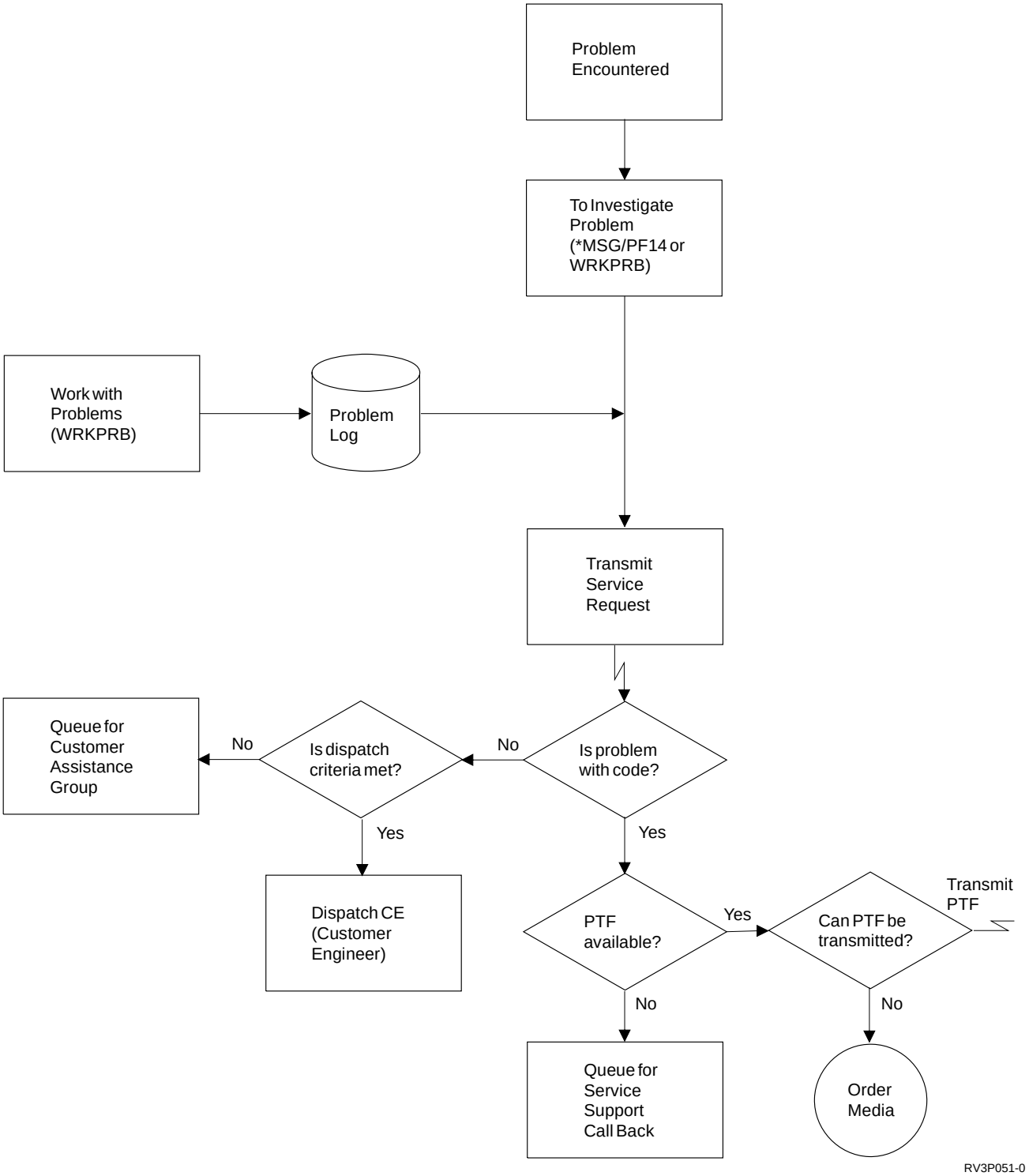

Figure 7-1. Overview of Electronic Customer Support

See Chapter 6 of the *System Startup and Problem Handling* book for information on how to report hardware and software problems.

Changing Connection Numbers for Electronic Customer Support

Your system provides a control language (CL) program called QESPHONE. This CL program uses the QESTELE data area in library QUSRSYS to store the primary and alternative connection numbers for the IBM service system. You can use this program to change the connection number in the electronic customer support. Use this program if your system cannot access the IBM service system using the primary number. To change your current connection numbers:

1. Type `dspdtaara qestele` on any command line, and press the Enter Key. Record the two numbers shown at offsets 0 and 50.
2. Press F3 (Exit) to leave the display.
3. Type `call qesphone` on any command line, and press the Enter Key. Change the number in the *New value* field to the second number you recorded in step 1 (the number at offset 50).

