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Systems

OS/VS2 JCL

VS2 Release 3

IBM

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This is a major revision of, and obsoletes, GC28-0692-0 and Technical Newsletter GN28-2576. See the Summary of Amendments following the Contents. Changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

This edition applies to Release 3 of OS/VS2 and to all subsequent releases of OS/VS2 until otherwise indicated in new editions or Technical Newsletters. Changes are continually made to the information herein; before using this publication in connection with the operation of IBM systems, consult the latest **Virtual Storage Supplement to IBM System/360 and System/370 Bibliography**, GC20-0001, for the editions that are applicable and current.

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About This Book

This publication contains the information necessary to code job control language (JCL), job entry subsystem 2 (JES2) control statements, and job entry subsystem 3 (JES3) control statements. It is intended for use by programmers who code JCL, JES2, and JES3 control statements and who understand the concepts of job management and data management.

JES3 and Mass Storage System information contained in this publication is for planning purposes only until the availability of the products.

The book is divided into several chapters:

- The Introduction and the first seven chapters are a guide to using JCL, JES2, and JES3 control statements, written primarily for the inexperienced user of JCL. It contains background information necessary to understand why to code certain parameters, sample situations illustrating when to code these parameters, and descriptions of how to code combinations of parameters to perform particular functions. Examples of jobs involving a variety of parameters are included. The descriptions of JCL services are grouped into seven chapters: Requesting Resources and Identifying Data, Routing a Job Through the System (JES2 only), Obtaining Output (JES2 only), Routing a Job Through the System (JES3 only), Obtaining Output (JES3 only), Special Data Sets, and Cataloged and In-stream Procedures.
- The next four chapters describe the parameters, their syntax, and rules for coding. The descriptions include the format of each JCL, JES2, and JES3 control statement and the format of the parameters associated with each statement. Parameters for the control statements are presented in alphabetical order giving a brief definition and a reference to the appropriate publication or section for a detailed explanation of the facility or service to be used. The definition and reference are followed by a default, rules for coding, and at least one example of how to code the control statement or parameter. The descriptions are grouped into four chapters: Programming Notes, JCL statements, JES2 statements, and JES3 statements.
- The last three sections contain reference tables, the glossary, and the index for quick retrieval of information.

JCL Statements no Longer Supported or Supported Differently

A few parameters introduced in OS are no longer supported in VS2 Release 3. Main storage heirarchy support and the rollout/rollin features are not available in VS. The system will check the HIERARCHY and ROLL parameters only for correct syntax.

The SEP and AFF parameters and the VOL=(,RETAIN) and UNIT=SEP subparameters have no meaning in VS2. If they are coded, they are ignored. If JES2 is used, PRTY is ignored.

JCL DD parameters supported differently are SPLIT and SUBALLOC. Their values are internally converted to SPACE requests. The REGION parameter on the JOB and EXEC statement has a new meaning. In virtual storage requests, REGION can be coded to act as an upper limit for variable-length GETMAIN requests.

JCL Statements New to VS2 Release 3

The following parameters are new for VS2 Release 3: DSID identifies data sets on a 3540 diskette; MSVGP defines groups of mass storage volumes; JOBPARM SYSAFF indicates the systems eligible to process a given job (for JES2); TYPRUN=COPY specifies that the input deck is converted directly to a SYSOUT data set and scheduled for output processing, bypassing job initiation; the PRTY parameter specifies the job's initial priority within its job class (for JES3), and the CHKPT parameter specifies that checkpoints are to be taken for the data set.

The book assumes the reader has a basic knowledge of computer operating systems and some familiarity with job control language. Background information on VS2 is included in the **OS/VS2 Planning Guide for Release 2**, GC28-0667.

Prerequisite Publications

Introduction to Virtual Storage in System/370, GR20-4260.
Introduction to OS/VS2 Release 2, GC28-0661.

Publications to which the text refers:

Data Processing Glossary, GC20-1699.

OS/VS2 Planning Guide for Release 2, GC28-0667.

OS/VS Checkpoint/Restart, GC26-3784.

OS/VS2 System Programming Library: Data Management, GC26-3830.

OS/VS2 System Programming Library: Debugging Handbook, GC28-0632.

OS/VS2 System Programming Library: Job Management, GC28-0627.

OS/VS2 Supervisor Services and Macro Instructions, GC28-0683.

OS/VS Tape Labels, GC26-3795.

OS/VS Data Management Macro Instructions, GC26-3793.

Operator's Library: OS/VS2 Reference (JES2), GC38-0210.

OS/VS2 System Programming Library: Initialization and Tuning Guide, GC28-0681.

OS/VS Data Management Services Guide, GC26-3783.

OS/VS2 Access Method Services, GC26-3841.

OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide, GC26-3838.

OS/VS Utilities, GC35-0005.

OS/VS System Management Facilities (SMF), GC35-0004.

OS Programming Support for the IBM 3505 Card Reader and IBM 3525 Card Punch, GC21-5097.

OS/VS2 Using OS Catalog Management with the Master Catalog: CVOL Processor, GC35-0010.

OS/VS2 TCAM Programmer's Guide, GC30-2041.

OS/VS BTAM, GC27-6980.

Graphic Programming Services for 2250, GC27-6971.

Graphic Programming Services for 2260, GC27-6972.

IBM 3340 Fixed Head Feature Users Guide, GA26-1632.

OS/VS Mass Storage System (MSS) Services for Space Management, GC35-0012.

OS/VS2 System Programming Library: System Generation Reference, GC26-3792.

OS/VS2 System Programming Library: Service Aids, GC28-0674.

OS/VS2 IBM 3540 Programmer's Reference, GC24-5111.

OS/VS2 TSO Command Language Reference, GC28-0646.

Contents

Figures

Summary of Amendments for GC28-0692-1 OS/VS2 Release 3

JES3 (for planning purposes only)

Includes all JCL related information and parameters for JES3.

AMP and DCB Parameters

DCB rewritten; AMP and DCB relocated in alphabetical order in the DD statements.

Allocation

Additional information on device status affecting eligibility for allocation; additions to specific volume and unit requests; additions to unit affinity; additions to UNIT and VOLUME parameters.

Space Requests

Additional information in requesting space and in the SPACE parameter.

Restart

Checkpoint data sets must have UNIT and VOLUME specified even if cataloged.

Label

Additions to label type subparameter and creating a model data set label for generation data groups.

Job Initiation Priority

JES3 supports the PRTY parameter on the JOB statement.

Testing JCL without Execution

PGM=JCLTEST, in addition to TYPRUN=SCAN, tests JCL syntax.

Dynamic Allocation

Additional rules for coding the DYNAM parameter.

Comment Statement

Clarification of continuing the comments statement.

Device Sharability

Describes what device types are sharable between jobs, including the 3340 fixed head feature drive.

JES2 JOBPARM Statement

SYSAFF is a new parameter that indicates the systems eligible to process a given job (for JES2).

DEST Parameter

The DEST parameter value is clarified for JES2 and non-JES2 users.

Reference Tables

The tables are updated to reflect the Release 3 changes.

Miscellaneous

The SPACE, UNIT, and VOLUME parameters are some of the parameters clarified in this release.

Unit Affinity

Data sets requesting unit affinity can be overridden in certain circumstances.

Mass Storage System (MSS) (for planning purposes only)

Mass storage volumes are virtual direct access devices defined in groups of volumes by the MSVGP parameter.

Associated Data Sets

These are data sets on a 3540 diskette and are identified by the DSID parameter.

TYPRUN=COPY

The input deck is converted directly to a SYSOUT data set and scheduled for output processing, bypassing job initiation.

VIO Data Sets

When allocating VIO data sets by average block length, the secondary request is determined by the average block length specified in the SPACE parameter.

TIME=0

On the JOB statement: no CPU time limit is assigned. On the EXEC statement: the remaining time from the previous step is used.

DD * and DD DATA

New keywords are allowed on these two statements.

Summary of Amendments for GC28-0692-0 as Updated by GN28-2576 OS/VS2 Release 2

Region size requirements

There is a minimum region size associated with requests for ADDRSPC=REAL.

Directory space for partitioned data sets

The directory is included in the beginning of the primary space.

Deferred restarting of a job

You must specify UNIT and VOLUME information even if the checkpoint data set is cataloged.

Testing of cataloged procedures

You should test catalog procedures without overrides before placing them in a procedure library.

SYSCHK facility on the DD statement

If a checkpoint data set is cataloged, you must always code the DSNAME, DISP, UNIT, and VOLUME parameters.

SPACE parameter on the DD statement

Delete the second sentence on page 175 of "primary quantity."

Disposition processing of unretrieved passed data sets

If a job step abnormally terminates, unretrieved data sets that specified a conditional disposition when passed are processed as specified in their conditional disposition unless this disposition requires an update to a user catalog.

Summary of Amendments for GC28-0692 OS/VS2 Release 2

Dynamic allocation and deallocation

Dynamic allocation and deallocation allows you to request resources as you need them.

Job priority

JES2 schedules jobs, assigns requested resources, and selects jobs for execution according to priority. PRTY is not supported for JES2; priority has nothing to do with the actual execution.

Performance

By making performance group associations between your job and a system defined performance group number, you influence your job's execution.

Obtaining output

JES2 handles output processing.

Virtual input/output (VIO)

Virtual input/output (VIO) is a new method for handling temporary data sets.

DCB parameter

FRID and DEN=4 are additional subparameters for the DCB parameter. All the access methods are updated to reflect VS2 Release 2 information.

Virtual Storage Access Method (VSAM)

VSAM is a new high-performance access method of OS/VS for use with direct-access storage. The AMP parameter replaces the DCB parameter for describing VSAM data sets.

Restarting a job

The discussion on restarting a job has been condensed.

Requesting space for a group of data sets

The two parameters, SPLIT and SUBALLOC, are no longer supported.

Dedicated data sets

Dedicated data sets are no longer supported. VIO is used to handle temporary data sets.

Channel separation

SEP and AFF parameters are no longer supported.

Statement	Parameter	Change	
JOB	accounting information field	○	In addition to standard OS usage, this field can be used for JES2 parameters.
	ADDRSPC	•	Assigns pageable or nonpageable storage space, and defaults for pageable storage.
	CLASS	○	(A-Z, 0-9). The job entry subsystem enqueues the job on the associated class queue.
	PERFORM	○	Associates jobs with performance group definitions.
	PRTY	⦿	This parameter is ignored when JES2 is used. Priority values, can be specified on a subsystem control card. PRTY specifies a job's initiation priority within its job class when JES3 is used.
	REGION	○	Limits the size of variable GETMAIN requests.
	ROLL	•	This parameter is ignored.
	TYPRUN	○	If TYPRUN=SCAN, the JCL is converted but does not execute.
		⦿	If TYPRUN=COPY, the input deck is copied to SYSOUT.
EXEC	ADDRSPC	•	Assigns pageable or nonpageable storage space, and defaults for pageable storage.
	DPRTY	○	The default is the value of the APG priority.
	DYNAMNBR	○	Limits the number of data sets that a job step may hold for reuse.
	PERFORM	○	Associates job steps with performance group definitions.
	REGION	○	Limits the size of variable GETMAIN requests.
	ROLL	•	This parameter is ignored; the job is not failed.
DD	AFF	○	This parameter is ignored; the job is not failed.
	AMP	○	Completes information in an access method control block (ACB) for the virtual storage access method (VSAM) data sets.
	CHKPT	⦿	Checkpoints are taken for the data set.
	COPIES	○	Specifies multiple copies of an output data set.
	DCB	○	DEN=4 subparameter indicates 6250 bits-per-inch for 9-track tape.
		○	FRID subparameter specifies the SYS1.IMAGELIB member to be used to interpret documents read by a 3886 OCR device.
		•	HIARCHY subparameter is ignored; the job is not failed.
	DEST	○	Allows you to route output to specified destinations.
	DSID	⦿	Identifies a data set on a 3540 diskette.
	DYNAM	○	Total is added to DYNAMNBR value, if any.
	FREE	○	Indicates when a data set is to be deallocated.
	JOBCAT	○	Defines a private user catalog.
	MVSGP	⦿	Identifies a group of mass storage volumes on a mass storage system (MSS) device.
	OUTLIM	○	With SYSOUT=, this parameter will specify the maximum number of logical records (for example, print lines) that may be written into this SYSOUT data set. An SMF exit routine is entered when this number is exceeded.
	RETAIN	○	This parameter is ignored; the job is not failed.
	SEP	○	This parameter is ignored; the job is not failed.
	SPACE	○	Has a new default value for VIO data sets.
	SPLIT	○	Converted to an equivalent SPACE parameter.
	STEPCAT	○	Defines a private VSAM user catalog.
	SUBALLOC	○	Converted to an equivalent SPACE parameter.
	SYSOUT=(c,p,f)	○	c – (A-Z, 0-9) (* is valid in JES2 only.) This output class designation is used to queue the associated output. Data is dequeued in much the same manner as the MVT output writer. p – (p=INTRDR). This data set is sent directly to input service for processing as an input job stream. p – (p ≠ INTRDR). This data set is enqueued separately for the named writer. f – Data is enqueued separately with this alphameric forms designation.
	UNIT	○	The SEP subparameter is ignored, the job is not failed.
	VOLUME	○	The RETAIN subparameter is ignored; the job is not failed.

• New or changed from MVT

○ New or changed from MVT and VS2 Release 1

⦿ New or changed from VS2 Release 2

Figure 1. New and Changed JCL Parameters

You can write programs in any one of a number of languages. The operating system will translate the language into machine language so that the instructions can be executed and the work performed. There is also a language, called **job control language** (JCL), that directs the operating system in the handling of application programs. When submitting programs to the operating system, you can provide JCL statements to define the work to be done, the methods to be used, and the resources needed. In addition, you can obtain special input and output processing by including JES2 and JES3 control statements for the job entry subsystems. A collection of related problem programs is submitted to the operating system as a **job**. A job is made up of one or more **job steps**, each of which is a unit of work associated with the overall processing program.

The JCL Statements

Job control language consists of nine statements. The name and purpose of each statement is summarized in Figure 2.

Every job requires the use of the JOB statement (to identify the job), EXEC statements (to identify each job step), and DD statements (to identify data sets used by the job). The null statement is optional. Placing it within the job causes JCL statements other than the JOB statement behind the null statement to be ignored. JES2 ignores the null statement. The delimiter statement can be used to indicate the end of data in the input stream. PROC and PEND statements are used to define a set of JCL statements to be used as an in-stream procedure. The command statement allows operator commands to be submitted through the input stream; this statement is used primarily by the operator. The comment statement can be used to make the programs readily understandable by other programmers and by yourself.

Name of Statement	Purpose
// JOB (job)	marks the beginning of a job; assigns a name to the job.
// EXEC (execute)	marks the beginning of a job step; identifies the programs to be executed or the cataloged or in-stream procedure to be called; assigns a name to the step.
// DD (data definition)	identifies a data set and describes its attributes.
/* (or two characters designated by the user to indicate delimiter)	indicates the end of data placed in the input stream.
// (null)	marks the end of a job.
// PROC (procedure)	for cataloged procedures, assigns default values to parameters defined in the procedure; for in-stream procedures, marks the beginning of the procedure.
// PEND (procedure end)	marks the end of in-stream procedure.
//* (comment)	contains comments.
// (command)	enters system operator commands through the input stream.

Figure 2. Job Control Statements

In addition to identifying data sets, job steps, and the job, you can code parameters on JCL statements to request resources and services from the operating system. The operating system is responsible for managing all the resources of the computing system. It automatically performs many services in processing jobs; however, you can influence the processing of a job by including JCL parameters. For example, JES2 selects a job for execution, but you can influence when the job is selected or delay its selection by coding parameters on the JOB statement (or on the MAIN statement for JES3 processed jobs). You can also ask for a specific volume on which to write a data set. The following paragraphs describe some of the functions that are available on the major JCL statements:

JOB statement: By using the parameters allowed on the JOB statement, you can provide accounting information for the installation's accounting routines, define execution characteristics, specify conditions for early termination of the job, request a specific class for job scheduler messages, hold a job for later execution, and limit the maximum amount of time the job can use the central processing unit (CPU).

