



@server

iSeries

Spooled files

*Version 5 Release 3*







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*Version 5 Release 3*

**Note**

Before using this information and the product it supports, be sure to read the information in "Notices," on page 13.

**Second Edition (August 2005)**

| This edition applies to version 5, release 3, modification 0 of IBM Operating System/400 (product number 5722-SS1)  
| and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not  
| run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

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## Spooled files

Spooling is a system function that saves data for later processing or printing. This data is stored in a spooled file. Spooled files work in a similar manner to tape files or other device files. Spooled files allow you to manage your data targeted for externally attached devices such as a diskette or printer.

Spooling functions help server users to manage input and output operations more efficiently. The server supports two types of spooling:

- “Output spooling” on page 2 sends job output to disk storage, rather than directly to a printer or diskette output device. Output spooling allows the job that produces the output to continue processing without consideration for the speed or availability of output devices.
- “Input spooling” on page 6 accepts job input, stores the input data in disk storage, and allows the input device to be used independently of when the job is actually processed.

Output spooling may be used for both printer and diskette devices; input spooling applies to diskette and database file input.

For additional information about working with spooled files, see the following topics:

- What’s new for V5R3
- Print this topic
- Output spooling
- Output queues of spooled files
- Spooling writers
- Command examples for additional spooling support
- Input spooling
- Related information

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## What’s new for V5R3

This Spooled files topic is new to the Files and file systems topic, however, much of the Spooled files information can now be found under the Basic Printing topic under Printing. New information regarding spooled files on Independent ASPs can also be found under the Basic printing topic.

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## Print this topic


To view or download the PDF version of this document, select Spooled files  (about 160 KB).

### Saving PDF files

To save a PDF on your workstation for viewing or printing:

1. Right-click the PDF in your browser (right-click the link above).
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## Output spooling

Output spooling allows the server to produce output on multiple output devices, such as printer and diskette devices, in an efficient manner. It does this by sending the output of a job destined for a printer or diskette to disk storage. This process breaks a potential job limitation imposed by the availability or speed of the output devices.

Spooling is especially important in a multiple-user environment where the number of jobs running often exceeds the number of available output devices. Using output spooling, the output can be easily redirected from one device to another.

The main elements of output spooling are:

### **Device description**

A description of the printer or diskette device

### **Spooled file**

A file containing spooled output records that are to be processed on an output device

### **Output queue**

An ordered list of spooled files

**Writer** A program that sends files from an output queue to a device

### **Application program**

A high-level language program that creates a spooled file using a device file with the spooling attribute specified as SPOOL(\*YES)

### **Device file**

A description of the format of the output, and a list of attributes that describe how the server should process the spooled file

Figure 1 on page 3 shows the relationship of these spooling elements.



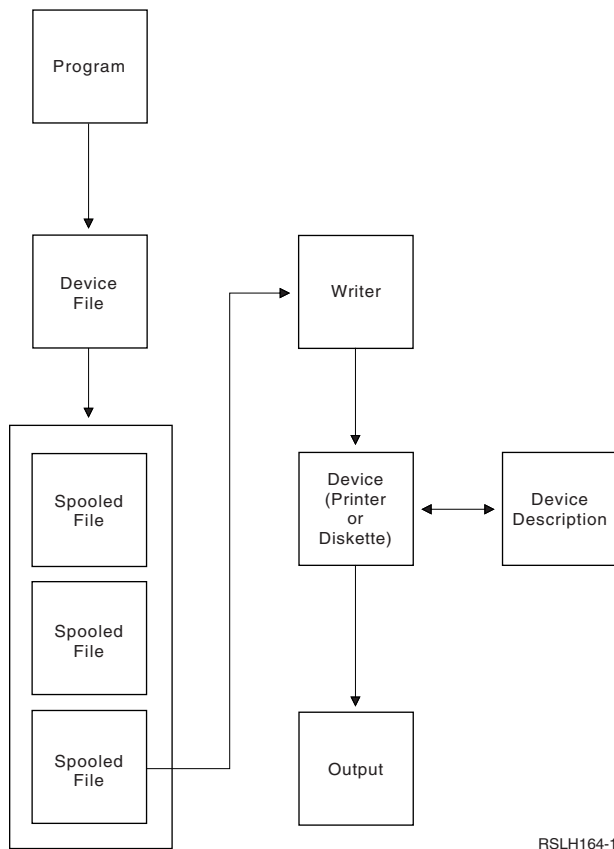


Figure 1. Relationship of Output Spooling Elements

Output spooling functions are performed by the server without requiring any special operations by the program that produces the output. When a device file is opened by a program, the operating system determines whether the output is to be spooled. When a printer or diskette device file specifying spooling is opened, the spooled file containing the output of the program is placed on the appropriate output queue in the server.