   Note:

   - There can be up to 32 character positions between the quotation marks. You must have one set of quotation marks at the beginning of the input data and one at the end.
   - Many places of the business have internal telephone networks. You may need to dial a single digit, usually a 9, to access the outside, public telephone network. This access number must be typed in front of the data connection numbers supplied to you by IBM.
4. Press the Enter Key to go to the next number. Change the number in the *New number* field to the first number you recorded in step 1 (the number at offset 0).
5. Continue to press the Enter Key until the Display Data Area display is shown, then verify that the numbers are correct.
6. Press F3 (Exit) to leave the display.

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 currently has its screens copied 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

The IBM-supplied AS/400 Question-and-Answer (Q & A) database (QSYSQST) is no longer available with the OS/400 licensed program. However, you can still use the existing Q & A functions or commands to work with other databases, if available. For more information about using or managing Q & A databases, see the *Q & A Database Coordinator's Guide*

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 3278 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.

   Note: IBMlink account number can be found in the IBMlink enrollment package. To receive the package, call 800 IBM-4YOU (800-426-4968), or contact your Account Representative.

   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.
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 7-5.

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 included in your IBM enrollment package 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.`

Requesting Order Assistance

The Request Order Assistance (RQSORDAST) command allows you to send a request to IBM for assistance in ordering services or products. If the RQSORDAST command runs successfully, an entry for the order assistance request is created in the order log on both the requester and provider systems. For more information about this command, see the *CL Reference* book, SC41-4722.

Working with Order Requests

The Work with Order Requests (WRKORDRQS) command allows you to display a list of order assistance requests created by the Request Order Assistance (RQSORDAST) command. The Work with Order Requests display allows you to send, answer, delete, or close order assistance requests. For more information about this command, see the *CL Reference* book, SC41-4722.

Chapter 8. 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 the System Time and Date

To verify the correct system time, type `dspsysval qtime`. To verify the correct system date, type `dspsysval qdate`. The format of the time or date is displayed according to the system values.

The accuracy of the system time or date may be affected by the following:

- Number of system IPLs
- Number of times the system is powered off
- Aging of the hardware parts
- Operating temperature
- Abnormal system ending

To change the system time, type `chgsysval qtime`. To change the system date, type `chgsysval qdate`. The format of the time or date is displayed according to system values.

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 4-10 for more information about creating and monitoring the QSYSMSG message queue.

See Chapter 4, “Handling Messages” for complete information about monitoring for and responding to messages.

Usage Limit Messages

Some OS/400 product are priced based on the number of users that will be using them. If you have purchased products that are user-based, it is your responsibility to set the usage limits after installing the products. The usage limit is based on the number of usage licenses purchased for each product.

Failure to set the usage limits will result in any of the following messages being sent.

- CPF9E17 *Usage Limit Exceeded - Operator Action Required*.

  This message indicates that you have not set the usage limits or you are exceeding the usage limit purchased.

- CPF9E18 *Attempt made to exceed usage limit for product xxxxxx. User not added*

  This message indicates that you attempted to add more users than the number of usage licenses purchased for your product.

- CPI9E19 *Usage limit threshold exceeded for product xxxxxx.*

  This message indicates that you are close to exceeding the usage limit. The default threshold is 90%.

If you need to purchase more licenses to increase your usage limits, contact your software provider.

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 8-1 on page 8-3 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 8-1. 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 8-2 on page 8-4 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 8-2. Work with Active Jobs Display - Status

2. To display information about elapsed data, press F11 (Display elapsed data). Figure 8-3 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 8-3. 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 8-54.

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 8-2).

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 2, “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 8-4.

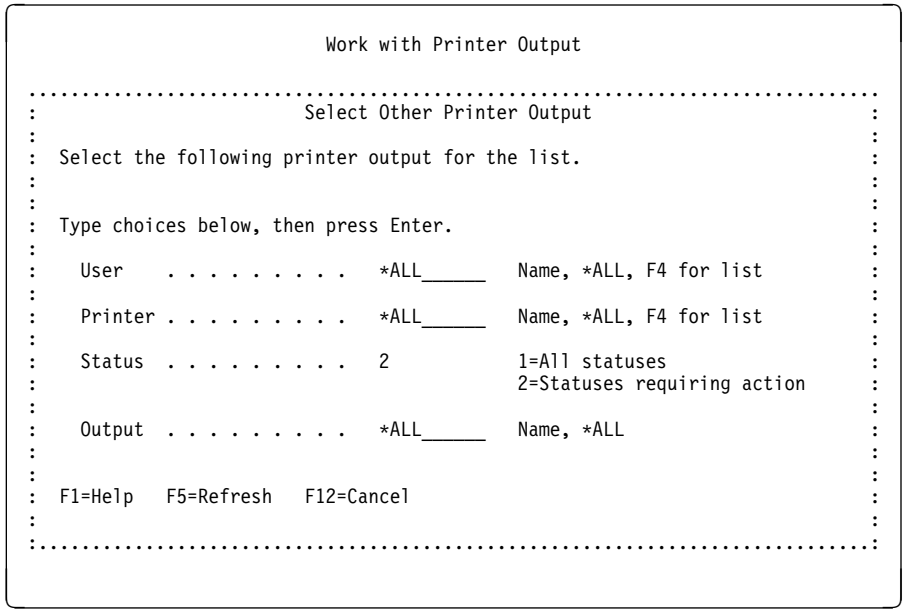

Figure 8-4. Select Other Printer Output Display

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 5, “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 8-5 on page 8-7 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 8-5. 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 5, “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* for more information about automatic recovery and line description parameters. See the *Work Management* 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 8-6 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 8-6. 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 *SNA Distribution Services*.