EXEC statement: Parameters on the EXEC statement can define the program that the system is to execute. They can also be used to provide job step accounting information, to give conditions for bypassing or executing a job step, to assign a limit on the CPU time used by a job step, and to pass information to a processing program such as the linkage editor.

DD statement: Parameters on the DD statement provide the system with such information as the name of the data set, the name of the volume on which it resides, the type of I/O device that holds the data set, the format of the records in the data set, whether a data set is old or new, the size of newly created data sets, and the access method that will be used to create or refer to the data.

The JES2 Statements

You can control the input, output, and processing of a program by coding JES2 control statements and placing them in the input stream. There are seven JES2 statements that can be used with JCL to direct the execution of the program. Figure 3 shows the name and purpose of each statement.

Name of Statement	Purpose
/*$command	enters JES2 operator commands through the input stream.
/*JOBPARM	indicates job related parameters that can be specified at input time.
/*MESSAGE	sends messages to the operator via the operator console.
/*OUTPUT	specifies characteristics and options of a specific SYSOUT data set or groups of SYSOUT data sets.
/*PRIORITY	assigns a job selection priority.
/*ROUTE	specifies the default output destination.
/*SETUP	indicates volumes needed for executing your job.

Figure 3. JES2 Control Statements

Use JES2 control statements to request more efficient use of resources. Three of these statements contain specific functions that are discussed below.

JOBPARM statement: Parameters on the JOBPARM statement specify the estimated number of cards to be produced as output from a job, the number of copies of printed output desired, the default print or punch forms, the number of output lines on each page, the estimated total number of output lines from the job, your room number, any system affinity that may be required, the estimated job execution time, the printing of the JES2 job log, and the name of the cataloged procedure library to be used to convert the JCL for the job.

OUTPUT statement: Parameters on the OUTPUT statement specify the number of copies of each data set that is desired, the destination device of the output, any special forms required, the indexing print position offset and forms control buffer image (FCB) (3211 only), and the use of the universal character set (UCS).

ROUTE statement: Parameters on the ROUTE statement route the printed or punched output to any local device, remote terminal, or remote device.

The JES3 Statements

You can also control the input, output, and processing of a program by coding JES3 control statements and placing them in the input stream. There are eight JES3 statements that can be used with JCL to direct the execution of a program. Figure 4 shows the name and purpose of each statement.

Name of Statement	Purpose
//**command	enters JES3 operator commands, except *DUMP and *RETURN, through the input stream.
//*DATASET	permits additional input data sets from the input stream.
//*ENDDATASET	terminates the creation of an input data set.
//*FORMAT	specifies special destination and format related instructions for a specific SYSOUT or JES3-managed print and punch data set.
//*MAIN	defines selected processing parameters for the current job.
//*NET	identifies relationships between predecessor and successor jobs in a dependent job control net.
//*OPERATOR	transmits messages to the operator.
//**PAUSE	halts the input reader.

Figure 4. JES3 Control Statements

Several of the JES3 statements contain keyword parameters that define options available to help improve the processing of the job. Two of these statements are briefly defined here.

FORMAT statement: Parameters on the FORMAT statement differ according to the type of request you are making. For print and punch data sets, keyword parameters specify such options as output destination, number of output copies, and types of output forms. For JES3 created data sets (AC) under MVT or VS2 Release 1, keyword parameters specify options for TSO users or local users wishing to route data sets to TSO users on MVT or VS2/1 ASP main processors. For network job processing data sets (NJP), keyword parameters specify the JES3 system name from which and to which the job will be transmitted.

MAIN statement: Parameters on the MAIN statement specify such options as the main processor name or type of system to be used for the job, the type of control program to be used, the estimated number of cards or lines of output, the job class for the job, and the time that the job is due to be completed.

Nonstandard job processong. A job, in addition to being a collection of related problem programs identified by a JOB statement, is also a collection of JES3 processing segments, called job segments. A job that consists only of a collection of releated problem programs to be processed by VS2 and that requires no special job segments is called a standard job. A non-standard job requires one or more special job segments in place of or in addition to the standard job segments of interpreter service, main service, and output service. Specify a nonstandard job by following the JOB statement with a JES3 PROCESS statement for each job segment. The ENDPROCESS statement ends the definition of the job segments for the job. How to code these statements and the use of nonstandard jobs is explained in **OS/VS2 System Programming Library: Job Management**, GC28-0627.

Cataloged and In-Stream Procedures

Often the same set of JCL statements are used repeatedly with little or no change (for example, to specify compilation, link-editing, and execution of programs). To save programming time and to reduce the possibility of error, standard job step definitions can be prepared and placed (or cataloged) in a partitioned data set known as the procedure library. A set of JCL statements placed in the procedure library is called a cataloged procedure. A cataloged procedure consists of EXEC and DD statements.

By simply using a JOB statement and an EXEC statement, you can retrieve a specific cataloged procedure. Specify the name of the procedure on the EXEC statement.

The effect is the same as if the JCL statements of the cataloged procedure appeared in the input stream in the place of the EXEC statement that calls the procedure. If necessary, you can modify the cataloged procedure by a process known as overriding.

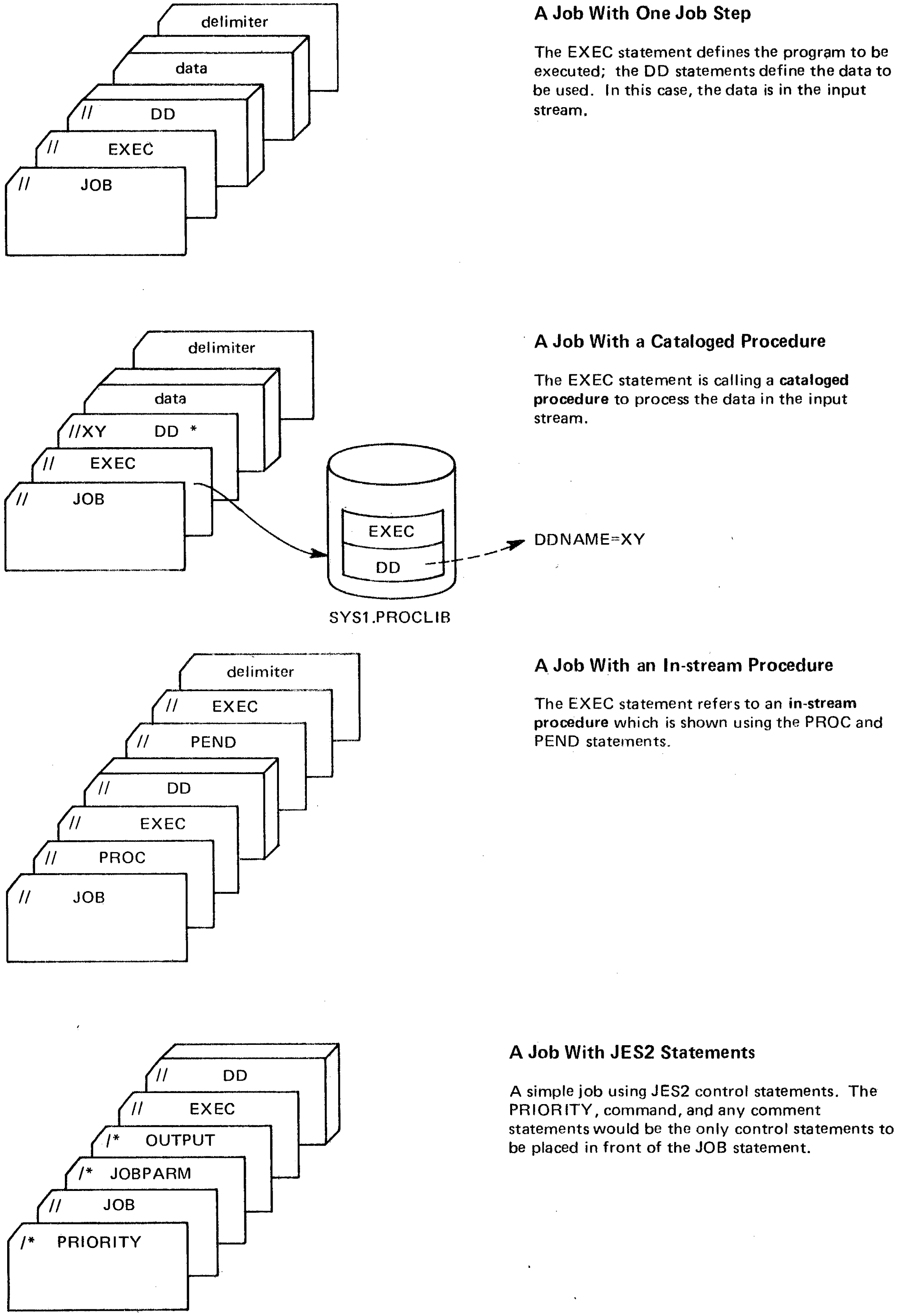
Before putting a procedure into the procedure library, you may want to test it. This can be done by converting the procedure to an in-stream procedure. An in-stream procedure is a set of JCL statements that can be used repeatedly by referencing it in an EXEC statement. Another advantage of in-stream procedures is that they can give you the facility of a cataloged procedure without being placed in the procedure library. After testing the procedure, keep it in card form and simply insert it in the input stream whenever you want to use it.

Processing Your Job

To have a job processed, submit the JCL statements and any related input data to the operating system through an input/output (I/O) device chosen by the operator. The input unit can be a card reader, a magnetic tape, a terminal, or a direct access device. The sequence of JCL statements and input data for all the jobs being submitted through an input unit is called the input stream.

A job control language (JCL) statement consists of one or more 80-byte records. Many jobs are submitted to the operating system for execution in the form of 80-column punched cards. The operating system is able to distinguish a job control statement from data included in the input stream. In columns 1 and 2 of all the statements except the delimiter statement, code //. For the delimiter statement, code /*. For a comment statement, code //* in the first three columns.

A job can be simple or complicated; you can have a procedure in the input stream or call a cataloged procedure. Figure 5 shows some examples of what jobs can look like. Although only one example shows the use of the JES2 statements, these statements could have been placed with all of the jobs. (JES3 statements can also be used with any of the jobs and are placed after the JOB statement.)



A Job With One Job Step

The EXEC statement defines the program to be executed; the DD statements define the data to be used. In this case, the data is in the input stream.

A Job With a Cataloged Procedure

The EXEC statement is calling a **cataloged procedure** to process the data in the input stream.

A Job With an In-stream Procedure

The EXEC statement refers to an **in-stream procedure** which is shown using the PROC and PEND statements.

A Job With JES2 Statements

A simple job using JES2 control statements. The PRIORITY, command, and any comment statements would be the only control statements to be placed in front of the JOB statement.

Figure 5. A Job in the Input Stream

Figure 6 shows a job that contains several job steps: a compilation, a link-edit, and a program.

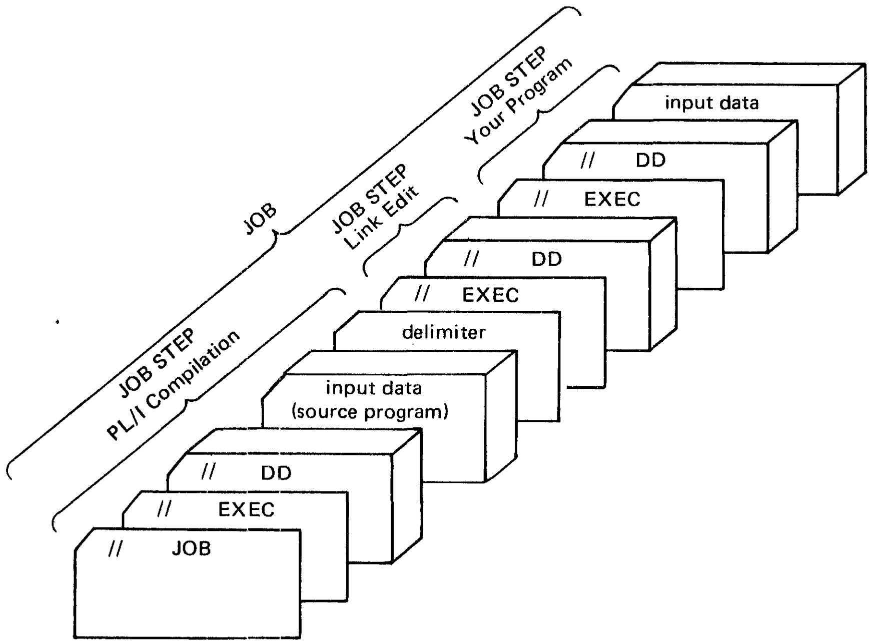


Figure 6. A Job with Several Job Steps

Figure 7 shows how several jobs run one after another through the input stream. Your job would be one job in a group of jobs that make up an input stream.

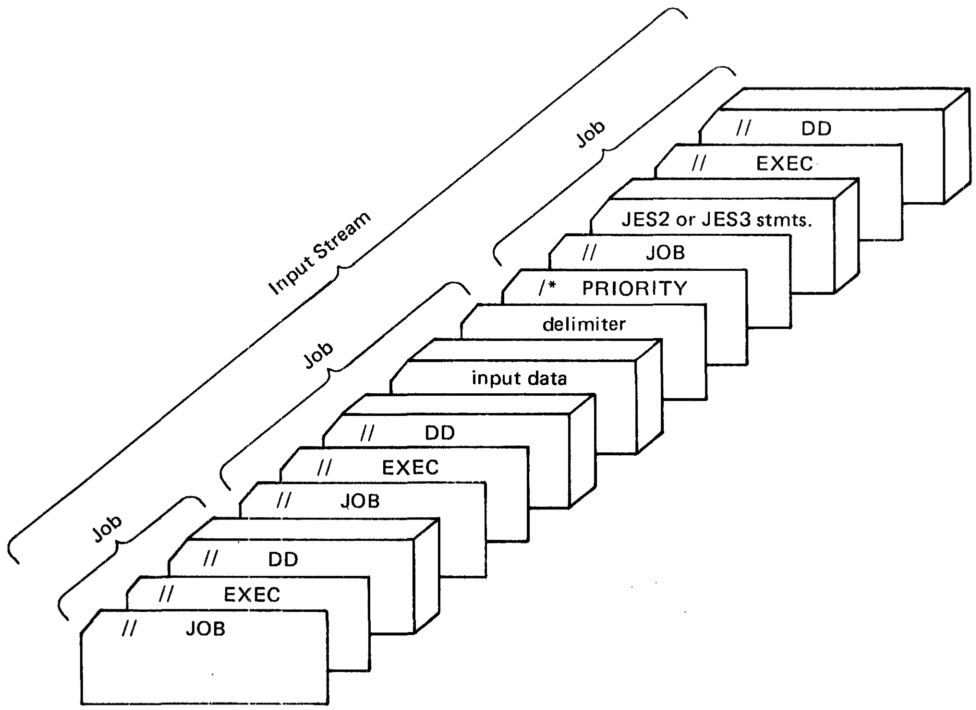


Figure 7. Job Boundaries in the Input Stream

Requesting Resources and Identifying Data

To execute a program, define its requirements for resources and data. For example, if the job is to use only real storage, that is, it cannot be paged, you must indicate this on a JCL statement. You can also request certain units and volumes to be used and define the amount of space required by the job. If you request dynamic allocation, you are requesting resources during program execution as they are needed.