A spooled file can be made available for printing when the printer file is opened, when the printer file is closed, or at the end of the job. A printer writer is started in the spooling subsystem to send the records to the printer. The spooled file is selected from an output queue. The same general description applies for spooled diskette files.

For more information about output spooling, see the following topics:

- Spooling device descriptions
- File redirection of spooled files

## Spooling device descriptions

Device descriptions must be created for each printer and diskette device to define that device to the server. Printer device descriptions are created using the Create Device Description for Printer (CRTDEVPR) command; diskette device descriptions are created using the Create Device Description for Diskette (CRTDEVDKT) command. See the Local Device Configuration book for more information about specifying device descriptions.

## File redirection of spooled files

File redirection occurs when a spooled file is sent to an output device other than the one for which it was originally intended. File redirection may involve devices that process different media (such as printer

output sent to a diskette device) or devices that process the same type of media but are of different device types (such as 5219 Printer output sent to a 4224 Printer).

Depending on the new output device for the spooled file, the file may be processed just as it would have been on the originally specified device. However, differences in devices often cause the output to be formatted differently. In these cases, the server sends an inquiry message to the writer's message queue to inform you of the situation and allow you to specify whether you want printing to continue. For more information about print file redirection, see the print topic in the iSeries Information Center.

---

## Output queues of spooled files

Batch and interactive job processing may result in spooled output records that are to be processed on an output device, such as a printer or diskette drive. These output records are stored in spooled files until they can be processed. There may be many spooled files for a single job.

When a spooled file is created, the file is placed on an output queue. Each output queue contains an ordered list of spooled files. A job can have spooled files on one or more output queues. All spooled files on a particular output queue should have a common set of output attributes, such as device, form type, and lines per inch. Using common attributes on an output queue reduces the amount of intervention required and increases the device throughput.

The following lists some of the parameters on the Create Output Queue (CRTOUTQ) command and what they specify:

- **MAXPAGES:** Specifies the maximum spooled file size in pages that is allowed to be printed between a starting and ending time of day.
- **AUTOSTRWTR:** Specifies the number of writers that are started automatically to this output queue.
- **DSPDTA:** Whether users without any special authority but who do have \*USE authority to the output queue can display, copy, or send the contents of spooled files other than their own. By specifying \*OWNER for DSPDTA, only the owner of the file or a user with \*SPLCTL special authority can display, copy, or send a file.
- **JOBSEP:** How many, if any, job separator pages are to be printed between the output of each job when the output is printed.
- **DTAQ:** The data queue associated with this output queue. If specified, an entry is sent to the data queue whenever a spooled file goes to Ready Status on the queue.
- **OPRCTL:** Whether a user having job control authority can control the output queue (for example, if the user can hold the output queue).
- **SEQ:** Controls the order in which spooled files will be sorted on the output queue. See Order of spooled files on an output queue for more information.
- **AUTCHK:** Specifies what type of authority to the output queue will enable a user to control the spooled files on the output queue (for example, enable the user to hold the spooled files on the output queue).
- **AUT:** Public authority. Specifies what control users have over the output queue itself.
- **TEXT:** Text description. Up to 50 characters of text that describes the output queue.

Select the following link for a complete list of parameters for the Create Output Queue (CRTOUTQ) command.

For more information about output queues, see the following topics:

- Default server output queues
- Creating your own output queues

## Default server output queues

The server is shipped with the defaults on commands to use the default output queue for the server printer as the default output queue for all spooled output. The server printer is defined by the QPRTDEV server value.

When a spooled file is created by opening a device file and the output queue specified for the file cannot be found, the server will attempt to place the spooled file on output queue QPRINT in library QGPL. If for any reason the spooled file cannot be placed on output queue QPRINT, an error message will be sent and the output will not be spooled.