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 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 Support* book, SC41-4413.

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 8-7 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 8-7. 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 8-8 on page 8-11.

```
                          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 8-8. 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 A-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 8-9 on page 8-13 shows the Print Disk Space Information display.

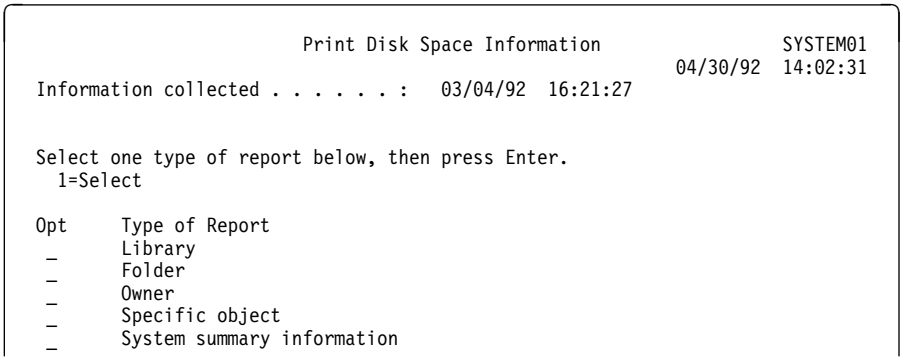

Figure 8-9. Print Disk Information Display

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 8-25.

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 8-10 on page 8-14 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 8-1 on page 8-25.

```
                        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

                                          % of      Size in
Description                               Disk      1,000,000 bytes

User libraries                             4.55              57.83
User directories                            .00                .00
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 8-10. System Information Disk Space Information Report

Figure 8-11 on page 8-15 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
System 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 8-11. 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 8-12.

   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 8-17.

```
                          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  . . . . . .  .   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 8-12. 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 8-13 on page 8-17.

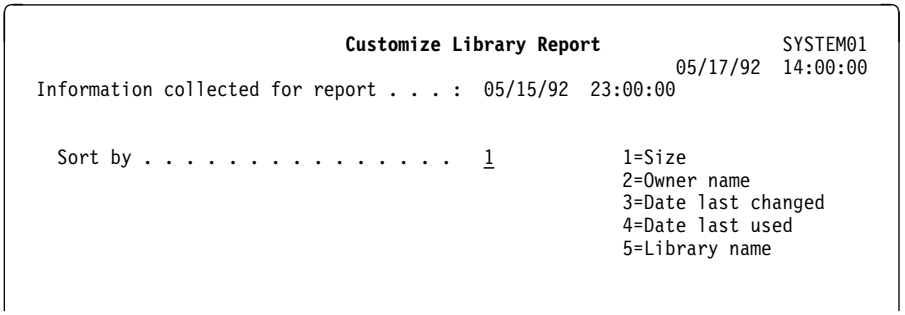

Figure 8-13. Customize Library Report Display – Sort by Field

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 8-14 shows an example of a library information report:

Disk Space Report
Library Information

Library	Owner	% of Disk	Size in 1000 Bytes	Last Change	Last 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 8-14. 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 8-12 on page 8-16.

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 8-15 on page 8-18.

```
                          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 8-15. 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 8-16 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 8-16. 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 8-17.

   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 8-20.

```
                          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 8-17. 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 8-18 on page 8-20 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 8-18. 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 8-19.

```
                          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 8-19. 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 8-20 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 8-20. 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 8-21 on page 8-22.

   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 8-23.

```
                          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 . . . . . . . . . . . . .   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 8-21. 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 8-22 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 8-22. 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 8-23.