Define temporary or nontemporary data sets or request the use of a nontemporary data set that is cataloged. Whether a data set is old or new, should be kept or deleted, are a few of the options you can define in establishing the disposition of data sets in the job.

This section contains six topics:

- Requesting Storage for Execution of a Program
- Requesting Units and Volumes
- Requesting Space for Non-VSAM Data Sets
- Dynamically Allocating and Deallocating Data Sets
- Identifying Data Sets to the System
- Disposition Processing of Non-VSAM Data Sets

Requesting Storage for Execution of a Program

In OS/VS, storage available for a program consists of real storage and virtual storage:

- **Real storage** is the storage of System/370 from which the central processing unit can directly obtain instructions and data and to which it can directly return results.
- **Virtual storage** is addressable space that appears to the user as real storage, from which instructions and data are mapped into real storage locations. The user address space is 16 million bytes which consists of the commonly addressable system storage, the nucleus, and the private address space (which includes the user's region).

When a program is selected, it is brought into virtual storage and divided into pages (a page is 4K in VS2). The supervisor is responsible for transferring pages of a program into real storage for execution. This paging is done automatically by the supervisor; to you, it appears as if the entire program exists in real storage. (The concept of paging is described in greater detail in the **Introduction to Virtual Storage in System/370**, GR20-4260.)

When to Request Real Storage

For most programs, the supervisor transfers pages of a program to real storage as they are required for execution; not all pages of a program are necessarily in real storage at one time and the pages that are in real storage at once do not necessarily occupy contiguous space. Certain programs, however, must have all their pages in contiguous real storage while they are executing—they cannot be paged **during** execution. The programs include:

- Programs that modify a channel program while it is active.
- Programs that are highly time dependent.

These programs must be placed into an area of virtual storage called the nonpageable dynamic area, whose virtual addresses are identical to real addresses; they are the only programs for which you should request **real** storage. If a job or job step must not be paged during execution, identify it by coding ADDRSPC=REAL on either the JOB or the EXEC statements. Request the amount of real storage needed with the REGION parameter. For more information concerning real and virtual storage, see the **Introduction to OS/VS2 Release 2**, GC28-0661.

Specifying Storage Requirements with the REGION Parameter

The meaning of the REGION parameter differs depending on whether the program can be paged during execution (if ADDRSPC=VIRT is coded or implied) or cannot be paged during execution (if ADDRSPC=REAL is coded).

When ADDRSPC=VIRT is coded or implied, a region value is established internally from either the REGION parameter or an installation-supplied default. The internal value is used to limit variable-length GETMAINs.

When you code ADDRSPC=REAL and the REGION parameter, the amount of space requested is allocated to the program from the address space—the request is actually a request for real storage. If you are requesting space in real storage, the amount of space requested must include any additional requests the program makes during its execution (for example, a request made with the GETMAIN macro instruction). Also, the amount of real storage requested must include sufficient space for the task termination function. Task termination invokes certain system resource managers that can issue GETMAIN macro instructions for space in the user's region. The region must have enough deallocated storage during task termination to allow the task termination function to complete. The minimum request for real storage must be 8K if the program to be executed is reenterable and resides in an authorized library, and 12K in all other cases. Note that this is the minimum region for successful execution, but not necessarily the minimum region size for successful job completion. It is suggested that programs to be run in an ADDRSPC=REAL environment perform as much clean-up as possible before terminating.

Example of Requesting Storage

The purpose of this job is to indicate how to request storage for a program when it is important that it not be paged.

```
//OBJ        JOB     BROWN,CLASS=D,MSGLEVEL=1
//STEP1      EXEC    PGM=REAL,REGION=20K,ADDRSPC=REAL
//DD1        DD      DSN=DISK1,DISP=OLD
//STEP2      EXEC    PGM=VIRT,REGION=75K,ADDRSPC=VIRT
//DD2        DD      DSN=DISK2,DISP=OLD
```

1. The JOB statement assigns jobs to class D and requests all JCL statements and messages to be printed.
2. STEP1 is to be executed in real storage.
3. STEP2 is to be executed in virtual storage.

Requesting Units and Volumes

On the DD statement defining a data set, indicate the device and volume on which the data set can be found or will be written by specifying unit and volume information. Input/output devices are grouped according to class; a device class is a kind of device: direct access, magnetic tape, unit record, graphic, and communications equipment. A **unit** is a particular device: a 2314 direct access device, a 1403 printer, etc.; a **volume** is a section of auxiliary storage that is serviced by a single read/write mechanism—for example, a reel of magnetic tape, a drum, or a disk pack.

Device status can affect the device eligibility for allocation. Figure 8 shows the various devices and the possible status each may have.

Status	Device Type				
	Direct Access	Tape	Unit Record	Graphic	Teleprocessing
Online	Eligible for allocation				
Offline	Eligible for allocation when the operator brings device online				Eligible for allocation
Pending Unload	Eligible for allocation when volume is specifically requested		not applicable		
Pending Offline	Eligible for allocation when the operator brings the device online and when the volume is specifically requested		Eligible for allocation when the operator brings the device online		not applicable

Figure 8. How Device Status Affects Eligibility for Allocation

Specifying Volume Information

Data sets exist on direct access and magnetic tape volumes which must be mounted on devices before they can be used. To inform the system on which volume an existing data set can be found, make a specific volume request; to create a new data set, make a specific or nonspecific volume request. If you request multiple disk volumes to be mounted in JES3, they must all be either mountable or permanently resident; a mixture of both is not allowed.

Specific Volume Requests

A **specific volume request** informs the system of the volume serial number of the volume required. Make a specific volume request for an existing data set; make either a **specific** or **nonspecific** volume request when creating a data set.

A specific request occurs when:

- Specifying the serial numbers in the SER subparameter of the VOLUME parameter, that is, VOL=SER=(948762,945231).
- Refering the system to an earlier specific volume request to copy the volume serial numbers by coding the name of a passed or cataloged data set or a previous DD statement in the REF subparameter of the VOLUME parameter. To refer the system to a passed or cataloged data set, code VOL=REF=dsname. To refer to a DD statement in the same step, code VOL=REF=*.ddname; in a preceding step, VOL=REF=*.stepname.ddname; or in a procedure step that is in a procedure called by a preceding step, VOL=REF=*.stepname.procstepname.ddname. (If you refer to a multi-device type VSAM data set, only the volume serial number of the first device type listed in the catalog will be used.)
- Passing the data set from an earlier step or from the catalog. The system obtains the volume serial numbers from the passed data set information or from the catalog; you need not code the VOLUME parameter unless requesting a private volume, coding a volume sequence number, or requesting additional volumes. If a cataloged data set is cataloged in, or is to be cataloged or uncataloged from, a private catalog other than JOBCAT and STEPCAT, then the system automatically allocates that private catalog to the job step. (The private catalog must be on a permanently resident volume in JES3). If this allocation is not successful, then the job fails.

Nonspecific Volume Requests

Nonspecific volume requests can be made only for new data sets. When making a nonspecific volume request, do not specify volume serial numbers. You need not code the VOLUME parameter unless you are requesting a private volume or a volume count.

There are four types of nonspecific volume requests that can be made:

1. A private volume for a temporary data set.
2. A private volume for a nontemporary data set.
3. A nonprivate volume for a temporary data set.
4. A nonprivate volume for a nontemporary data set.

How the system satisfies these different types of requests are described below. Since the system satisfies the first two types of requests in the same way, these two requests are described together.

- When making a nonspecific volume request for a private **direct access or tape** volume, the system always requests the operator to mount a volume. The operator should mount a volume whose space is unused. This allows you to have control over all space on the volume. Once mounted, the volume is assigned the use attribute of private.
- When making a nonspecific volume request for a nonprivate **direct access** volume that is to contain a temporary data set, the system assigns a public or storage volume that is already mounted, or requests the operator to mount a removable volume. If a mounted volume is selected, its use attribute is not affected. If a removable volume is mounted, it is assigned the use attribute of public.

  When making a nonspecific volume request for a nonprivate **tape** volume that is to contain a temporary data set, the system assigns a public volume that is already mounted, or it requests the operator to mount a tape volume. Once mounted, the volume is assigned the use attribute of public.
- When making a nonspecific volume request for a nonprivate **direct access** volume that is to contain a nontemporary data set, the system assigns a storage volume if one is mounted. Otherwise, the request is treated as a nonspecific volume request for a private volume.

  When making a nonspecific volume request for a nonprivate **tape** volume that is to contain a nontemporary data set, the request is treated as a nonspecific volume request for a private volume.

Using Private Volumes

A **private volume** is one that can be used exclusively unless a specific request is made for that volume. Code PRIVATE as the first subparameter in the VOLUME parameter with both specific and nonspecific volume requests. When making a specific volume request for a direct access volume, code PRIVATE if you want a private volume; tape volumes for which you make a specific volume request are automatically made private, so you need not code the PRIVATE subparameter.

A volume already made private cannot be allocated to satisfy other nonspecific volume requests. Therefore, if you request a private volume, you will be the only user using that volume, unless another job makes a specific volume request for that volume.

Sharing Volumes Between Data Sets

To conserve space and use fewer volumes, request that data sets be assigned the same volume. Data sets on the same volume have **volume affinity.**

You can request volume affinity either:

- Implicitly, by specifying the same volume serial numbers for the data sets in the SER subparameter of the VOLUME parameter.
- Explicitly, by using the REF subparameter of the VOLUME parameter to indicate that volumes identified in the catalog or on an earlier DD statement in the job are to be assigned to the data set being defined.

Volume affinity influences the allocation of devices. The system can modify a request for a specific number of units if a data set has volume affinity with at least one other data set. For examples of volume affinity, see the end of this chapter.

Multivolume Data Sets

If you are creating or extending a data set that can require more than one volume, request the maximum number of volumes that can be required in the **volume count** subparameter of the VOLUME parameter. The maximum number of volumes you can request is 255. For some jobs, each volume requested must be mounted on a unit before it can be used. For these jobs, request as many units as volumes. When making a specific volume request for more volumes than units, the system automatically indicates that the volumes on the same unit cannot be shared.

When reading or lengthening an existing multivolume data set, instruct the system to begin processing other than the first volume by coding the volume sequence number subparameter. Usually a volume sequence number is coded when you are defining an existing cataloged or passed data set.

Specifying Unit Information

Provide the system with the information it needs to assign a device to a data set in the UNIT parameter. To indicate what unit or type of unit you want, code one of the following:

- Unit address.
- Device type (generic name).
- User-assigned group name (esoteric name).

The **unit address** is a 3-character address made up of the channel, control unit, and unit number. For example, UNIT=180 indicates channel 1, control unit 8, and unit number 0. Specifying a unit address, however, limits unit assignment: the system can assign only that specific unit, and, if the unit is being used, the job must be delayed or canceled. Unit addresses should only be specified when necessary since these specifications restrict the system.

A **device type** corresponds to a particular set of features of input/output devices. When coding a device type, allow the system to assign any available device of that device type. For example, UNIT=2314 indicates that you want the system to assign an available 2314 disk storage facility.

Each installation can also define **user-assigned group names** during system generation to signify a group of devices that may or may not all be of the same type. When coding a user-assigned group name, allow the system to assign any available device included in the group. For example, if the group named DISK includes all 2314 and 3330 disk storage facilities and you code UNIT=DISK), the system assigns an available 2314 or 3330 device. If the group named 2314A includes particular 2314's and you code UNIT=2314A, it could refer to one of several groups of 2314 devices.

If a group contains more than one device type or class (for example, SYSSQ can refer to all tape and direct access devices), you should not code the group name when defining an existing data set or requesting a specific volume. The volume on which the data set resides may require a device different from the one assigned to it. For example, if the data set resides on a tape volume, it must be assigned to a tape device.

The same is true if the data set resides on a 3348 Model 70F Data Module and the group name includes 3340 drives with and without the Fixed Head Feature. The 3348 Model 70F must be assigned to a 3340 with the feature. For more information on the Fixed Head Feature, see the **IBM 3340 Fixed Head Feature Users Guide**, GA26-1632.

Only direct access devices can be simultaneously allocated for two or more jobs. Teleprocessing equipment is not allowed to be allocated more than once in the same job step. If a unit record, teleprocessing equipment, or graphics device is designated as a console, it is not eligible for allocation by a job.

Requesting More than One Unit

To increase operating efficiency, request multiple units for a multivolume data set or for a data set that may require additional volumes. When each required volume is mounted on a separate device, execution of the job step is not interrupted to allow the operator to demount and mount volumes. You should always request multiple units when the data set can be extended to a new volume if the data set resides on a permanently resident or reserved volume—permanently resident and reserved volumes cannot be demounted in order to mount a new volume.

You request multiple units by:

- Coding the unit count subparameter in the UNIT parameter.
- Requesting parallel mounting.

Request **parrallel mounting** when making a specific or non-specific volume request. The system counts the number of volumes requested (by counting the volume serial numbers specified on the DD statement or counting the volume serial numbers in cataloged or passed data sets). This is compared with the volume count, if it has been specified, and the system assigns the larger of the specified number of devices. Code P in place of the unit count subparameter.

Deferred Mounting of Volumes

If the job step includes a data set that might not be used, depending on conditions determined in the job step, you can request (using the DEFER subparameter) that the system not mount the volume containing the data set until the data set is opened. This can save operator action of mounting volumes on direct access devices. Note: No other job step can use this volume until the job step specifying DEFER ends. If DEFER is coded for a new data set which could be placed on a direct access device, then DEFER is ignored.

When You Do Not Have to Code the UNIT Parameter

The system can obtain unit information from sources other than the UNIT parameter. In these cases, you do not have to code the UNIT parameter:

- When the data set is cataloged. For cataloged data sets, the system obtains unit and volume information from the catalog. However, if VOL=SER=serial number is coded on a DD statement that defines a cataloged data set, the system does not look in the catalog. In this case, you must code the UNIT parameter.
- When the data set is passed from a previous job step. For passed data sets, the system obtains unit and volume information from passed data set information. However, if VOL=SER=serial number is coded on a DD statement that defines a passed data set, the system does not look in the passed data set information. In this case, you must code the UNIT parameter.
- When the data set is to use the same volumes assigned to an earlier data set, that is, VOLUME=REF=reference is coded. In this case, the system obtains unit and volume information from an earlier DD statement that specified the volume serial number or from the catalog.

In all of the cases listed above, code the UNIT parameter when you want additional devices assigned or when you want to influence device allocation. If the coded UNIT parameter is a subset of the unit type referenced, then it will be used. Otherwise, it is ignored. Do not code the UNIT parameter when defining a data set included in the input stream. If UNIT is coded on a DD * or DD DATA statement, the job is abnormally terminated.

Sharing a Unit Between Data Sets on Different Volumes

To conserve the number of devices used in a job step, request that an existing data set be assigned to the same device or devices as assigned to a data set defined earlier in the job step. When two or more volumes are assigned the same device, the volumes are said to have **unit affinity**. Unit affinity implies deferred mounting for all except one of the volumes, since all volumes cannot be mounted on the same device at the same time.

Request explicit unit affinity by coding UNIT=AFF=ddname on a DD statement. The ddname is the name of an earlier DD statement in the same job step. The data set defined on the DD statement that requests unit affinity is assigned the same device or devices as the data set defined on the named DD statement. If the ddname refers to a DD statement that defines a dummy data set, the data set defined on the DD statement requesting unit affinity is assigned a dummy status. Unit affinity also exists on one DD statement when there are more volumes than units. This is implied unit affinity. See examples of unit affinity.

If all of the following conditions are present, the data set defined on the DD statement requesting unit affinity might be written over by the named data set:

- The named DD statement requests a scratch tape.
- The data set defined on the DD statement requesting unit affinity is opened prior to that on the named DD statement.
- The tape is not unloaded prior to the OPEN of the data set defined on the named DD statement.