The following output queues are supplied with the server:

### QDKT

Default diskette output queue

### QPRINT

Default printer output queue

### QPRINTS

Printer output queue for special forms

### QPRINT2

Printer output queue for 2-part paper

## Creating your own output queues

You can create output queues for each user of the server. For example:

```
CRTOUTQ OUTQ(QGPL/JONES) +  
  TEXT('Output queue for Mike Jones')
```

---

## Spooling writers

A writer is an OS/400 program that takes spooled files from an output queue and produces them on an output device. The spooled files that have been placed on a particular output queue will remain stored in the server until a writer is started to the output queue.

The writer takes spooled files one at a time from the output queue, based on their priority. The writer processes a spooled file only if its entry on the output queue indicates that it has a ready (RDY) status. You can display the status of a particular spooled file using the Work with Output Queue (WRKOUTQ) command.

If the spooled file has a ready status, the writer takes the entry from the output queue and prints the specified job or file separators or both, followed by the output data in the file. If the spooled file does not have a ready status, the writer leaves the entry on the output queue and goes on to the next entry. In most cases the writer will continue to process spooled files (preceded by job and file separators) until all files with a ready status have been taken from the output queue.

The AUTOEND parameter on the start writer commands determines whether the writer continues to wait for new spooled files to become available to be written, end after processing one file, or end after all spooled files with ready status have been taken from the output queue.

See Summary of spooling writer commands for more information.

## Summary of spooling writer commands

The following commands may be used to control spooling writers. For detailed descriptions of the commands, see the CL topic in the iSeries Information Center.

**STRDKTWTR**

Start Diskette Writer: Starts a spooling writer to a specified diskette device to process spooled files on that device.

**STRPRTWTR**

Start Printer Writer: Starts a spooling writer to a specified printer device to process spooled files on that device.

**STRRMTWTR**

Start Remote Writer: Starts a spooling writer that sends spooled files from an output queue to a remote server.

**CHGWTR**

Change Writer: Allows you to change some writer attributes, such as form type, number of file separator pages, or output queue attributes.

**HLDWTR**

Hold Writer: Stops a writer at the end of a record, at the end of a spooled file, or at the end of a page.

**RLSWTR**

Release Writer: Releases a previously held writer for additional processing.

**ENDWTR**

End Writer: Ends a spooling writer and makes the associated output device available to the server.

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## Command examples for additional spooling support

You can define some functions to provide additional spooling support. Example source and documentation for the commands, files, and programs for these functions are part of library QUSRTOOL, which is an optionally installed part of OS/400.

---

## Input spooling

Input spooling takes the information from the input device, prepares the job for scheduling, and places an entry in a job queue. Using input spooling, you can typically shorten job run time, increase the number of jobs that can be run sequentially, and improve device throughput.

The main elements of input spooling are:

**Job queue**

An ordered list of batch jobs submitted to the server for running and from which batch jobs are selected to run.

**Reader**

A function that takes jobs from an input device or a database file and places them on a job queue.

When a batch job is read from an input source by a reader, the commands in the input stream are stored in the server as requests for the job, the inline data is spooled as inline data files, and an entry for the job is placed on a job queue. The job information remains stored in the server where it was placed by the reader until the job entry is selected from the job queue for processing by a subsystem. Figure 2 on page 7 shows this relationship.

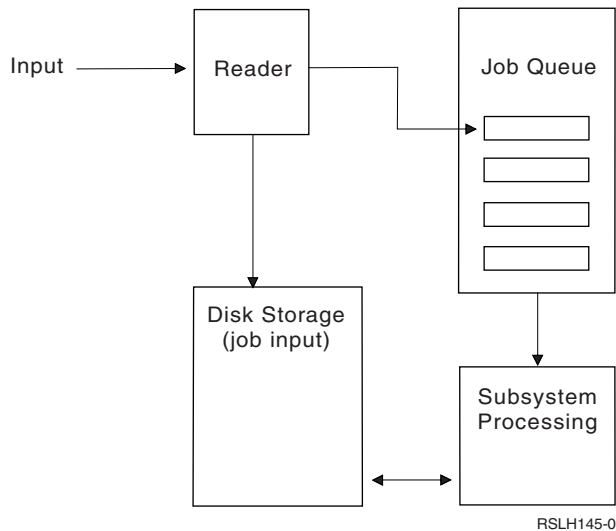


Figure 2. Relationship of Input Spooling Elements

You can use the reader functions to read an input stream from diskette or database files. Figure 3 shows the typical organization of an input stream:

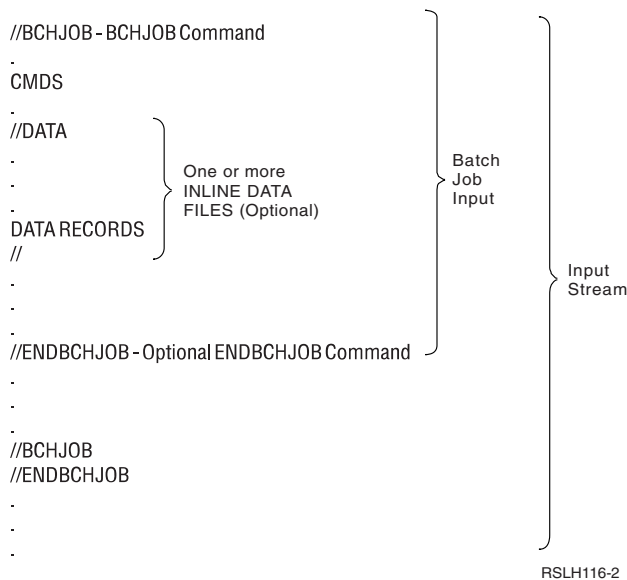


Figure 3. Typical Organization of an Input Stream

The job queue on which the job is placed is specified on the JOBQ parameter on the BCHJOB command, on the start reader command, or in the job description. If the JOBQ parameter on the BCHJOB command is:

- \*RDR: The job queue is selected from the JOBQ parameter on the start reader command.
- \*JOBQ: The job queue is selected from the JOBQ parameter in the job description.
- A specific job queue: The specified queue is used.

For jobs with small input streams, you may improve server performance by not using input spooling. The submit job commands (SBMDBJOB and SBMDKTJOB) read the input stream and place the job on the job queue in the appropriate subsystem, bypassing the spooling subsystem and reader operations.

If your job requires a large input stream to be read, you should use input spooling (STRDKTRDR or STRDBRDR command) to allow the job to be input independent of when the job is actually processed.

For more information about input spooling, see the following topics:

- Summary of job input commands
- Job queues
- Transferring jobs in a queue
- Using an inline data file

## Summary of job input commands

The following commands may be used when submitting jobs to the server. The start reader commands may be used for spooling job input; the submit job commands do not use spooling. For detailed descriptions of these commands, see the CL topic in the iSeries Information Center.

### **BCHJOB**

Batch Job: Marks the start of a job in a batch input stream and defines the operating characteristics of the job.

**DATA** Data: Marks the start of an inline data file.

### **ENDBCHJOB**

End Batch Job: Marks the end of a job in a batch input stream.

### **ENDINP**

End Input: Marks the end of the batch input stream.

### **SBMDBJOB**

Submit Database Jobs: Reads an input stream from a database file and places the jobs in the input stream on the appropriate job queues.

### **SBMDKTJOB**

Submit Diskette Jobs: Reads an input stream from diskette and places the jobs in the input stream on the appropriate job queues.

### **STRDBRDR**

Start Database Reader: Starts a reader to read an input stream from a database file and places the job in the input stream on the appropriate job queue.

### **STRDKTRDR**

Start Diskette Reader: Starts a reader to read an input stream from diskette and places the job in the input stream on the appropriate job queue.

## Job queues

A job queue is an ordered list of jobs waiting to be processed by a particular subsystem. Jobs will not be selected from a job queue by a subsystem unless the subsystem is active and the job queue is not held. You can use job queues to control the order in which jobs are run.

A base set of job queues is provided with your server. In addition, you may create additional job queues that you need.

For more information regarding job queues, select any of the following:

- "IBM-supplied job queues" on page 9
- "Using multiple job queues" on page 9
- "Using the WRKJOBQ command" on page 10

## IBM-supplied job queues

Several job queues are provided by IBM® when your server is shipped. IBM supplies job queues for each IBM-supplied subsystem.