```
                          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 8-23. 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 8-24 on page 8-24 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 8-24. 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 8-25.

```
                          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 8-25. 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 8-26 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 8-26. Specific Object Disk Space Information Report

Interpreting Disk Space Information Reports

Table 8-1 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 8-1 (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.

Table 8-1 (Page 2 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
User directories	Space used by user directories and associated objects, which include the following object types: *DIR, *STMF, *SYMLINK, *SOCKET.	• Use the Work with Object Links (WRKLNK) command to view the objects and their sizes. • Use the Save (SAV) command to save unused objects and then select option 4 (Remove) on the WRKLNK display to remove unused objects.
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.
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 8-27 and *User profiles* on page 8-27 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 *Backup and Recovery – Basic* book.	• Delete any IBM libraries included in this category that are not needed. • See the individual fields under the Miscellaneous items reported column on page 8-29 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.

Table 8-1 (Page 3 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
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 8-11 on page 8-15 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.
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 *Backup and Recovery – Basic* book 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 8-37 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 8-45 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, *NTBD, *NWSD, *NWID and *SVRSTG 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 size, check to make sure there are no user objects stored in this library.
Calendars	Size of database files in QUSRSYS managing OfficeVision for OS/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 for OS/400 folders and documents.	Delete any documents and folders that are not needed.

Table 8-1 (Page 4 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
OfficeVision for OS/400 items reported:		
Enrollment	Size of database files managing OfficeVision for OS/400 enrollment information.	Delete any users that do not need to be enrolled in OfficeVision for OS/400.
Mail files	Size of all external objects managing OfficeVision for OS/400 mail.	• Delete hard-copy references. • Do not log outgoing mail status if not needed. • Delete all outgoing mail status.
Text search	Space for managing OfficeVision for OS/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 for OS/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 and checksum protection	Cannot be adjusted.
Space used by internal objects:		

Table 8-1 (Page 5 of 5). System Information Disk Space Report Entries

Field	Description	Possible Actions if Size is Large
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 8-27.
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.
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 8-46 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 Backup and Recovery – Basic, 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 on your system that were damaged. The media that are used for saving or restoring objects and information include tape, diskette, and optical storage.

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 8-27 on page 8-31, Figure 8-28 on page 8-32 and Figure 8-29 on page 8-33 provide an overview of the save and restore commands. They show the save and restore processes for different types of 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 *Backup and Recovery – Basic* book for a more detailed explanation of when and how to use these commands.

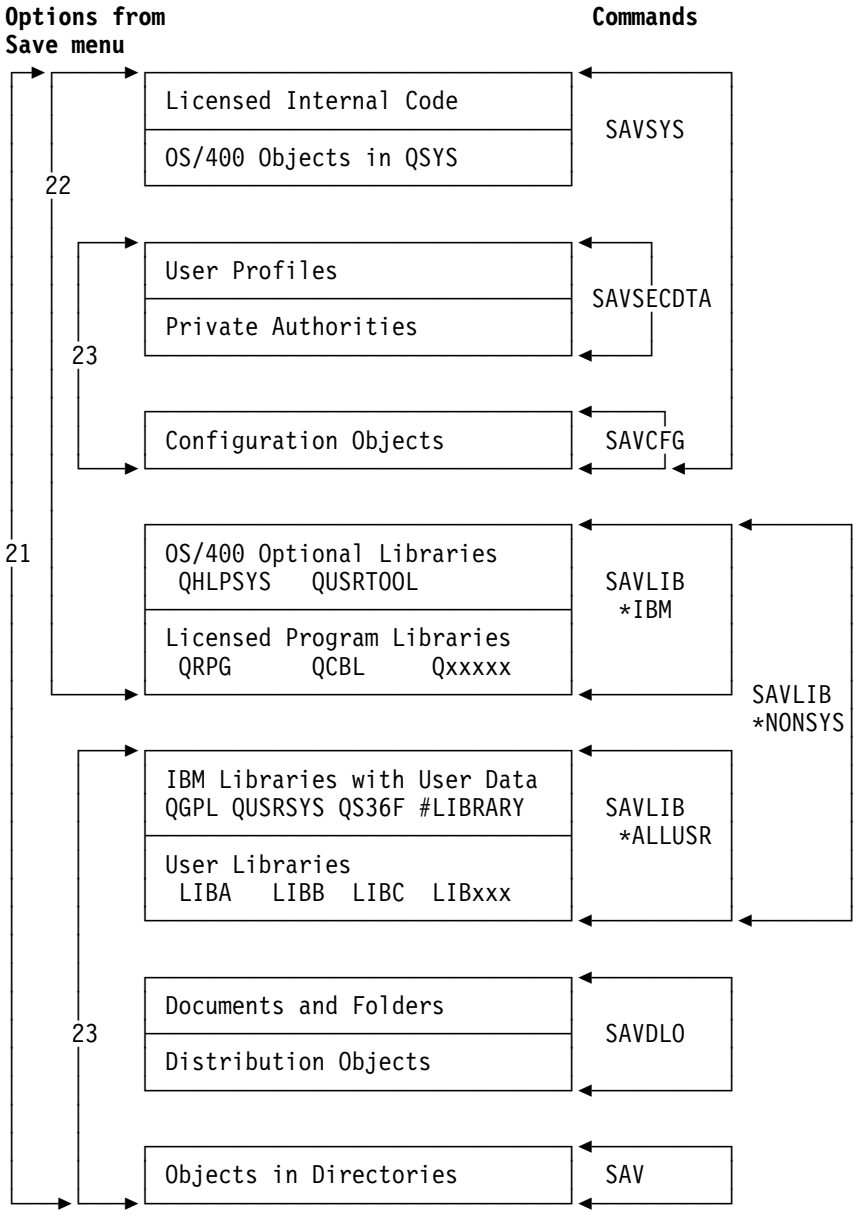

Figure 8-27. Save Commands and Menu Options

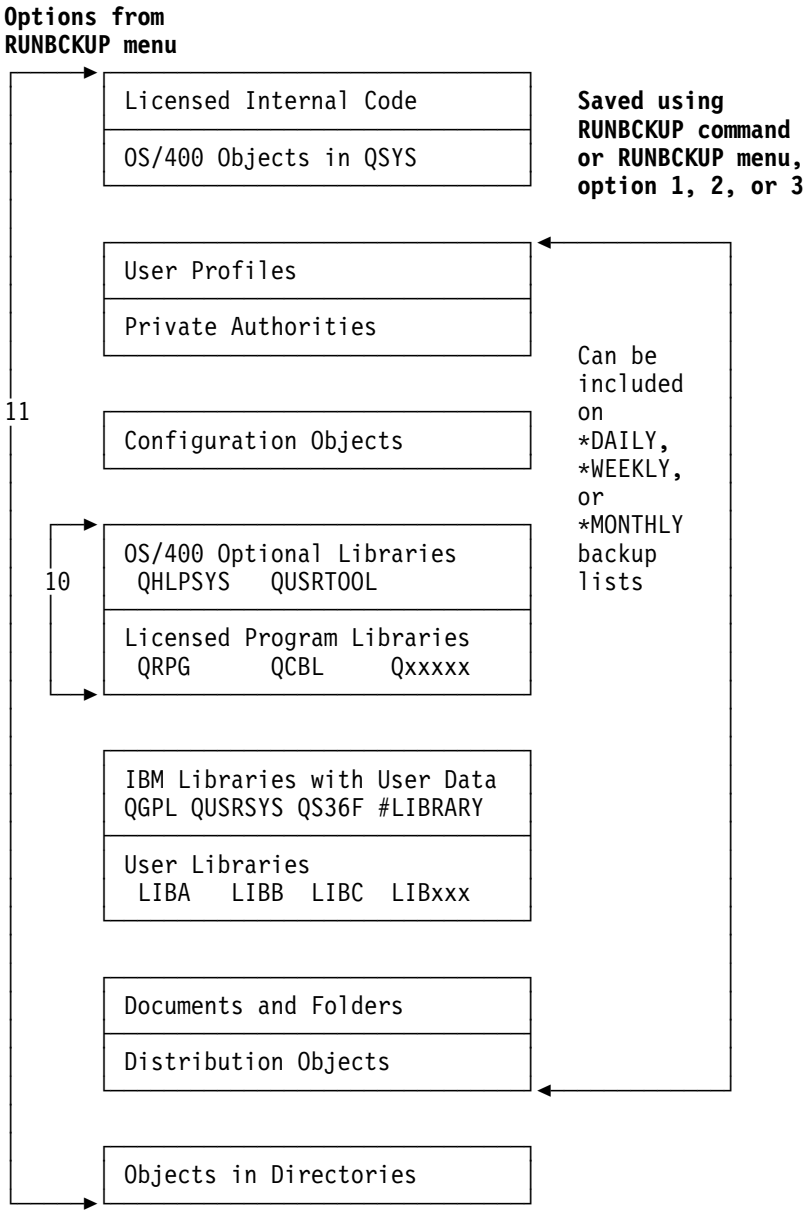

Figure 8-28. Use Operational Assistant to Save Information.

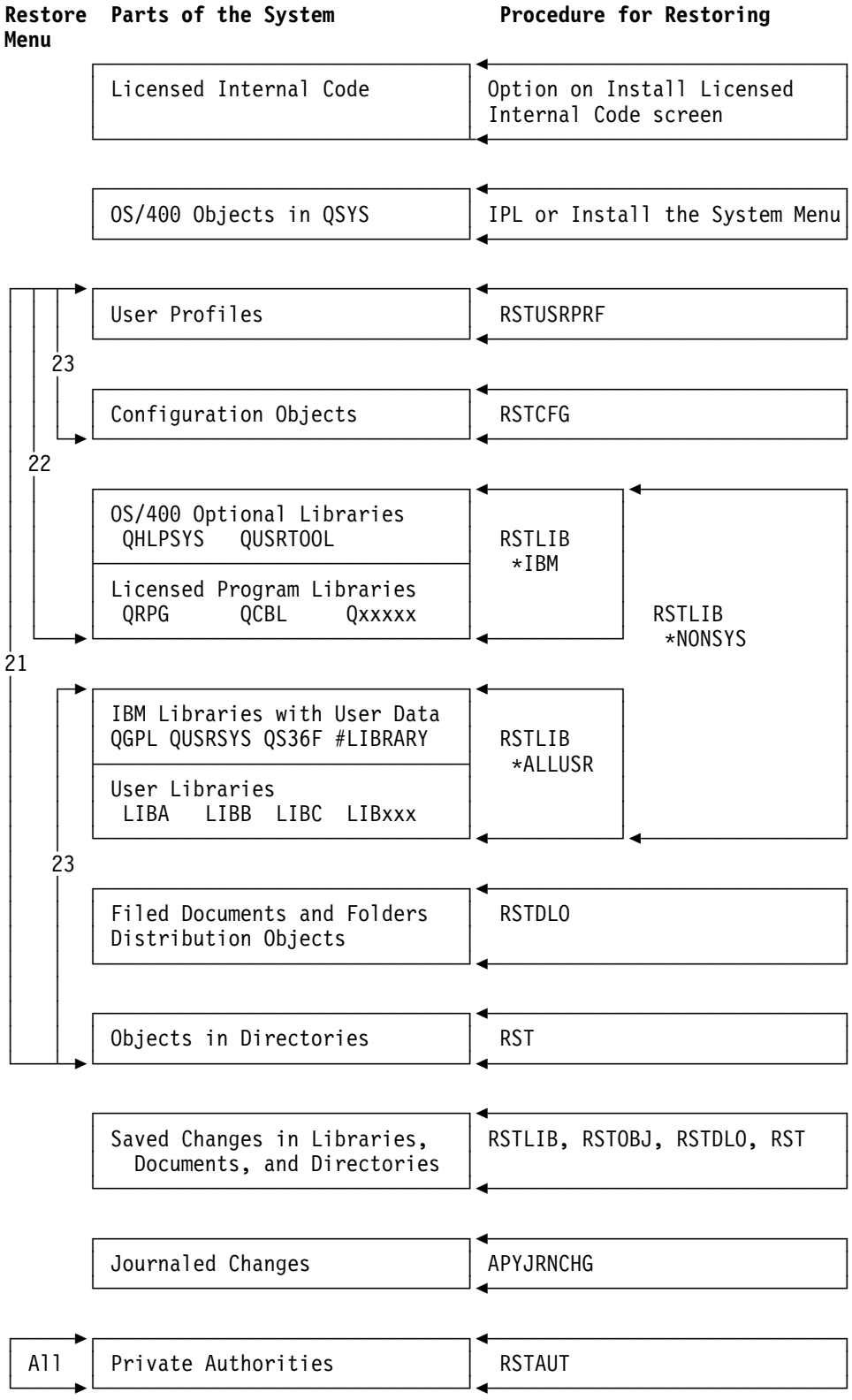