Unit and Volume Affinities: Unit and volume affinity can occur in the same step and, within the step, on the same DD statement. There are three relationships possible between unit and volume affinity.

1. All volume affinity requests are unrelated to any of the unit affinity requests. For example,

```
//DD1    DD        VOL=SER=A
//DD2    DD        UNIT=AFF=DD1,VOL=SER=B
//DD3    DD        VOL=SER=(C,D)
//DD4    DD        VOL=SER=C
```

2. All volume affinity requests are contained in the unit affinity requests. For example,

```
//DD1    DD        VOL=SER=(A,D)
//DD2    DD        UNIT=AFF=DD1,VOL=SER=(A,B)
//DD3    DD        VOL=SER=X
```

3. Some volume affinity requests are contained in the unit affinity requests, but not all. For example,

```
//DD1    DD        VOL=SER=A
//DD2    DD        UNIT=AFF=DD1,VOL=SER=B
//DD3    DD        VOL=SER=B
```

If both unit and volume affinity do exist in the same step, sometimes only one requested affinity can be honored at a time. Figure 9 indicates what will happen when you code unit and volume affinity for either tape or direct access devices.

Relationship of unit and volume affinities	**Tape**	**Direct Access**
Unit and volume affinities unrelated.	Because there is no conflict, both unit and volume affinity requests are honored.	Because there is no conflict, both unit and volume affinity requests are honored.
All volume affinities contained in unit affinities.	All volumes will use the same unit; that is, volume affinity is ignored and unit affinity is honored.	For those volumes having volume affinity that are contained in the unit affinity requests, unit affinity is ignored. That is, they will share the same unit while the remaining requests in the unit affinity will use a different unit.
Some volume affinities contained in unit affinities.	For those volumes having volume affinity that are contained in the unit affinity requests, unit affinity is ignored. That is, they will share the same unit while the remaining requests in the unit affinity will use a different unit.	For those volumes having volume affinity that are contained in the unit affinity requests, unit affinity is ignored. That is, they will share the same unit while the remaining requests in the unit affinity will use a different unit.

Figure 9. Unit and Volume Affinity

Note: If a requested volume is mounted on an eligible permanently resident or reserved unit, it must be allocated to that unit regardless of any relationships to other requests. This is done because no dismount of that particular volume can take place.

Example of UNIT and VOLUME Affinities: The purpose of this job is to show several job steps that use either unit or volume affinity for their processing.

```
//AFFIN     JOB      (8526,831),WOON,CLASS=J,PERFORM=50
//STEP1     EXEC     PGM=TESTAFF
//DD1       DD       UNIT=2400,VOL=SER=111111
//DD2       DD       UNIT=AFF=DD1,VOL=SER=222222
//STEP2     EXEC     PGM=TESTAFF
//DD11      DD       UNIT=(3330,2),VOL=SER=(A,B)
//DD12      DD       UNIT=AFF=DD11,VOL=SER=(C,D)
//STEP3     EXEC     PGM=TESTAFF
//DD21      DD       UNIT=(3330,2),VOL=SER=(A,B)
//DD22      DD       UNIT=AFF=DD21,VOL=SER=(C,D)
//DD23      DD       UNIT=3330,VOL=SER=B
//STEP4     EXEC     PGM=TESTAFF
//DD31      DD       UNIT=(3330,2),VOL=SER=(E,F)
//DD32      DD       UNIT=AFF=DD31,VOL=SER=(G,H)
//STEP5     EXEC     PGM=TESTAFF
//DD41      DD       UNIT=2400,VOL=SER=(111111,222222)
//DD42      DD       UNIT=AFF=DD41,VOL=SER=(222222)
//STEP6     EXEC     PGM=TESTAFF
//DD51      DD       UNIT=3330,VOL=SER=(ABCDEF,GHIJKL)
//DD52      DD       UNIT=AFF=DD51,VOL=SER=(ABCDEF)
```

1. The JOB statement assigns jobs to class J in performance group 50.
2. STEP1 assigns one unit for both volumes. Volume 111111 will be mounted first, then 222222 will be mounted when DD2 is opened. (This processing is true for both tape and direct access.)
3. STEP2 allocates two units to DD11 and volumes A and B are mounted. DD12 gets allocated to the same two units but volumes C and D will be mounted when DD12 is opened.
4. STEP3 is a direct access example of volume affinity for volume B. The actual allocation of units will cause volumes A and C to share one unit and volumes B and D to have their own units.
5. STEP4 is a direct access example. Assume that volume E is currently mounted and has been assigned the permanently resident or reserved attribute. In this case, since volume E cannot be dismounted, a separate unit will be allocated for it. Volume G will have its own unit and volumes F and H will share one unit. Therefore, three volumes will be allocated for these requests, instead of two, because of the permanently resident or reserved mount attributes.
6. STEP5 is a tape example. Volume affinity is ignored between the DD statements because only one tape data set for each tape volume can be open at a time.
7. STEP6 is a direct access example where unit affinity is ignored for the common volume. Volume ABCDEF of both DD statements will share the same unit while the remaining request (GHIJKL) will use a different unit.

For more information, see **OS/VS2 System Programming Library: Job Management,** GC28-0627.

Example of Requesting Units and Volumes

This job shows the unit and volume parameters.

```
//TEST         JOB    WIBORG,CLASS=C
//STEP1        EXEC   PGM=TESTSYSO
//DD11         DD     DSN=A01DD1,UNIT=3330,DISP=(,PASS),
//                    SPACE=(TRK,1),VOL=SER=333001
//STEP2        EXEC   PGM=TESTSYSO
//DD21         DD     DSN=SYSLIB,UNIT=2314,VOL=(PRIVATE,SER=123456),
//                    DISP=OLD
//DD22         DD     DSN=SYSABC,UNIT=AFF=DD21,VOL=SER=777777,
//                    DISP=(OLD,KEEP)
//DD23         DD     DSN=SYSTAPE,UNIT=(2400,P,DEFER),DISP=OLD,
//                    VOL=SER=(240001,240002,240003,240004,240005)
//DD24         DD     DSN=SYSDISK,DISP=(SHR,KEEP),UNIT=(,P),
//                    VOL=SER=(333005,333008,333010)
//DD25         DD     UNIT=2314,VOL=REF=*.STEP2.DD21,SPACE=(TRK,(5,2))
//DD26         DD     UNIT=3330,VOL=REF=SYSDISK,SPACE=(TRK,(10,5))
```

1. The job is assigned to class C.
2. DD11 defines a new data set named A01DD1. It is to be on volume 333001 which is mounted on a 3330 device.
3. DD21 defines an old data set named SYSLIB that exists on a private volume, 123456. The volume is mounted on a 2314 device.
4. DD22 defines an old data set named SYSABC that is to be kept after this job step is complete. SYSABC is on volume 777777. This volume is to be mounted on the same 2314 device as the volume defined on DD21.
5. DD23 defines an old data set named SYSTAPE. There are five volumes that are to be mounted only after the data set is opened (caused by the DEFER subparameter). The P requests parallel mounting; that is, all five volumes are to be mounted at the same time on five different 2400 devices.
6. DD24 defines an old data named SYSDISK that can be shared by another job since it will only be read. It is to be kept after this job step. The number of units used is determined by the number of volumes requested.
7. DD25 is a temporary data set (no DSNAME specified) and therefore, assumes a disposition of NEW,DELETE. The volume to be used is the same one used in STEP2 DD21; that is, volume 123456.
8. DD26 is also a temporary data set. The backward reference for volume information is to STEP2 DD24 where the data set named SYSDISK is located.

Requesting Space for Non-VSAM Data Sets

You must request space for every non-VSAM data set created on a direct access volume. To request space, code the SPACE parameter on the DD statement that defines the data set. The SPACE parameter provides two ways to request space:

- Tell the system how much space you want and let the system assign specific tracks.
- Tell the system the specific tracks on which you want the data set written.

Letting the system assign specific tracks is the easiest and most frequently used method of requesting space. Only the unit of measurement to be used to compute the space requirement and how many of the units of measurement the data set requires needs to be specified. In addition, this form of the SPACE parameter offers several options:

- A secondary quantity, to be used if the data set runs out of space.
- Space for a directory or index.
- Release of unused space.
- Contiguous space.
- Whole cylinders.

OS/MVT and VS2 Release 1 included the SPLIT and SUBALLOC parameters for requesting space for a group of data sets on a single direct access volume. These two parameters are now internally converted to SPACE requests.

The Basic Request: Unit of Measurement and Primary Quantity

To have the system assign specific tracks, specify only the **unit of measurement** the system should use to allocate space and the **primary quantity** of space needed. As the unit of measurement, you can specify:

- Average block length of the data, for blocks.
- TRK, for tracks.
- CYL, for cylinders.

As the primary quantity, code an integer, indicating how many blocks, tracks, or cylinders are required.

It is easiest to specify an average block length: the system will allocate the least number of tracks required to contain the number of blocks specified. Specifying block length also maintains device independence; you can change the device type in the UNIT parameter without altering the space request or code a group name that includes different direct access devices in the UNIT parameter.

When specifying TRK or CYL, compute the number of tracks or cylinders required; consider such variables as the device, type, track capacity, tracks per cylinder, cylinders per volume, data length (blocksize), key length, and device overhead. These variables, and examples of estimating space requirements for partitioned and indexed sequential data sets, are described in **OS/VS Data Management Services Guide,** GC26-3783.

Cylinder allocation allows faster input/output of sequential data sets than does track allocation. When requesting space in terms of average block length, request that the space allocated begin and end on cylinder boundaries: code ROUND as the last subparameter in the SPACE parameter. The smallest number of whole cylinders needed to contain the request will be allocated.

How the System Satisfies Your Primary and Secondary Request

Enough available space must exist on one volume to satisfy the primary request. If enough space is not available on a single volume, the system will terminate the job or search another volume, depending on the type of volume request made:

Specific volume request (for example, volume serial numbers are specified): If sufficient space is not available on the first volume specified, the job is terminated.

Nonspecific volume request (for example, the system chooses the volume): If space is not available on the first volume chosen, the system will choose another volume and continue the search, causing volumes to be mounted if necessary, until a volume with sufficient space is found or the operator cancels the job.

The system attempts to allocate the primary and secondary quantity in contiguous tracks or cylinders. If contiguous space is not available, the system satisfies the request with up to five noncontiguous **extents** (blocks) of space. (If user labels are specified — that is, you code SUL in the LABEL parameter—the system allocates up to four noncontiguous extents of space. The system allocates a track for user labels separate from the primary quantity; this one track is considered an extent, and therefore, up to four additional extents can be allocated to satisfy the primary quantity.)

A Secondary Request for Space

In the primary quantity, you need not anticipate all future demands for space for a data set. Code a **secondary** request for space to be used only if the data set exceeds its allocated space. Do this by coding an integer following the primary quantity that indicates how much additional space should be allocated. For data sets whose disposition is NEW or MOD, this space is allocated on the same volume as the primary quantity until: (1) there is not enough space available on the volume to allocate the secondary quantity, or (2) a total of 16 extents, less the number of extents for primary quantity and user label space, have been allocated to the data set. (BDAM data sets cannot be extended.) If either of these conditions is satisfied, the system must allocate the secondary quantity or another volume. However, this can be done only if you request more than one volume in the VOLUME parameter (for a nonspecific volume request, code PRIVATE; for a specific volume request, request more volumes than devices).

When allocating a secondary quantity for a data set whose disposition is OLD (in other words, a data set that is preallocated or is being written over), the system will go to the next volume, if one is specified, and see if there is already a secondary quantity allocated there. If you did specify another volume and there is already a secondary quantity, the system will use that space instead of making another allocation or will allocate space if no space is already allocated there for the data set. If you didn't specify another volume, the space will be allocated on the current volume.

A secondary quantity can be requested when creating a data set or when retrieving an existing data set, whether or not you coded a secondary quantity in the original request. A secondary request for an existing data set is in effect only for the duration of the job step and overrides an original request if one was made.

If you specify SPACE in terms of average block length, code the maximum block length of the data in either the DCB macro instruction or the BLKSIZE subparameter of the DCB parameter on the DD statement: the system uses the maximum block length to compute how many additional tracks to allocate.

Requesting Directory Space for a Partitioned Data Set

To create a partitioned data set, request a primary quantity large enough to include space for a directory. A directory is an index used by the system to locate members in a partitioned data set. It consists of 256-byte records, and you must specify, as the third quantity in the SPACE parameter, how many records the directory is to contain. The directory is included in the beginning of the primary space, which must be large enough to contain the directory. Request enough directory space to allow for growth of the data set: you cannot lengthen the directory as you can lengthen the data set itself by requesting a secondary quantity. If the directory runs out of space, recreate the data set. For a complete description of the directory, including details on member entries that will enable you to compute how many records to request, see **OS/VS Data Management Services Guide**, GC26-3783.

Requesting Index Space for an Indexed Sequential Data Set

If you are creating an indexed sequential data set that occupies more than one cylinder, and are not defining the index on a separate DD statement, you can request index space in addition to a primary quantity. (Request index space as the third quantity in the SPACE parameter. The space request for an indexed sequential data set must be in terms of cylinders or absolute track allocation.) The system determines whether the request is for a directory or an index by examining the DSORG subparameter of the DCB parameter on the DD statement. DCB=DSORG=IS or DCB=DSORG=ISU must be included on any DD statement defining an indexed sequential data set.

The index quantity is added to the primary quantity when considering the space requirements.

Assigning Specific Tracks

You can request that specified tracks on a volume be allocated to a data set. This is the most stringent request for space: if any of the tracks requested are occupied, the space cannot be allocated and the job is terminated. An example of where specific track allocation is required is a data set that is to reside under the fixed heads of a 3348 Model 70F Data Module (cylinders 1-5).

To request specific tracks, you must code:

- ABSTR as the first subparameter, indicating absolute tracks.
- A primary quantity, specifying the number of tracks to be allocated.
- The relative track number of the first track to be allocated.

For a partitioned data set, specify how many records you want allocated for a directory. If requesting a user-label track, this track will be the first of the space requested.

If defining an indexed sequential data set using absolute track allocation, the number of tracks for the index, primary, or overflow areas must be equal to an integral number of cylinders and on a cylinder boundary. All of the DD statements defining the indexed sequential data sets must request specific tracks.

Example of Requesting Space

One purpose of this job is to request space for two temporary data sets. The following steps refer to these data sets for volume information.

```
//ALLOC      JOB     (3416,354),STONER,MSGLEVEL=1,MSGCLASS=C
//STEP1      EXEC    PGM=TESTSYSO
//DD11       DD      UNIT=2314,DISP=(,PASS),SPACE=(TRK,(10,5))
//DD12       DD      UNIT=3330,DISP=(,PASS),SPACE=(TRK,(10,5))
//SYSABEND   DD      SYSOUT=L
//STEP2      EXEC    PGM=TESTSYSO
//DD1        DD      DSN=*.STEP1.DD11,DISP=(OLD,DELETE,DELETE)
//DD2        DD      VOL=REF=*.STEP1.DD12,SPACE=(TRK,(3,1)),UNIT=3330
//SYSABEND   DD      SYSOUT=L
```

1. The JOB statement specifies that all job related output is to be printed and that system messages for the job are to be written to output class C.

2. STEP1 defines two temporary data sets. Step 2 refers to these data sets for volume information.

3. The space requirements for these requests indicate that for DD11 and DD12 in STEP1 you want 10 primary and 5 secondary tracks; for DD2 in STEP2 you want 3 primary and 1 secondary track; and, for DD11 in STEP3 you want 5 primary and 2 secondary tracks.

Mass Storage System (MSS) Considerations

Mass storage volumes are virtual direct access devices. All previously defined descriptions of direct access device resource requests apply, with several additional functions also available. The mass storage volume device type is 3330V.