**QCTL** Controlling subsystem queue

### **QBASE**

QBASE subsystem job queue

### **QBATCH**

Batch subsystem queue

### **QINTER**

Interactive subsystem queue

### **QPGMR**

Programmer subsystem queue

**QSPL** Spooling subsystem queue

### **QSYSSBSD**

QSYSSBSD subsystem job queue

### **QS36MRT**

QS36MRT job queue

### **QS36EVOKE**

QS36EVOKE job queue

**QFNC** Finance subsystem job queue

### **QSNADS**

QSNADS subsystem job queue

## Using multiple job queues

In many cases, using QBATCH as the only job queue with the default of one active job will be adequate for your needs. If this is not adequate, you may want to have multiple job queues so that some job queues are active during normal working hours, some are for special purposes, and some are active after normal working hours. For example, you can designate different job queues for:

- Long-running jobs so you can control how many jobs are active at the same time.

You may also want these jobs to use a lower priority than the other batch jobs.

- Overnight jobs that are inconvenient to run during normal working hours.

For example, to run a Reorganize Physical File Member (RGZPFM) command on a large database file requires an exclusive lock on the file. This means that other users cannot access the file while this operation is taking place. Additionally, this operation can take a long time. It would be more efficient to place this job on a job queue for jobs which run during off-shift hours.

- High-priority jobs.

You may want to have a job queue to which all high-priority work is sent. You can then ensure that this work is completed rapidly and is not delayed by lower-priority jobs.

- Jobs that are directed to particular resource requirement such as diskette or tape.

Such a job queue would need a MAXACT parameter of 1 in the job queue entry of the subsystem description so that only one job at a time uses the resource.

For example, if a tape is used for several jobs, all jobs using tape are placed on a single job queue. One job at a time are then selected from the job queue. This ensures that no two jobs compete for the same device at the same time. If this happens, one of the jobs would end with an allocation error.

**Note:** Tape output cannot be spooled.

- Programmer work.

You may want to have a job queue to handle programmer work or types of work that can be held while production work is being run.

- Sequential running of a series of jobs.

You may have an application in which one job is dependent on the completion of another job. If you place these jobs on a job queue that selects and runs one job at a time, this would ensure the running sequence of these jobs.

If a job requires exclusive control of a file, you may want to place it on a job queue when the queue is the only one active on the server, such as during the night or on a weekend.

If you use multiple job queues, you will find that control of the various job queues is a main consideration. You will typically want to control:

- How many job queues exist.
- How many job queues are active in a particular subsystem at the same time.
- How many active jobs can be selected from a particular job queue at a particular time.
- How many jobs can be active in a subsystem at a particular time.

## Using the WRKJOBQ command

Jobs already on the job queue can be controlled using the Work with Job Queue (WRKJOBQ) command.

The WRKJOBQ command lists either:

- All the job queues on the server
- All the jobs on a specific job queue

The ability to list all the job queues is important when you are not sure what job queue was used for a job. From the list of all job queues, you can look at each job queue to find the job. The display of a specific job queue provides a list of all the jobs on the queue in the order in which they will become active.

## Transferring jobs in a queue

If a job is on a job queue and is not yet active, you can change the job to a different job queue using the JOBQ parameter on the Change Job (CHGJOB) command.

If a job becomes active, it is possible to place it back on a job queue. See the Work Management topic in the iSeries Information Center for a discussion of the Transfer Job (TFRJOB) and Transfer Batch Job (TFRBCHJOB) commands.

Select “Job queue security” to learn more on authorization and security levels for your job queue.

## Job queue security

You can maintain a level of security with your job queue by authorizing only certain persons (user profiles) to that job queue. In general, there are three ways that a user can become authorized to control a job queue (for example, hold or release the job queue):

- User is assigned spool control authority (SPCAUT(\*SPLCTL)) in the user’s user profile.
- User is assigned job control authority (SPCAUT(\*JOBCTL)) in the user’s user profile and the job queue can be controlled by the operator (OPRCTL(\*YES)).
- User has the required object authority to the job queue. The required object authority is specified by the AUTCHK parameter on the CRTJOBQ command. A value of \*OWNER indicates that only the owner of the job queue is authorized via the object authority for the job queue. A value of \*DTAAUT indicates that users with \*CHANGE authority for the job queue are authorized to control the job queue.