Figure 8-29. Overview of Restore Procedures

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, optical storage, 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 Backup and Recovery – Basic, 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 Objects in Directories (SAV)

The Save (SAV) command saves a copy of one or more objects that can be used in the integrated file system. For more information about the integrated file system, see the *Integrated File System Introduction* book.

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 user libraries. See the *Backup and Recovery – Basic* book to determine which libraries are IBM libraries and which libraries are user libraries.

The RSTLIB SAVLIB(*NONSYS) command restores to the system all libraries saved by SAVLIB LIB(*NONSYS) command.

Restoring Objects in Directories (RST)

The Restore (RST) command restores a copy of one or more objects that can be used in the integrated file system. For more information about integrated file system, see the *Integrated File System Introduction* book.

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 8-30 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 for OS/400 Calendar items  . . . .   30__          1-366, *KEEP




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

Figure 8-30. 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. For more information about the power off schedule, see the section on setting up your automatic power on and off schedule in Chapter 2 of the *System Startup and Problem Handling* book.

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 8-2 on page 8-39 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 8-2. 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 data journal (See note below) • Performance adjustment data journal • Problem databases journal • QSNADS journal • OSI Message Services/400 journal	Journals • DIA files journal • Managed System Services/400 journal • SNMP journal • Application Development Manager transactions journal • Project logs journal • Work with order requests journal
OfficeVision for OS/400 program • Calendar entries • Folders (reorganized) • Database files (reorganized)	OfficeVision for OS/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 data 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 data 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 2-17 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 for OS/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 8-48 provides more information about working with journal receivers.

The journal receivers associated with the journals listed below are cleaned up:

QACGJRN
Journal for job accounting data

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

QLYJRN
Journal for Application Development Manager Transactions

QLYPRJLOG
Journal for project logs

QMAJRN
Journal for work with order requests

QO1JRN
Journal for the Application Enabler OFC files

QSNADS
Journal for SNA distribution services (SNADS) files

QSNMP
Journal for SNMP

QSXJRN
Journal for problem database

QPFRADJ
Journal for performance adjustment data

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 8-45.
- The job accounting journal is cleaned up only if the Operational Assistant function creates the journal.

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 *System Startup and Problem Handling* book.

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 temporary objects are created in the libraries to which PTFs have been applied. These objects remain on the system until the PTFs are permanently applied or removed. Sometimes the temporary objects are left on the system because of PTFs that are damaged. These temporary objects are no longer associated with any PTFs. If you select automatic cleanup of system journals and logs, the system deletes the temporary objects that are no longer associated with the PTFs.

The following objects are deleted:

- Temporary objects named:
  - QPZA000000 through QPZA999999
  - QPZR000000 through QPZR999999
  - QSCA000000 through QSCA999999
  - QSCR000000 through QSCR999999
- Exit programs and other temporary objects shipped with PTFs that start with QPZ1, and exit programs shipped with PTFs that start with QPZ2
- PTF save files and cover letters from previous releases

The following physical files in QUSRSYS are reorganized:

- QAPZPTF
- QAPZREQ
- QAPZSYM
- QAPZOBJ
- QAPZACT

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, the following will happen:

- If IBM licensed programs are installed, PTF save files for the installed product release are deleted.
- If IBM licensed programs are not installed, PTFs for any product release prior to the installed OS/400 release are deleted.
- If non-IBM licensed programs are installed, PTFs for any product release that is prior to the earliest installed product 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, the following will happen:

- For IBM licensed programs, any PTFs for a product release prior to the installed product release are deleted.
- For IBM licensed programs, if the product is supported but not installed, any PTFs for a product release prior to the earliest supported product

release are deleted. If the product is not supported or installed, all PTFs prior to the OS/400 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 product release prior to the earliest installed product release are deleted. If the product is supported but not installed, the PTFs for any product release prior to the earliest supported product release are deleted.

Cleaning Up OfficeVision for OS/400 Calendars and Files Automatically

Individuals who use OfficeVision for OS/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 for OS/400 performance. You can request that old calendar entries be removed.

The following OfficeVision for OS/400 files are reorganized during automatic cleanup:

Table 8-3. OfficeVision for OS/400 Files Reorganized during Automatic Cleanup

Personal Directories	Hardcopy Document	Office Enrollment	Library Descriptions	Remote Document Library Service	Mail	Calendars
QAOFDDH	QAOFDOCH	QAOFENRA	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 for OS/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 8-48.

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 for OS/400 Items

Active users of the OfficeVision for OS/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 for OS/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 for OS/400 files, documents, and folders.

Additional Reading: For more information about the OfficeVision for OS/400 program, see the *Managing OfficeVision/400* manual.

Reorganizing OfficeVision for OS/400 Files: The following is a list of files used for various functions in the OfficeVision for OS/400 licensed program. OfficeVision for OS/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 8-47.

Table 8-4. OfficeVision for OS/400 Files You Should Reorganize

System Distribution Directories	Distribution List	Nickname	Calendar	Application Enabling Files	Shadowing Files
QAOKP01A	QAOKP02A	QAOKP06A	QAOOUDF	QAO1CVNP	QAOKPCLA
QAOKP09A	QAOKP03A				QAOKPLGA
QAOKPX4A					QAOKPLCA

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 *Backup and Recovery – Basic* book.

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 6, "Handling and Reporting System Problems" in the *System Startup and Problem Handling* book. 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 8-48 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 8-31 on page 8-48 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 8-31. 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 for OS/400 Journal Receiver

The following is an example of the commands needed to detach, save, and delete an OfficeVision for OS/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 *Backup and Recovery – Basic* book.

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 *Backup and Recovery – Basic* book.

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 8-37 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" in Chapter 2 of the *System Startup and Problem Handling* book 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 *Backup and Recovery – Basic* book 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 8-32 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 8-32. 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.

Note: When the Operational Assistant batch cleanup program is running, it uses the QUSRSYS library or the QEZPWRCLN user index. The cleanup may encounter difficulties if other jobs are also using the same library or user index. Therefore, avoid starting such commands as SAVLIB QUSRSYS, or the power schedule commands in the QEZUSRCLNP CL program. If you must start those commands, consider adding them to the exit program you use for power off (QEZPWROFFP), or changing the subsystem that runs your cleanup jobs to allow only two jobs to run at the same time.