Mass Storage Volume Groups

The mass storage system (3850) can contain up to 4,720 mass storage volumes (3330V). To assist the installation in managing the volumes, the mass storage system utilities are used to assign the volumes ,to groups. When creating a new data set with a nonspecific request, the desired group can be specified using MSVGP=id. The system then selects the best volume for the requirements from the specified group and causes it to be mounted.

The installation can define as many groups as necessary; one group and its name are standard in all systems (SYSGROUP). The installation then assigns each mass storage volume to a user group, SYSGROUP, or to no group.

Nonspecific Volume Requests for Mass Storage Volumes

Previously defined descriptions of nonspecific DASD volume requests apply to mass storage volumes. The type of request can be modified by the MSVGP parameter that specifies an installation defined subset of all mass storage volumes to be used by the system to satisfy the request. MSVGP implies a private volume and will always cause a mount of a mass storage volume. The system will select a volume from the defined group that has sufficient space to satisfy the space requirements of the DD statement. (See the section on mass storage volume control in **OS/VS Mass Storage System (MSS) Services for Space Management,** GC35-0012, concerning selection of MSVGP volumes to satisfy space requirements.) If you code the MSVGP parameter, the VOLUME parameter can be used to specify a volume count, but must not be used for volume serial numbers. VOLUME=PRIVATE is redundant when MSVGP is used.

If MSVGP is not specified—

- when you make a nonspecific request for a private mass storage volume, the system always causes a default group of volumes to be used (MSVGP=SYSGROUP).
- when you make a nonspecific request for a non-private mass storage volume that is to contain a temporary data set, the system assigns a public or storage mass storage volume that is already mounted. Otherwise, the request is treated as a nonspecific volume request for a private volume.
- when you make a nonspecific request for a non-private mass storage volume that is to contain a nontemporary data set, the system assigns a storage mass storage volume, if one is mounted. Otherwise, the request is treated as a nonspecific volume request for a private volume.

Specific Volume Requests for Mass Storage Volumes

Previously defined descriptions of specific DASD volume requests (direct access storage volumes) also apply to mass storage volumes.

Because there is no operator involvement or decision making in mounting mass storage volumes, it is recommended (for data integrity pruposes) that all permanent data sets on mass storage volumes be cataloged. All specific requests for these data sets should always reference the volumes using the catalog, not the VOLUME parameter. Reference to the catalog is required when extending an existing multivolume data set to one or more volumes. The reason is that the system must know all volumes on which the data set currently resides before it selects the new volume. Parallel mounting must also be specified to ensure proper multivolume extensions.

Requesting Space for Non-VSAM Data Sets on Mass Storage Volumes

When an installation defines mass storage volume groups, each group is given a default for space. Specific volume requests for new data sets require the SPACE parameter. Nonspecific volume requests with the MSVGP parameter can optionally specify the SPACE parameter. Nonspecific volume requests without the MSVGP parameter can optionally specify the SPACE parameter if the request will default to MSVGP=SYSGROUP. The space default will always be contiguous cylinders. If other types of space attributes are desired, the SPACE parameter can be coded to override the specified default. Neither directory nor index quantities can be provided in the default; therefore, the SPACE parameter must be coded for new BPAM or ISAM data sets on mass storage volumes.

Before using mass storage volumes, refer to **OS/VS Mass Storage System (MSS) Services for Space Management,** GC35-0012.

Dynamically Allocating and Deallocating Data Sets

Dynamic allocation allows you to acquire resources as they are needed. One reason to use dynamic allocation is that you may not know all of the device requirements for a job prior to execution. Another reason is that it allows resources to be used more efficiently; that is, resources can be acquired just before their use and/or released immediately after use. (Resources, as used here, refer to a ddname-data set combination with its associated volumes and devices, if any.) The number of dynamic allocations indicated by coding the DYNAM and DYNAMNBR parameters are used to establish a control value for tracking resources held in anticipation of reuse.

You can dynamically deallocate resources during the execution of a job step (at the time the data set is closed) by coding the FREE=CLOSE parameter. If you do dynamically deallocate a resource at close time, it cannot be reopened in the same step. If you do not want to dynamically deallocate the resource, either specify nothing or specify FREE=END to let the system deallocate the resources at the end of the job step.

For more information on how to use dynamic allocation and deallocation, see **OS/VS2 System Programming Library: Job Management,** GC28-0627.

Example of Dynamically Allocating and Deallocating Data Sets

```
//PROS   JOB     CLASS=A,MSGLEVEL=(2,0),PERFORM=70
//STEP1  EXEC    PGM=TEST,DYNAMNBR=4,PARM=(P3,123,MT5)
//DD1    DD      DYNAM
//DD2    DD      DYNAM
//OUT1   DD      SYSOUT=C,FREE=CLOSE
//OUT2   DD      SYSOUT=A
//SYSIN  DD      *
         .
         .
         .
         data
         .
         .
         .
/*
```

1. The JOB statement specifies that this job will be processed in class A in performance group 70. Only JCL statements will be printed.
2. The control value is the total DYNAMNBR and DYNAM parameters coded, in this case, 6. If this control value is exceeded and a request for another dynamic allocation is made, the request is not honored unless resources can be deallocated so that the control value is not exceeded.
3. When OUT1 is closed, it is immediately ready for printing.

Identifying Data Sets to the System

Specifying the DDNAME Parameter

The DDNAME parameter is most often used in cataloged procedures and in job steps that call procedures. It is used in cataloged procedures to postpone defining data in the input stream until a job step calls the procedure. (Procedures cannot contain DD statements that define data in the input stream; that is, DD * or DD DATA statements). It is used in job steps that call procedures to postpone defining data in the input stream on an overriding DD statement until the last overriding DD statement for a procedure step. (Overriding DD statements must appear in the same order as the corresponding DD statements in the procedure).

When You Code the DDNAME Parameter

When the system encounters a DD statement that contains the DDNAME parameter, it saves the ddname of that statement. The system also temporarily saves the name specified in the DDNAME parameter so that it can relate that name to the ddname of a later DD statement. Once a DD statement with that corresponding name is encountered, the name is no longer saved. For example, if the system encounters this statement

```
//XYZ         DD          DDNAME=PHOB
```

the system saves XYZ and, temporarily, PHOB. Until the ddname is encountered in the input stream, the data set is a dummy data set.

When the system encounters a statement whose ddname has been temporarily saved, it does two things. It uses the information contained on this statement to define the data set; it associates this information with the name of the statement that contained the DDNAME parameter. The value that appeared in the DDNAME parameter is no longer saved by the system. To continue the above example, if the system encounters this statement

```
//PHOB        DD          DSNAME=NIN,DISP=(NEW,KEEP),UNIT=2400
```

the system uses the data set name and the disposition and unit information to define the data set; it also associates the ddname of the statement that contained the DDNAME parameter with this information. In this example, the ddname used is XYZ; the ddname PHOB is no longer saved. The data set is now defined, just as it would be if you had coded

```
//XYZ         DD          DSNAME=NIN,DISP=(NEW,KEEP),UNIT=2400
```

The system associates the ddname of the statement that contains the DDNAME parameter with the data set definition information. It does not use the ddname of the later statement that defines the data set. Therefore, any references to the data set, before or after the data set is defined, must refer to the DD statement that contains the DDNAME parameter, not the DD statement that defines the data set. The following sequence of control statements illustrates this:

```
//DD1         DD          DDNAME=LATER
               .
               .
               .
//LATER       DD          DSN=SET12,DISP=(NEW,KEEP),UNIT=2314,
//                        VOLUME=SER=46231,SPACE=(TRK,(20,5))
               .
               .
               .
//DD12        DD          DSN=SET13,DISP=(NEW,KEEP),VOLUME=REF=*.DD1,
//                        SPACE=(TRK,(40,5))
```

When you want to concatenate data sets, the unnamed DD statements must follow the DD statement that contains the DDNAME parameter, not the DD statement that defines the data set. The following sequence of control statements illustrates this:

```
//DDA       DD      DDNAME=DEFINE
//          DD      DSN=A.B.C,DISP=OLD
//          DD      DSN=SEVC,DISP=OLD,UNIT=2314,VOL=SER=52226
             .
             .
             .
//DEFINE    DD      *
            data
/*
```

You can use the DDNAME parameter up to five times in a job step or procedure step. However, each time the DDNAME parameter is coded, it must refer to a different ddname.

Specifying the DSNAME Parameter

When creating a data set, use the DSNAME parameter to assign a name to the data set. The data set name is part of the information stored with the data set on a volume. Later, when another job step or job wants to use the data set, it identifies the data set name in the DSNAME parameter; the system uses the data set name to locate the data set on the volume.

How you code the DSNAME parameter depends on the type of data set and whether the data set is nontemporary or temporary.

Creating or Retrieving a Nontemporary Data Set

If the data set is nontemporary, you can identify:

- A permanent data set by coding DSNAME=dsname.
- A member of a nontemporary partitioned data set by coding DSNAME=dsname(member name).
- A generation of a nontemporary generation data group by coding DSNAME=dsname(number).
- An area of a nontemporary indexed sequential data set by coding DSNAME=dsname(area name).

Nontemporary Data Sets

When a nontemporary data set is created, it is assigned a name in the DSNAME parameter and is assigned a disposition of KEEP or CATLG. (A data set assigned a disposition of KEEP may be assigned a disposition of CATLG by a later job step or job). The name assigned to a nontemporary data set must be specified in the DSNAME parameter by all other steps and jobs that want to use the data set.

A nontemporary data set name can be either an unqualified or qualified name. An unqualified data set name consists of 1 through 8 characters. The first character must be an alphabetic or national (@,#,$) character; the remaining characters can be any alphameric or national characters, a hyphen, or a plus zero (10-12) punch.

A qualified data set name consists of 1 through 44 characters (including periods), except when the qualified name identifies a generation data group. In this case, the data set name may consist of only 1 through 35 characters (including periods). For each eight characters or less there must be a period, and the first character of the name and the character following a period must be an alphabetic or national (@,#,$) character.

When requesting a data set that is cataloged on a control volume or a private catalog, the system attempts to mount this control volume if it is not already mounted. After the system obtains the pointer to this data set, the control volume or private catalog can then be demounted by the system if the unit on which it was mounted is required by another volume. The control volume or private catalog is assigned to the job step and is available for disposition processing when the job step ends.

In the following cases, the control volume or private catalog is not mounted when disposition is processed:

- The job fails or abnormally terminates and data sets with a conditional disposition of CATLG, UNCATLG have been passed but not received.
- A job step is deallocated during system warmstart.

Members of a Partitioned Data Set

A partitioned data set consists of independent groups of sequential records, each identified by a member name in a directory. When you want to add a member to a partitioned data set or retrieve a member, specify the partitioned data set name and follow it with the member name. The member name is enclosed in parentheses and consists of 1 to 8 characters. The first character must be an alphabetic or national (@,$,#) character, the remaining characters can be any alphameric or national characters.

Generations of a Generation Data Group

A generation data group is a collection of chronologically related data sets that can be referred to by the same data set name. When you want to add a generation to a generation data group or retrieve a generation, specify the generation data group name and follow it with the generation number. The generation number is enclosed in parentheses and the number is a zero or a signed integer. A zero represents the most current generation of the group, a negative integer (for example, -1) represents an older generation; a positive integer (for example, +1) represents a new generation that has not as yet been cataloged.

To retrieve all generations of a generation data group (up to 255 generations), code only the group name in the DSNAME parameter and the DISP parameter.

A complete discussion of creating and retrieving generation data sets is contained in "Creating and Retrieving Generation Data Sets."

Areas of an Indexed Sequential Data Set

The areas used for an indexed sequential data set are the index, prime, and overflow areas. When you are creating the data set and define any of these areas on a DD statement, you must identify the data set name and follow it with the area name you are defining. The area name is enclosed in parentheses and is either PRIME, INDEX, or OVFLOW. If you are using only one DD statement to define the entire data set, code DSNAME=dsname or DSNAME=dsname(PRIME). When you retrieve the data set, you code only the data set name; you do not include the terms PRIME, INDEX, or OVFLOW.

Creating or Retrieving a Temporary Data Set

If the data set is temporary, you can identify:

- A temporary data set by coding DSNAME= & & dsname.
- A member of a temporary partitioned data set by coding DSNAME= & & dsname(member name).
- An area of a temporary indexed sequential data set by coding DSNAME= & & dsname(area name).

Temporary Data Sets

Any data set that is created and deleted within the same job is a temporary data set. A DD statement that defines a temporary data set need not include the DSNAME parameter; the system generates one for you.

If you do include the DSNAME parameter, the temporary data set name can consist of 1 through 8 characters and is preceded by two ampersands (& &). The character following the ampersands must be alphabetic or national (@,#,$) characters; the remaining characters can be any alphameric or national characters. (A temporary data set name that is preceded by only one ampersand is treated as a temporary data set name as long as no value is assigned to it either on the EXEC statement for this job step when it calls a procedure, or on a PROC statement within the procedure. If a value is assigned to it by one of these means, it is treated as a symbolic parameter).

The system generates a qualified name for the temporary data set, which begins with SYS and includes the jobname, the temporary name assigned in the DSNAME parameter, and other identifying characters.

If you attempt to keep or catalog a temporary data set (you specify a disposition of KEEP or CATLG in the DISP parameter), the system changes the disposition to PASS and the data set is deleted at job termination. However, this change is not made for a data set on a tape volume when the following conditions exist: (1) the data set is new; (2) the data set is not assigned a name; and (3) DEFER is specified in the UNIT parameter. The data set is deleted at job termination, but the system tells the operator to keep the volume on which the data set resided during the job. To simplify processing of temporary data sets, see "Using Virtual Input/Output (VIO) for Temporary Data Sets". If you code a conditional disposition for temporary data sets, it is ignored.

Members of a Temporary Partitioned Data Set

When adding a member to a temporary partitioned data set or retrieve a member during the job, specify the partitioned data set's temporary name and follow it with the member name. The member name is enclosed in parentheses and consists of 1 through 8 characters. The first character must be an alphabetic or national (@,$,#) character; the remaining characters can be any alphameric or national characters.

Areas of a Temporary Indexed Sequential Data Set

The areas used for indexed sequential data set are the index, prime, and overflow areas. When you are creating a temporary indexed sequential data set and define any of these areas on a DD statement, you must identify the data set's temporary name and follow it with the area name you are defining. The area name is enclosed in parentheses and is either PRIME, INDEX, or OVFLOW. If you are using only one DD statement to define the entire temporary data set, code DSNAME= & & dsname or DSNAME= & & dsname(PRIME). If you want to retrieve the temporary data set on the same job, you code only the data set's temporary name; you do not include the term PRIME, INDEX, or OVFLOW.

Associated Data Sets (3540 Diskette)

Associated data sets are data sets on 3540 diskette volumes that are separate from the job stream data set and are to be spooled as SYSIN data sets. Associated SYSIN data sets are identified by specifying a data set identifier (on the DD DSID parameter) and, optionally, a volume identifier on the DD * or DD DATA statements in the job stream.

To have associated data sets merged into the job stream, the job stream containing the diskette associated data set requests must be processed by the diskette reader program; it cannot be read by either JES2 or JES3.

Data sets are created on 3540 diskette volumes only by using SYSOUT. The SYSOUT DD statement must contain the DSID parameter and a sysout class (or classes) designed by the installation to be used by data sets on a 3540 diskette. The diskette writer must be started to the sysout class to transfer the data sets to diskettes.

For more information on the 3540 diskette, refer to **OS/VS2 IBM 3540 Programmer's Reference**, GC24-5111.