**Note:** The specific authority required for \*DTAAUT are \*READ, \*ADD, and \*DLT data authority.



See the CL topic for more information about authority requirements for individual commands.

These three methods of authorization apply only to the job queue, not to the jobs on the job queue. The normal authority rules for controlling jobs apply whether the job is on a job queue or whether it is currently running. See the Work Management topic for details on the authority rules for jobs.

## Using an inline data file

An inline data file is a data file that is included as part of a batch job when the job is read by a reader or a submit jobs command. An inline data file is delimited in the job by a //DATA command at the start of the file and by an end-of-data delimiter at the end of the file. The end-of-data delimiter can be a user-defined character string or the default of //.

The // must appear in positions 1 and 2. If your data contains a // in positions 1 and 2, you should use a unique set of characters such as:

```
// *** END OF DATA
```

To specify this as a unique end-of-data delimiter, the ENDCHAR parameter on the //DATA command should be coded as:

```
ENDCHAR('// *** END OF DATA')
```

**Note:** Inline data files can be accessed only during the first routing step of a batch job. If a batch job contains a Transfer Job (TFRJOB), a Reroute Job (RRTJOB), or a Transfer Batch Job (TFRBCHJOB) command, the inline data files cannot be accessed in the new routing step.

An inline data file can be either named or unnamed. For an unnamed inline data file, either QINLINE is specified as the file name in the //DATA command or no name is specified. For a named inline data file, a file name is specified.

A named inline data file has the following characteristics:

- It has a unique name in a job; no other inline data file can have the same name.
- It can be used more than once in a job.
- Each time it is opened, it is positioned to the first record.

To use a named inline data file, you must either specify the file name in the program or use an override command to change the file name specified in the program to the name of the inline data file. The file must be opened for input only.

An unnamed inline data file has the following characteristics:

- Its name is QINLINE. (In a batch job, all unnamed inline data files are given the same name.)
- It can only be used once in a job.
- When more than one unnamed inline data file is included in a job, the files must be in the input stream in the same order as when the files are opened.

To use an unnamed inline data file, do one of the following:

- Specify QINLINE in the program.
- Use an override file command to change the file name specified in the program to QINLINE.

If your high-level language requires unique file names within one program, you can use QINLINE as a file name only once. If you need to use more than one unnamed inline data file, you can use an override file command in the program to specify QINLINE for additional unnamed inline data files.

**Note:** If you run commands conditionally and process more than one unnamed inline data file, the results cannot be predicted if the wrong unnamed inline data file is used.

“Open considerations for inline data files” provides more information about considerations that apply to opening inline data files.

## Open considerations for inline data files

The following considerations apply to opening inline data files:

- Record length specifies the length of the input records. (Record length is optional.) When the record length exceeds the length of the data, a message is sent to your program. The data is padded with blanks. When the record length is less than the data length, the records are truncated.
- When a file is specified in a program, the server searches for the file as a named inline data file before it searches for the file in a library. Therefore, if a named inline data file has the same name as a file that is not an inline data file, the inline data file is always used, even if the file name is qualified by a library name.
- Named inline data files *can* be shared between programs in the same job by specifying SHARE(\*YES) on a create file or override file command.

For example, if an override file command specifying a file named INPUT and SHARE(\*YES) is in a batch job with an inline data file named INPUT, any programs running in the job that specify the file name INPUT will share the same named inline data file.

Unnamed inline data files *cannot* be shared between programs in the same job.


- When you use inline data files, you should make sure the correct file type is specified on the //DATA command. For example, if the file is to be used as a source file, the file type on the //DATA command must be source.
- Inline data files must be opened for input only.

---

## Related information

Listed below are iSeries manuals and iSeries Information Center topics. You can view or print any of the PDFs.

The CL topic in the iSeries Information Center provides a description of the control language (CL) and its commands. Each command is defined including its syntax diagram, parameters, default values, and keywords.

Printer Device Programming  provides information about how to understand and control printing: printing elements and concepts, printer file support, print spooling support, printer connectivity, advanced function printing, and printing with personal computers.

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## Appendix. Notices

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