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*. For information about the Performance Tools/400 licensed program, see the *Performance Tools/400*.

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* 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 the *System Startup and Problem Handling* book.

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 use on the system.

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 8-37. 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 8-55.
- 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 8-41 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 *Backup and Recovery – Advanced*.

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 the *System Startup and Problem Handling* book.

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 8-47.

See "Cleaning Up System Journals, System Logs, and PTFs Automatically" on page 8-41 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. Enter the Display Hardware Resource (DSPHDWRSC) command at any command line. The Display Hardware Resource (DSPHDWRSC) display appears.
2. Specify `*AHW` in the *Type* field, and `*PRINT` in the *Output* field. Press the Enter key. The system configuration list is sent to the output queue identified in your user profile. If your printer is ready, the system configuration list will also be printed. If your printer is not ready, do the following:
   a. Start the printer. See “Working with Printers” on page 3-10 for more information.
   b. When the printer is ready, type `go assist` to display the Operational Assistant menu.
   c. Select option 1 (Work with printer output).
   d. 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.
   e. Use option 10 (Start printing) on the Work with Printer Output display to print the system configuration list.
3. Keep a printed copy of the system configuration list with the *System Startup and Problem Handling* book, and with this book for future reference. Your system representative will need the system configuration list to handle problems.

Appendix A. Operational Assistant Callable Programs

Table A-1 shows the Operational Assistant function, CL command, menu option, and callable program. See the *System API Reference* book. For more information on how to use Operational Assistant application program interfaces (APIs).

Table A-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 A-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)
DIOBTP	Object type.	C (7)

Table A-2 (Page 2 of 2). Disk Space Utilization

Field Name	Description	Attributes
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)

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 planning, installation, and migration:

- *Local Device Configuration*, SC41-4121, provides information about how to do an initial configuration and how to change that configuration. It also contains conceptual information about device configuration.
- *Software Installation*, SC41-4120, provides step-by-step procedures for initial install, installing licensed programs, program temporary fixes (PTFs), and secondary languages from IBM.
- *ASCII Work Station Reference*, SA41-3130, 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.

For information about system use:

- *Getting Started with AS/400*, SC41-4204, is for new or novice AS/400 users to help them get started on the AS/400 system. The booklet shows how to perform simple tasks on the system in a short time (2 or 3 hours) and introduces them to key functions on the AS/400.
- *Managing OfficeVision/400*, SH21-0699, provides information on how to manage the day-to-day activities of OfficeVision for OS/400. It also includes information on maintaining office enrollment and creating and managing office objects.
- *Operator Tasks – Multiple Operating Systems*, SC21-8384, provides information on running an AS/400 with multiple operating systems. It contains operator tasks, considerations and restrictions that apply to multiple operating system environment.
- *Q & A Database Coordinator's Guide*, SC41-8088, 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.