Copying the Data Set Name from an Earlier DD Statement

The name of a data set that is used several times in a job, whether specified in the DSNAME parameter or assigned by the system, can be copied after its first use in the job. This allows you to easily change data sets from job to job and eliminates your having to assign names to temporary data sets. To copy a data set name, refer to an earlier DD statement that identifies the data set. When the earlier DD statement is contained in an earlier job step, you code DSNAME=*.stepname.ddname; when the earlier DD statement is contained in the same job step, you code DSNAME=*.ddname; when the earlier DD statement is contained in a cataloged procedure step called by an earlier job step, you code DSNAME=*.stepname.procstepname.ddname.

Specifying the DSNAME Parameter in Apostrophes

Sometimes, it may be necessary or desirable to specify a data set name that contains special characters. If the name contains special characters, you must enclose the name in apostrophes (5-8 punch), for example, DSNAME='DAT+5'. If one of the special characters is an apostrophe, you must identify it by coding two consecutive apostrophes (two 5-8 punches) in its place, for example, DSNAME='DAY''SEND'. A data set name enclosed in apostrophes can consist of 1 through 44 characters.

There are cases when the data set name must contain required special characters, which tell the system something about the data set (for example, & & in DSNAME= & & name are required special characters that tell the system that this is a temporary data set). In these cases, the data set name must not be enclosed in apostrophes because the system will not recognize the required special characters as having any special significance. The following data set names contain special characters that tell the system something about the data set and, therefore, cannot be enclosed in apostrophes:

- DSNAME=name(member name)
- DSNAME=name(area name)
- DSNAME=name(generation number)
- DSNAME= & & name
- DSNAME=*.stepname.ddname

Keep the following rules in mind:

- If the data set is to be cataloged, the data set name cannot have special characters.
- If the data set name ends with a blank character, the blank is ignored.
- If the only special character is a period, a hyphen, or plus zero (10-12 punch), you need not enclose the data set name in apostrophes.

Specifying the LABEL Parameter

Labels are used by the operating system to identify volumes and the data sets they contain, and to store data set attributes. Data sets residing on magnetic tape volumes usually have data set labels. If data set labels are present, they precede each data set on the volume. Data sets residing on direct access volumes always have data set labels. These data set labels are contained in the volume table of contents of the direct access volume.

A data set label may be a standard or nonstandard label. Standard labels can be processed by the system; nonstandard labels must be processed by nonstandard label processing routines, which the installation includes in the system. Data sets on direct access volumes must have standard labels. Data sets on tape volumes usually have standard labels, but can have nonstandard labels or no labels.

The LABEL parameter must be coded if:

- You are processing a tape data set that is not the first data set on the reel; in this case, indicate the data set sequence number.
- The data set labels are not IBM standard labels; you must indicate the label type.
- You want to specify what type of labels a data set is to have when it is written on a scratch volume; indicate the label type.
- The data set is to be password protected; specify PASSWORD when creating the data set.
- The data set is to be processed only for input or output and this conflicts with the processing method indicated in the OPEN macro instruction; specify IN, for input, or OUT, for output.
- The data set is to be kept for a specific period of time; indicate a retention period (RETPD) or expiration data (EXPDT).

The Data Set Sequence Number Subparameter

When placing a data set on a tape volume that already contains one or more data sets, specify where the data set is to be placed, that is, whether the data set is to be the second, third, fourth, etc., data set on the volume. The data set sequence number causes the tape to be positioned properly so that the data set can be written on the tape or retrieved.

The data set sequence number subparameter is a positional subparameter and is the first subparameter that can be coded. The data set sequence number is a 1- to 4-digit number. The system assumes 1 (this is the first data set on the reel) if you omit this subparameter or code 0, unless the data set is a passed or cataloged data set. If a data set is cataloged, the system obtains the data set sequence number from the catalog; for a passed data set, the data set sequence number is obtained from the passing step.

The Label Type Subparameter

The label type subparameter tells the system the type of labels associated with the data set. The label type subparameter is a positional subparameter and must be coded second, after the data set sequence number subparameter. You can omit this subparameter if the data set has IBM standard labels.

The label type subparameter is specified as:

- SL — if the data set has IBM standard labels.
- SUL — if the data set has both IBM standard and user labels.
- AL — if the data set has American National Standard labels.
- AUL — if the data set has Americal National Standard labels and American National Standard user labels.
- NSL — if the data set has nonstandard labels.
- NL — if the data set has no labels.
- BLP — if you want label processing bypassed.
- LTM — bypass leading tape mark, if encountered, on unlabeled tape. (OS/DOS interchange)

SL or SUL is the only label type that can be specified for data sets that reside on direct access volumes. SL, SUL, AL, AUL, NSL, and NL are the only label types that can be specified for data sets that reside on tape volumes. BLP and LTM are label type subparameters that can also be coded for tape.

When SL or SUL is specified, or the label type subparameter is omitted and the data set has IBM standard labels, the system can ensure that the correct tape or direct access volume is mounted. When specifying NSL, installation-provided nonstandard label processing routines must ensure that the correct tape volume is mounted. When specifying NL or BLP, the operator must ensure that the correct tape volume is mounted. If you specify NL, the data set must have no standard labels. When specifying AL or AUL, the system ensures that the correct American National Standard labeled tape is mounted.

For cataloged and passed data sets, label type information is not kept. Therefore, refering to a cataloged or passed data set that has other than standard labels, code the LABEL parameter and specify the label type.

BLP is not a label type, but a request that the system bypass label processing. This specification allows you to use a blank tape or overwrite a seven-track tape that differs from the current parity or density specifications. If the bypass label processing option is not selected by the installation and you have coded BLP, the system assumes NL.

Note for BLP: When requesting the system to bypass label processing and the tape volume has labels, the system treats anything between tapemarks as a data set. Therefore, in order for a tape with labels to be positioned properly, the data set sequence number subparameter of the LABEL parameter must be coded and the subparameter must reflect all labels and data sets that precede the desired data set. The **OS/VS Tape Labels** publication illustrates where tapemarks appear.

Nonspecific volume request: The label type subparameter can also be specified when making a nonspecific volume request for a tape volume (that is, no volume serial numbers are specified on the DD statement) and when having a certain type of labels. If the volume that is mounted does not have the corresponding label type desired, you may be able to change the label type.

When specifying NL or NSL and the operator mounts a tape volume that contains standard labels, you can use the volume provided: (1) the expiration data of the existing data set on the volume has passed; (2) the existing data set on the volume is not password protected; and (3) you make a nonspecific volume request. All of these conditions must be met. If they are not, the system requests the operator to mount another tape volume.

If you specify SL and make a nonspecific volume request, but the operator mounts a tape volume that contains other than IBM standard labels, the system asks the operator to identify the volume serial number and the volume's new owner before the IBM standard labels are written. If the tape volume has American National Standard labels, the system asks the operator for permission to destroy the labels. If you specify SL and make a specific volume request, but the volume that is mounted does not contain IBM standard labels, the system rejects the tape and requests the operator to mount the tape volume specified.

The PASSWORD and NOPWREAD Subparameters

The PASSWORD and NOPWREAD subparameters tells the system that you want the data set to be password protected. If you specify PASSWORD, the data set cannot be read from, written into, or deleted by another job step or job unless the operator can supply the system with the correct password. If you specify NOPWREAD (no password read), the data set can be read without the operator supplying the password, but the password is still required for writing or deleting data sets.

The PASSWORD and NOPWREAD subparameters are positional and must be coded third, after the data set sequence number subparameter and the label type subparameter or the commas that indicate their absence. If you want the data set password protected, specify PASSWORD when the data set is created. Password protected data sets must have standard labels, either IBM standard or American National Standard labels.

The IN and OUT Subparameters

The basic sequential access method (BSAM) permits a specification of INOUT or OUTIN in the OPEN macro instruction as the processing method. If you have specified either of these processing methods in the OPEN macro instruction and want to override it, you may be able to do so by coding either the IN or OUT subparameter. For FORTRAN users, the IN and OUT subparameters specify whether the data set is for input or output.

When INOUT is specified in the OPEN macro instruction and you want the data set processed for input only, you can specify the IN subparameter. When the IN subparameter is coded, any attempt by the processing program to process the data set for output is treated as an error.

When OUTIN is specified in the OPEN macro instruction and you want the data set processed for output only, you can specify the OUT subparameter. When the OUT subparameter is coded, any attempt by the processing program to process the data set for input is treated as an error.

The IN and OUT subparameters are positional subparameters. If either is coded, it must appear as the fourth subparameter, after the data set sequence number subparameter, the label type subparameter, and the PASSWORD subparameter, or the commas that indicate their absence.

The RETPD and EXPDT Subparameters

When it is necessary that a data set be kept for some period of time you can tell the system how long it is to be kept when you create the data set. As long as the time period has not expired, a data set that resides on a direct access volume cannot be deleted by or overwritten by another job step or job. (If it is necessary to delete a data set, you can use the Access Methods Services DELETE command, as described in **OS/VS Access Method Services,** GC26-3836.)

When the expiration date of a data set is the current date, the data set is considered expired and can be deleted or written over by another data set.

There are two different ways to specify a time period: (1) tell the system how many days you want the data set kept, the RETPD subparameter, or (2) tell the system the exact date after which the data set need not be kept, the EXPDT subparameter.

If you code the RETPD subparameter, you specify a 1- to 4-digit number, which represents the number of days the data set is to be kept. If you code the EXPDT subparameter, you specify a 2-digit year number and a 3-digit day number (for example, January 1 would be 001, July 1 would be 182), which represents the date after which the data set need not be kept. When neither the RETPD or EXPDT subparameter is specified for a new data set, the system assumes a retention period of zero days.

The RETPD or EXPDT subparameter must follow all other subparameters of the LABEL parameter. If no other subparameters are coded, you can code LABEL=RETPD=nnnn or LABEL=EXPDT=yyddd.

Example of Identifying Data Sets to the System

This job shows how to use the DSNAME parameter.

```
/*PRIORITY        8
//DATASETS      JOB     FREEMAN,MSGLEVEL=1
//STEP1         EXEC    PGM=IEFBR14
//D1            DD      DSN=ABC,DISP=(NEW,CATLG),UNIT=2314,
//                      VOL=SER=333001,SPACE=(CYL,(12,1,1),CONTIG)
//D2            DD      DSN=&&NAME,UNIT=3330,SPACE=(TRK,(10,1))
//D3            DD      DSN=SYSLIB,DISP=(OLD,KEEP)
//D4            DD      *
                .
                .
                .
                data
                .
                .
                .
/*
```

1. This job runs in priority 8, the meaning of which is defined by the installation.
2. The job statement specifies that system messages and JCL statements are to be printed.
3. D1 catalogs a newly created data set. The space request is 12 primary cylinders, 1 secondary, 1 directory, and the space is to be contiguous.
4. D2 creates a temporary data set on a 3330. The space request is for 10 primary tracks and 1 secondary.
5. D3 defines an old cataloged data set.
6. D4 defines a SYSIN data set. This will be followed by data in the input stream.

Disposition Processing of Non-VSAM Data Sets

Disposing of data sets at the end of a job step is known as disposition processing. You request disposition processing for non-VSAM data sets by coding the DISP parameter on the DD statement defining the data set. (VSAM data sets are handled differently. For information on VSAM, refer to **OS/VS Access Method Services**, GC28-3836.) In the DISP parameter, you can code:

- Data set status as the first subparameter, indicating if the data set is new, is old, can be shared with other jobs, or can be lengthened.
- Normal disposition as the second subparameter, indicating how the data set should be handled if the job step terminates normally.
- Conditional disposition as the third subparameter, indicating how the data set should be handled if the job step terminates abnormally.

If you do not code one of the subparameters, or omit the DISP parameter entirely, the system supplies default values, as described under "Default Disposition Processing".

Specifying Data Set Status

Indicate a data set's status by coding one of the following:

- NEW — the data set is being created in this job step.
- OLD — the data set existed before this job step.
- SHR — the data set existed before this job step and can be read simultaneously by other jobs.

- MOD — the system assumes the data set exists and will position the read/write mechanism after the last record in the data set; if the system cannot find volume information for the data set, the system assumes the data set will be created in the job step.

When coding SHR, you are requesting shared control of the data set and the job should be reading the data set only. When coding NEW, OLD, or MOD, you are requesting exclusive control of the data set. Shared and exclusive control are described in this chapter under "Insuring Data Set Integrity".

Specifying a Disposition for the Data Set

You can specify one disposition, called a normal disposition, to be used when the job step terminates normally (successfully) and another disposition, called the conditional disposition, to be used when the job step terminates abnormally.

For normal disposition, you can request as the second subparameter that the data set be:

- Deleted by coding DELETE.
- Kept by coding KEEP.
- Cataloged by coding CATLG.
- Uncataloged by coding UNCATLG.
- Passed by coding PASS.

Note: The disposition of a data set is solely a function of the DISP parameter; however, the disposition of the volumes on which the data set resides is a function of the volume status when the volume is demounted.

For conditional disposition (the third subparameter of the DISP parameter), you can code all of the above with the exception of PASS.

Data sets allocated to steps that abnormally terminated and that do not have automatic restart are disposed of as specified by the conditional disposition. If a job step abnormally terminates during execution and a conditional disposition is not specified, the normal disposition is processed. If a job step fails during step allocation:

- A data set created in that job step is deleted.
- A data set that existed before that job step is kept.

Disposition processing differs for data sets on direct access volumes and data sets on magnetic tape volumes. A direct access volume contains a volume table of contents (VTOC) which consists of control blocks describing the non-VSAM data sets and available space on the volume. The handling of tape and direct access volumes when specifying a particular disposition is described below.

When specifying KEEP or PASS for a cataloged data set, the system assumes that you want the data set recataloged if volume information was obtained from the catalog and it is determined that the catalog entry must be updated. If the job step performs catalog maintenance and you wish to avoid recataloging, refer to the data set by its specific unit and volume serial when coding the DD statement.

Deleting a Data Set

Specifying DELETE requests that the data set's space on the volume be released at the end of the job step (when coded as the normal disposition) or if the step abnormally terminates (when coded as the conditional disposition). If the data set resides on a public tape volume, the tape is rewound and the volume is available for use by other job steps. If the data set resides on a private volume, the tape is rewound and unloaded. In this case, it is rewound and unloaded and a KEEP message is issued. If the data set exists on a direct access volume, the control block describing the data set is removed from the VTOC and the space on the volume is then available to other data sets.

In one case, however, a data set on a direct access volume will not be deleted, even though you specify DELETE: when the expiration date or retention period has not expired. Specify a length of time that a data set must be kept by assigning a retention period or expiration date in the LABEL parameter on the DD statement. Specifying a retention period or expiration date is described under "Specifying the LABEL Parameter".

If you are deleting a cataloged non-VSAM data set, the entry for the data set in the system catalog is also removed, provided the system obtained volume information for the data set from the catalog (that is, the volume's serial number was not coded on the DD statement). If the system did not obtain volume information from the catalog, the data set is still deleted but its entry in the catalog remains. If an error is encountered while attempting to delete a data set, its entry in the catalog will not be removed. (The data set will or will not be deleted, depending on where the error occurs). Use the Access Method Services DELETE command or the IEHPROGM UNCATLG command to delete a non-VSAM entry from the catalog.

DELETE is the only valid conditional disposition for a data set with no name or a temporary name. If a disposition other than DELETE is specified, the system assumes DELETE.

Keeping a Data Set

Specifying KEEP instructs the system to keep a data set intact until a subsequent job step or job requests that the data set be deleted or until the expiration date or retention period is passed. (You can specify an expiration date or retention period, indicating the length of time a data set must be kept, in the LABEL parameter on the DD statement. If you do not specify a time period, the system assumes a retention period of zero days. Coding an expiration date or retention period is described under "Specifying the LABEL Parameter" in this publication.

For data sets on direct access devices, the entry describing the data set in the VTOC and the data set itself is kept intact. For data sets on tape, the volume is rewound and unloaded and a KEEP message is issued to the operator.

Cataloging a Data Set

Cataloging allows you to keep track of and retrieve data sets. Data sets can be cataloged in the system master catalog or in user (private) catalogs. When retrieving a cataloged data set, you do not have to specify volume information, you need only code the DSNAME parameter and a status in the DISP parameter other than NEW.

To catalog a non-VSAM data set, code CATLG as the disposition; the system creates an entry in the catalog that points to the data set. The disposition CATLG implies KEEP.

You can specify a disposition of CATLG for an already cataloged data set. This should be done when lengthening the data set with additional output (a status of MOD is coded) and the data set can exceed one volume. If the system obtained volume information for the data set from the catalog (that is, the volume's serial number was not coded on the DD statement) and you code DISP=(MOD,CATLG), the system updates the entry to include the volume serial numbers of any additional volumes.

A collection of cataloged data sets that are kept in chronological order can be defined as a generation data group (GDG). The entire GDG is stored under a single data set name; each data set within the group, called a generation data set, is associated with a generation number that indicates how far removed the data set is from the original generation. For more information on defining and creating generation data groups, see "Generation Data Groups" in this publication, and **OS/VS Access Method Services**, GC26-3836.

Uncataloging a Data Set

To remove the entry describing a non-VSAM data set from the catalog, code UNCATLG as the disposition. Specifying UNCATLG does not request the initiator to delete the data set — just the reference in the catalog is removed. When you request use of the data set in a subsequent job or job step, you must include volume information on the DD statement.

Passing a Data Set

If more than one step in a job requests the same data set, each step using the data set can pass the data set for use by a subsequent step. A data set can only be passed within a job.

To pass a data set, you code PASS as the normal disposition; PASS cannot be specified as the conditional disposition. You continue to code PASS each time the data set is referred to until the last time it is used in the job. At this time, you assign it a final disposition.

Specifying the data set name of a passed data set without specifying volume serial number or a volume reference is called "receiving" the data set. Identical data set names (whether or not the same data set is referred to) can be passed at the same time. Such identical data set names are received in the same order in which they are passed. A data set name that has been passed n times can be received no more than n times. A data set can not be passed and received within the same step.

Disposition Processing of Unreceived Passed Data Sets

A data set can be passed by a job step and not subsequently received by another job step. In such a case, if a job step abnormally terminates, unreceived data sets that specified a conditional disposition when passed are processed as specified in their conditional disposition, with four exceptions. If the conditional disposition requires an update to a user catalog:

- and CATLG is specified for a data set with a first-level qualifier of a catalog name or alias, the data set will not be cataloged.
- and UNCATLG or DELETE (of a cataloged data set) is specified for a data set with a first-level qualifier of a catalog name or alias, the data set will not be uncataloged.
- and CATLG is specified for a data set with no qualifier or with a qualifier that is not a catalog name, the data set will be cataloged in the master catalog.
- and UNCATLG or DELETE (of a cataloged data set) is specified for a data set with no qualifier or with a qualifier that is not a catalog name, an attempt will be made to uncatalog the data set from the master catalog.

Data sets that do not specify a conditional disposition, that is, those that were specified as (NEW,PASS) in this job, are deleted; all others are kept.

If no job step abnormally terminates, unreceived data sets that were specified as (NEW,PASS) are deleted; other data sets are kept.

Default Disposition Processing

If you do not code the DISP parameter, or omit one of the subparameters, the system supplies default values.

If you do not specify a data set status, the system assumes NEW. If you do not code the second or third subparameters, the system determines how a data set should be handled according to the status of the data set: data sets that existed before the job step are automatically kept (data sets for which OLD, SHR, or MOD is coded when volume information is available): data sets created in the job step are automatically deleted (data sets for which you coded NEW or MOD when volume information is not available, or for which you did not code a status).

If a step abnormally terminates before it actually begins execution (for example, during allocation of units and volumes or direct access space), the system ignores the disposition you code and again automatically keeps existing data sets and deletes new data sets.

For example, if you code:

```
DISP=( ,PASS,CATLG)
```

the system assumes the data set is new. If the job step abnormally terminates during its execution, the system will catalog the data set,·as instructed by the conditional disposition of CATLG. If, however, the step abnormally terminates before it actually begins execution, the system will delete the data set, since it is a new data set.

Bypassing Disposition Processing

If you define a data set as a dummy data set, the DISP parameter, if coded, is ignored and disposition processing is not performed. For details, see "Defining a Dummy Data Set."

Insuring Data Set Integrity

When a job must receive control of the data sets it requests, you can request either exclusive control, allowing no other job to use the data set, or shared control, allowing the data set to be used by other jobs that also request shared control. The process of securing control of data sets for use by a job is called data set integrity processing.

Data set integrity processing avoids conflict between two or more jobs that request use of the same data set. For example, two jobs, one named READ and another named MODIFY, both request the data set FILE. READ wants only to read and copy certain records, MODIFY deletes some records and changes other records in the data set FILE. If both jobs have control of FILE concurrently, READ cannot be certain of the records contained in FILE — cannot be sure of the integrity of the data set. MODIFY should have exclusive control of the data set; READ can share control of FILE with other jobs that also want only to read the data set. Indicate the type of control a data set requires in the DISP parameter on the DD statement defining the data set.

Exclusive Control of a Data Set

When a job has exclusive control of a data set, no other job can use that data set until termination of the job that refers to the data set. A job should have exclusive control of a data set in order to modify, add, or delete records.

In some cases, you may not need exclusive control of the entire data set. You can request exclusive control of a block of records by coding the DCB, READ, WRITE, and RELEX macro instructions. (These instructions are described in **OS/VS Data Management Macro Instructions,** GC26-3793.)

To request exclusive control of a data set, you code NEW, OLD, or MOD as the first subparameter of the DISP parameter.

Shared Control of a Data Set

A data set on a direct access storage device can be used concurrently by several jobs, if these jobs request shared control of the data set; however, none of the jobs should change the data set in any way.

To request shared control, you code SHR as the first subparameter in the DISP parameter. If more than one step of your job requests a data set, you must code SHR every time you define the data set if it is to be used by concurrently executing jobs. Data set integrity processing is performed once for a job; a data set has either shared or exclusive control. If you code NEW, OLD, or MOD on any reference to a data set, the system assigns exclusive control to the data set for the entire job; a reference requesting exclusive control will override any number of references requesting shared control.

How the System Performs Data Set Integrity Processing

Data set integrity processing is performed for:

- Nontemporary data sets.
- Non-VIO temporary data sets (see "Using Virtual Input/Output (VIO) for Temporary Data Sets").
- Data sets with alias names (created with the Access Methods Services DEFINE command; see **OS/VS Access Methods Services**, GC26-3836).
- Members of generation data groups.

To secure control of a data set for a job, the system enqueues on the data set, marking the data set as requested by that job and noting what kind of control was requested. The job will receive control of the data set if:

- The data set is not being used by another job, or
- The data set is being used by another job but both the job requesting the data set and the job using the data set request shared control.

For example, a job named READ requests shared control of a data set named FILE; if FILE is being used by a job named LOOKAT and LOOKAT also requests shared control, both READ and LOOKAT can use the data set at the same time.

A job will not receive control of a data set if:

- The data set is being used by another job and that job has exclusive control, or
- The data set is being used by another job (with either exclusive or shared control), but the job requesting use of the data set requests exclusive control.

For example, the job named MODIFY requests exclusive control of the data set FILE; FILE is already being used by the job LOOKAT. MODIFY cannot receive control of the data set until LOOKAT has terminated.

If a job requests data sets that are not available, the system issues the message "JOB IS WAITING ON DATA SETS". The initiator that started the job will automatically wait until the required data sets become available, unless the operator cancels the job. However, a job will fail if it requests a data set with an alias name, or a member of a generation data group, and the data set is not immediately available.

Examples of Disposition Processing of Non-VSAM Data Sets

```
//DISP       JOB       MSGLEVEL=1
//S1         EXEC      PGM=IEFBR14
//D1         DD        DSN=ABC,DISP=( SHR,KEEP )
//D2         DD        DSN=SYSA,DISP=( OLD,DELETE,UNCATLG )
//D3         DD        DSN=SYSB,UNIT=2314,VOL=SER=231401,
//                     SPACE=( CYL,( 4,2,1 ) ),DISP=( NEW,KEEP,CATLG )
//D4         DD        DSN=&SYS1,DISP=( MOD,PASS ),UNIT=2314,
//                     VOL=SER=231404,SPACE=( TRK,( 15,5,1 ) )
//S2         EXEC      PGM=IEFBR14
//D1         DD        DSN=&&SYS1,DISP=( MOD,DELETE ),UNIT=2314,
//                     VOL=SER=231404,SPACE=( TRK,( 15,5,1 ) )
```

1. The JOB statement requests that all JCL statements and system messages be printed.
2. D1 in S1 defines a data set that already exists and can be shared with other data sets. It is to be kept on the volume after this job step.
3. D2 in S1 defines a data set that already exists, cannot be shared with other data sets, is to be deleted at the end of the job step, and is to be uncataloged if the program abnormally terminates.
4. D3 in S1 defines a new data set that is to be assigned a specific volume (231401) on a 2314 device. The data set is to be kept on the volume at the end of this job step for normal processing but is to be cataloged if the program abnormally terminates.
5. D4 in S1 defines a temporary data set that is to be created in this job step. It is to be assigned to volume 231404 on a 2314 device with the space request of 15 primary tracks, five secondary, and a directory. This data set is to be passed for subsequent use by a job step in this job.
6. D1 in S2 defines the same temporary data set that was defined in D4 of S1. When this step is completed, the data set is to be deleted.

```
//PASS   JOB     MSGLEVEL=1
//S1     EXEC    PGM=IEFBR14
//DD1    DD      DSN=A,DISP=( NEW,PASS ),VOL=SER=231400,
//               UNIT=2314,SPACE=( TRK,1 )
//DD2    DD      DSN=A,DISP=( OLD,PASS ),VOL=REF=*.DD1
//DD3    DD      DSN=B,DISP=( OLD,PASS ),VOL=SER=231400,UNIT=2314
//DD4    DD      DSN=B,DISP=( OLD,PASS ),VOL=SER=231401,UNIT=2314
//S2     EXEC    PGM=IEFBR14
//DD5    DD      DSN=A,DISP=OLD
//DD6    DD      DSN=A,DISP=OLD
//DD7    DD      DSN=B,DISP=OLD
//DD8    DD      DSN=B,DISP+( OLD,PASS )
//S3     EXEC    PGM=IEFBR14
//DD9    DD      DSN=B,DISP=OLD
```

1. DD1 and DD2 pass the same data set. DD5 and DD6 receive that same data set.
2. DD3 and DD4 pass different data sets of the same name, DD7 receives the data set passed by DD3 and DD8 receives the one passed by DD4. DD8 also continues to pass the data set originally passed by DD4.
3. DD9 receives the data set passed by DD4 and DD8.

Routing a Job Through the System (JES2 only)

The operating system interprets JCL statements to determine the resource requirements of jobs and job steps. The job entry subsystem 2 (JES2) reads a job into the system, satisfies the requirements requested on JCL and JES2 statements, schedules the job, and selects it for execution. JES2 automatically performs most of these services for you, but you can code JCL and JES2 parameters to influence how these services are performed. For example, JES2 schedules a job for execution, but you can influence when the job is selected by coding the JES2 PRIORITY control statement and the CLASS parameter of the JOB statement.

This section contains six topics:

- Job Scheduling
- Passing Information to the Job in Execution
- Delaying Job Initiation
- Bypassing Job Initiation
- Conditional Execution of Job Steps
- Restarting a Job

Job Scheduling

The job entry subsystem (JES2) controls the selection of jobs for processing. As JES2 reads a job into the system, JCL statements and any input stream data are placed on respective logical data sets. The JCL and JES2 statements are checked for syntax errors and appropriate error messages are issued. If the JCL statements are syntactically correct, the job is placed on an execution queue. The execution queue is divided into job class queues and, within each job class queue, jobs are placed according to their priority. Jobs in the same class with the same priority are placed on the execution queue in the order they were read into the system. A JES2 initiator is assigned job classes to process. It selects jobs from the first class assigned to it according to the priority of the jobs until no more jobs exist in that class, and then selects jobs from the next class assigned. You can influence how a job is placed in the execution queue—therefore, when it is selected for execution—by assigning a job class and priority to the job. Do this by coding the CLASS parameter on the JOB statement and the JES2 PRIORITY control statement.

To insure that one job is selected before another or that the desired volumes are mounted before a job is executed, delay the job's selection by coding TYPRUN=HOLD on the JOB statement, by coding a job class that will force TYPRUN=HOLD, or by coding a SETUP control statement.

The job initiation stage can be entirely bypassed by coding TYPRUN=SCAN or TYPRUN=COPY on the JOB statement or by coding a job class that will force either of these options.

VS2 includes support for controlling the processing rate of jobs and job steps. The installation defines a certain number of performance group definitions. Each of these defines a particular processing rate formula which is to be used for associated jobs or job steps. To associate a job or job step with performance group definitions, code the PERFORM parameter on either the JOB or EXEC statements.

Assigning a Job to a Job Class

Job classes are established by an installation to group jobs. By assigning jobs to job classes, the installation tries to avoid contention between jobs that require the same resources by preventing them from running concurrently and tries to provide a better mix of jobs for more efficient system use. The installation determines which characteristics are most important in achieving a good balance of jobs in the computing system. Assign a job to a job class by coding the CLASS parameter on the JOB statement.

Assigning a Priority to a Job

Within a job class, jobs are selected for execution from the execution queue according to job priority. Jobs with the same class and priority are placed in the execution queue in a first in/first out order. In most cases, JES2 will calculate the job's priority. However, for certain jobs, you or the operator can be instructed to assign different priorities. Specify job priority by coding a JES2 PRIORITY statement.

Priority is explicitly stated on a PRIORITY statement and used by JES2. The estimated number of cards, lines of output, and the time for job execution are used according to installation algorithms to calculate the priority, and are also used by JES2 to monitor job execution time and output. If these estimates are not stated, installation defaults are assumed. If any of these estimates are exceeded, the operator is notified. In some cases, the installation can specify that the job be canceled. For example, an installation might specify that the lower the estimated execution time and output, the higher the priority. This can enforce correct amounts to be specified or the job will be canceled.

Assigning a Dispatching Priority to Job Steps

In most jobs, you will want the job's dispatching priority to default to an automatic priority group (APG) instead of assigning your own dispatching priority. The automatic priority group function is an algorithm that the system resources manager will use to attempt to increase system throughput by dynamically adjusting the dispatching priority of associated address spaces.

If you do assign a dispatching priority, code the DPRTY parameter on the EXEC statement. In the DPRTY parameter, you can code two values. The system substitutes these values in the following formula to form the dispatching priority:

(value1 x 16) + value2 = step's dispatching priority

If value1 is not coded, the system assumes the APG value for the default. (Value2 has a default of 11.) If you omit the DPRTY parameter completely or if DPRTY is equal to the APG value, the step has the same dispatching priority as the APG value.

Performance of Jobs and Job Steps

You can associate a job or job step with any one of several performance group definitions. Performance group definitions which are supplied by the installation, describe the workload-dependent processing rate which should be afforded to an associated job or job step. Most performance group definitions prescribe good processing rates under light system workload conditions. However, when the system workload is moderate or heavy, some performance group definitions will specify significantly lower processing rates than for other performance groups. The installation defines the number and definition of performance groups needed to meet the response requirements of its various users and will probably publish this information for your use. Make the performance group association with the job or job step by coding an appropriate performance group number on the PERFORM parameter of the JOB or EXEC statement.

For further information concerning performance, refer to the **OS/VS2 System Programming Library: Initialization and Tuning Guide,** GC28-0681.