- *System Operation for New Users*, SC41-3200, 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.
- *System Startup and Problem Handling*, SC41-4206, is intended for system operators or administrators and includes information about the system unit control panel, starting and stopping the system, using tapes and diskettes, working with program temporary fixes, as well as handling problems.

For information about system management

- *Security – Basic*, SC41-3301, explains why security is necessary, defines major concepts, and provides information on planning, implementing, and monitoring basic security on the AS/400 system.
- *Backup and Recovery – Basic*, SC41-4304, 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.
- *Backup and Recovery – Advanced*, SC41-4305, 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 provides information about journaling and save-while-active.
- *Work Management*, SC41-4306, 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.
- *System Manager/400 Use*, SC41-4321, provides information about the commands and functions available when the 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.
- *Performance Tools/400*, SC41-4340, 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.

For more information about communications and connectivity:

- *Alerts Support*, SC41-4413, Provides information for configuring and using AS/400 alert support. The book discusses how to allow end-user applications to create alerts and notify the alert manager of alerts that need to be handled, how to control the creating and sending of alert messages for problem management, and how to perform central site problem analysis for the AS/400 systems in the network.
- *SNA Distribution Services*, SC41-3410, provides information about administering data communications applications on an AS/400 system.
- *Communications Management*, SC41-3406, provides information on how to start, stop, verify, and test communications, handle communications errors, and work with communications status.
- *Communications Configuration*, SC41-3401, 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.
- *Local Device Configuration*, SC41-4121, Provides information about configuring local devices on the AS/400 system. This includes information on how to configure the following:
  - Local work station controllers (including twinaxial controllers)
  - Tape controllers
  - Locally attached devices (including twinaxial devices)

For information about program enablers

- *CL Programming*, SC41-4721, Provides a wide-ranging discussion of AS/400 programming topics including a general discussion on objects and libraries, CL programming, controlling flow and communicating between programs, working with objects in CL programs, and creating CL programs. Other topics include predefined and impromptu messages and message handling, defining and creating user-defined commands and menus, application testing, including debug mode, breakpoints, traces, and display functions.
- *CL Reference*, SC41-4722, Provides a description of the AS/400 control language (CL) and its OS/400 commands. (Non-OS/400 commands are described in the respective licensed program publications.) Also provides an overview of *all* the CL commands for the AS/400 system, and it describes the syntax rules needed to code them.
- *Printer Device Programming*, SC41-3713, provides information on printing elements and concepts of the AS/400 system, printer file and print spooling support for printing operation, and printer connectivity.
- *System/36 Environment Programming*, SC41-4730, 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.
- *System/36 Environment Reference*, SC41-4731, provides information about using System/36 procedure control expressions, procedures, operation control language (OCL) statements, control commands, and utilities on the AS/400 system.

For information about program interfaces:

- *System API Reference*, SC41-4801, 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.
- *Integrated File System Introduction*, SC41-4711, Provides an overview of the integrated file system, which includes:
  - What it is
  - Why you might want to use it
  - The interfaces you can use to interact with it
  - The APIs and techniques you can use in programs that interact with it
  - Characteristics of individual file systems

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