Passing Information to the Job in Execution

Some information required by a program can vary from application to application, such as module attributes and options required by the compiler, assembler, and linkage editor programs. In order to provide this information to the program at the time it is executed, code the PARM parameter on the EXEC statement. The program must include instructions that can retrieve this information. (The exact location and format of the information passed to a processing program are included in **OS/VS2 Supervisor Services and Macro Instructions**, GC28-0683.)

The PARM parameter can also be coded on the EXEC statement of a cataloged or in-stream procedure step. This establishes fields in which you can pass information to the job. By coding the PARM parameter on the EXEC statement of the job calling a cataloged or in-stream procedure, you can override, add, or nullify parameters in the procedure or define symbolic parameters. For more information on the PARM parameter for these features, see "Cataloged and In-stream Procedures."

Identifying the Program to be Executed

All executable programs are members of partitioned data sets (libraries). The library that contains the program can be a temporary library or a private library. In order to execute a program contained in these libraries, code the PGM parameter as the first parameter on the EXEC statement.

Temporary Library

If in a job you want to assemble, linkage edit, and then execute a program, make the output of the linkage editor a member of a partitioned data set. This is accomplished by creating a temporary library. A temporary library is a partitioned data set created in the job to store a program as a member of the data set until it is executed in a subsequent job step. When the program is required, refer back to the DD statement that defines the temporary library and the member by code PGM=*.stepname.ddname or PGM=*.stepname.procstepname.ddname. You can also request use of a program that is a member of a temporary library by coding PGM=program name and including a DD statement named JOBLIB or STEPLIB that defines the temporary library. To keep this program available for use by other jobs, make the program a member of a private library.

Private Library

Request use of a program that is a member of a private library by coding PGM=program name and including a DD statement named JOBLIB or STEPLIB that defines the private library. The system automatically looks in the private library for a member with the corresponding name.

A program that resides in a private library can also be executed by coding PGM=*.stepname.ddname or PGM=*.stepname.procstepname.ddname. This can be done only when the named DD statement defines the program as a member of a private library.

The IEFBR14 Program

This program is used to check the syntax of the control statements, allocate space, or satisfy requests for disposition processing prior to execution of a job. To do this, substitute IEFBR14 for the program name on the EXEC statement. (If you created a data set when using this program, the data set's status will be old when you execute your own program.)

Selecting a Cataloged Procedure Library

You can choose which of the installation specified cataloged procedure libraries will be used for resolving catalog procedure references in the JCL by coding the PROCLIB parameter on the JOBPARM statement. If this parameter is omitted, a cataloged procedure library associated with your job's class will be used.

Delaying Job Initiation

Although you can influence a job's selection by assigning a job class and priority to the job, you cannot predict whether a job in one job class queue will be selected for execution before another job in a different job class queue. When jobs exist in the same job class queue, you cannot be certain that one job will complete execution before the other job is selected, even if you assign a higher priority to the first job. In some cases, when submitting two jobs, JOBA and JOBB, JOBA must complete execution before JOBB is initiated—JOBA might create records that JOBB will use. JOBB's initiation will have to be delayed until JOBA completes execution. It is also possible that resources a job requires will not be available—in this case, you will want to delay the job's initiation until required resources are available. Delay a job's initiation by coding TYPRUN=HOLD on the JOB statement or by specifying a job class defined by the installation to force a TYPRUN=HOLD default. You can also delay a job's initiation and have specific volumes mounted before the job executes, by coding the SETUP control statement to notify the operator which volumes are required.

To delay a job's initiation, code SETUP, TYPRUN=HOLD, or job class; the job remains on the execution queue but cannot be selected for processing until the operator releases the job. When the operator releases the job, it is again eligible for selection according to class and priority.

If you code a SETUP control statement, you are able to notify the operator what volumes are to be retrieved from the library. The operator will mount the requested volumes and then should release the job.

Bypassing Job Initiation

Under certain conditions you may wish to scan the control statements for syntax errors without submitting the associated input data sets, or you may wish to produce a copy of your input deck without actually initiating any steps.

To scan the control statements for syntax errors without initiating the job, code TYPRUN=SCAN on the JOB statement or select a job class which the installation has defined to force the TYPRUN=SCAN default. With this option coded, the job is first scanned for control statement syntax errors and then passed directly to the output stage for processing.

To produce a copy of the input deck without initiating any steps, code TYPRUN=COPY on the JOB statement or select a job class which the installation has defined to force the TYPRUN=COPY default. With this option coded, the input deck (as submitted) is converted directly to a SYSOUT data set and scheduled for output processing. The class of the SYSOUT data set is the same as the message class of the job and can be controlled by the MSGCLASS parameter on the JOB statement. The SYSOUT data set generated can be processed by either the JES2 output processor or by the external writer, but is not available to the TSO OUTPUT command. JES2 control statements encountered in the input stream are interpreted before being added to the SYSOUT data set; job control language (JCL) statements are copied without any processing (that is, no JCL conversion).

Conditional Execution of Job Steps

Depending on the results of one step of a job, you may not wish to execute subsequent steps—if a compilation fails, you would not want to waste computing time attempting subsequent link-editing or execution steps. Specify tests to determine whether to bypass or execute job steps, based on the results from previous steps by coding the COND parameter on either a JOB or EXEC statement.

The results of a job step can be reflected in a **return code**, a number from 0 to 4095. The COND parameter can be coded to test the return codes which are issued by the compiler, assembler, and linkage editor programs. Some return codes are standard for certain programs; for example, a return code of 8 issued by a compiler or linkage editor indicates that serious errors were found and execution is likely to fail. In problem programs, assign a number as the return code to signify a certain condition. For example, if STEP1 of a job reads accounts to be processed in subsequent job steps, you might set a return code of 10 if no delinquent accounts are found. Before STEP3 is executed to process delinquent accounts, test the return code from STEP1; if the return code from STEP1 is 10—there are no delinquent accounts—you can skip STEP3. Specify the test to check the return code from STEP1 by coding the COND parameter.

You can also instruct the system to execute a step **even** if a previous step has abnormally terminated or **only** if a previous step has abnormally terminated by coding EVEN or ONLY in the COND parameter on a EXEC statement. For example, STEP1 of a job updates records in a data set. If STEP1 abnormally terminates, you want to execute STEP2, which will print the data set. Specify that STEP2 should be executed **only** if STEP1 abnormally terminates by coding ONLY in the COND parameter on the EXEC statement for STEP2.

Specifying Return Code Tests

In the COND parameter, specify tests to determine if the system should bypass a job step. If the system determines that a comparison is true, the job step is skipped (if COND was coded on the EXEC statement) or all remaining job steps are skipped (if COND was coded on the JOB statement).

For example, if you code COND=((10,GT),(20,LT)), you are asking, "Is 10 greater than the return code or is 20 less than the return code?"

If the return code is 12, neither test is satisfied: no job step is skipped. All the tests you specify must be false if processing is to continue without skipping any job steps. If the return code is 25, the first test is still false, but the second test is satisfied: 20 is less than 25. The system will bypass one job step or all remaining job steps, depending on if the COND parameter was coded on the EXEC statement or on the JOB statement.

Restarting a Job

When a job step abnormally terminates, you may have to resubmit the job for execution; this means lost computer time and a delay in obtaining the desired results. The operating system provides restart facilities to reduce the effects of abnormal termination.

There are two types of restarts:

- **Step restart**, from the beginning of a job step.
- **Checkpoint restart**, from a checkpoint within a job step. (You establish checkpoints in a job step by coding the CHKPT macro instruction for each checkpoint. The CHKPT macro is described in **OS/VS Data Management Macro Instructions**, GC26-3793.) See also the DD CHKPT parameter. It specifies that checkpoints are to be taken at end of volume for the data set defined by the DD statement on which it is coded.

Whether using step restart or checkpoint restart, the restart facility can be automatic or deferred.

Automatic restart: To use automatic restart, code the RD (restart definition) parameter on the JOB or EXEC statement. If you use this facility, the presence of a job journal is required. (A **job journal** is established at JES2 initialization in order to hold restart information for each program in execution.) When a system failure occurs or a job step abnormally terminates and you have a job journal, the restart facility allows you to have automatic restart by coding RD=R on the JOB or EXEC statements. If you have taken checkpoints, automatically restart at the last checkpoint regardless of whether you have coded the RD parameter. When a job step abnormally terminates or a system failure occurs while the job is in execution and you do not have a job journal, these jobs are ineligible for automatic restart regardless of whether or not the RD parameter is coded.

Deferred restart: To use deferred restart, code the RESTART parameter on the JOB statement. This required parameter specifies a job step or a step of a cataloged procedure and can specify a checkpoint identifier if you are using deferred checkpoint restart. The effect of the parameter is simply to restart the job at the beginning of the specified step or checkpoint. The SYSCHK DD statement is required when a job is being submitted for deferred checkpoint restart and must specify explicit UNIT and VOLUME information even if the checkpoint data set is cataloged.

Refer to **OS/VS Checkpoint/Restart**, GC26-3784, for a complete description of planning for and using the checkpoint restart facility.

Example of Routing a Job Through the System (JES2 only)

The purpose of this job is to execute five steps to perform an unspecified function. Not all of the steps will execute because conditions are placed on them.

```
/*PRIORITY     *
//ROUTE      JOB      (D58706),ROEGER,MSGLEVEL=(1,1),CLASS=E
//STEP1      EXEC     PGM=IEFBR14
//DD1        DD       SYSOUT=A
//STEP2      EXEC     PGM=IEFBR14,COND=EVEN
//DD2        DD       SYSOUT=A
//STEP3      EXEC     PGM=IEFBR14,COND=ONLY
//DD3        DD       SYSOUT=A
//STEP4      EXEC     PGM=ABEND806
//DD4        DD       SYSOUT=A
//STEP5      EXEC     PGM=IEFBR14,COND=ONLY
//DD5        DD       SYSOUT=A
```

1. This job will use the installation-defined priority default.
2. The JOB statement specifies that only JCL statements and messages are to be written, that the job is assigned to job class E.
3. All SYSOUT data sets will be processed by output class A.
4. STEP1 will execute normally.
5. STEP2 will execute normally.
6. STEP3 will not execute.
7. STEP4 will execute and will abnormally terminate.
8. STEP5 will execute because a preceding step did abnormally terminate.

Obtaining Output (JES2 only)

By coding JCL statements, you can request output data sets, listings of JCL statements, system messages, and abnormal termination dumps. By coding JCL and JES2 statements, you can request special forms processing, routing of output to specific devices, and multiple original printing by data sets within a job. The JES2 statements have the same options as JCL with some additional features such as multiple destination, left and right indexing feature for the 3211 printer, and data set grouping.

This section includes four topics:

- Requesting Listings of JCL Statements and System Messages
- Requesting an Abnormal Termination Dump
- Writing Output Data Sets
- Controlling Output Destination

Requesting Listings of JCL Statements and System Messages

The system produces messages about a job concerning allocation of units and volumes, disposition of data sets, and termination of job steps and the job. You can request that these messages and/or the JCL statements from the job and from cataloged procedures called by the job be included on an output listing.

By coding the MSGLEVEL parameter on the JOB statement, you inform the system of what statements and messages you want included on the output listing. (The notation used on the output listing to identify cataloged and in-stream procedure statements is described in the chapter "Using Cataloged and In-stream Procedures.")

By coding the MSGCLASS parameter on the JOB statement, you assign messages and JCL statements to an output class. A default is assigned if MSGCLASS is not coded.

Requesting an Abnormal Termination Dump

To obtain a dump in the event of abnormal termination of a job step, code a DD statement defining a dump data set. The name of the DD statement must be either SYSABEND or SYSUDUMP. If both are presnet, the last occurance will be used.

The SYSABEND or SYSUDUMP DD statements can provide a dump containing the processing program's virtual storage area, the system nucleus, the entire system queue area, all local system queue areas, and any active link pack area (LPA) modules for the failing task. If the generalized trace facility (GTF) is active in the system and performing an internal trace, you receive GTF trace records. If GTF is active but performing an external trace, no trace information is included in the dump. Determine what dump features are wanted in addition to the installation defaults and define them in a dump option list. How to do this is explained in the **System Programming Library: Supervisor**, GC28-0628.

Descriptions of dumps and information on reading dumps are included in the **OS/VS2 System Programming Library: Debugging Handbook**, GC28-0632.

To have the dump printed, either assign the dump to an output class in the SYSOUT parameter on the DD statement or code the UNIT parameter and specify the printer you want. To store the dump, define the data set as you would any other data set, code the DSNAME, DISP, UNIT, and VOLUME parameters. If the data set will go to a direct access device, code the SPACE parameter.

If a private data set is specified and more than one dump is possible, the data set should be specified with a disposition of MOD as it will be closed after each dump.

Writing Output Data Sets

There are two ways to write output data sets:

- Assign the data set to an output class.
- Specify the device on which the output should be written.

When you assign a data set to an output class, it is handled by JES2. The data set is first written to the JES2 spool device and then written to the final output device by either JES2 or an external writer. When you specify the device on the UNIT parameter, if the device is available, it is exclusively assigned to your job and under the control of your program.

Output data sets to be written to a 3540 diskette must be assigned to an output class that is processed by the diskette writer (an external writer) as described in **OS/VS2 IBM 3540 Programmer's Reference**, GC24-5111.

Assigning Output Data Sets to Output Classes

Output classes include output with similar characteristics that are written to the same device. There are 36 possible output classes that can be coded on either the SYSOUT or MSGCLASS parameters. The letter and number names have no inherent meaning;—each installation defines its own output classes. For example, output class W might contain low priority output; class X might be reserved for high-volume output. If you want the output data set and messages from the job to be printed on the same output listing, specify SYSOUT=* or the same output class in the SYSOUT parameter as specified for messages in the MSGCLASS parameter.

The installation can designate certain SYSOUT data sets as reserved. Reserved classes can cause the data sets to be held; that is, not sent to JES2 output processing. If the output class specified for the MSGCLASS parameter is not designated as a reserved class, it will not be held and none of the job's data sets assigned to reserved classes will be held. Data sets can be explicitly held by coding either the HOLD=YES JCL parameter or the HOLD parameter on the ALLOCATE and FREE TSO commands. (Refer to **OS/VS2 TSO Command Language Reference**, GC28-0646, for information on the TSO commands.) Jobs can be released from the hold state by the operator or by the time-sharing user with the OUTPUT TSO command. By using reserved classes, the controlling of the holding or not holding of all desired print data sets is done by means of the MSGCLASS parameter on the JOB statement.

Specifying the Device

To write an output data set without using the JES2 SYSOUT service, code the UNIT parameter on the DD statement defining the device on which the data set is written. The system will allocate the device exclusively to the job if the device is available: no other job can write output to that device until it is released. Jobs cannot share an output device as they can when output is assigned to output classes.

Data management routines write the output from the program to the device specified in the UNIT parameter. Specifying a particular output device in the UNIT parameter generally is not the most efficient method for obtaining system output.

Processing Output Classes

Using JES2 is an efficient way to write output. JES2 supports the use of local and remote printers and punches as devices on which output classes are written. An external writer supports tape and direct access devices and user-written writer routines.

Job related output is output that is neither held nor spun off nor processed by a user-written writer. (A spun off data set is made available for output processing before job termination.) Job related output will be retained until the end of the job and printed by JES2. All dynamically deallocated SYSOUT data sets are spun off and, as with held output, are not considered part of the job related output.

Output will be printed on the same listing if such parameters as CLASS, FORMS, FCB, UCS, and DEST have similar characteristics for all data sets and a user-written writer is not specified. The installation may choose to put all data sets that specify the same output class as the MSGCLASS parameter out on the same listing, even though FORMS, UCS, FCB, and DEST are different.

For an external writer, the operator will determine what data set will be selected. This can cause certain output to print out on the same listing even though all of the FORMS, DEST, UCS, and FCB parameters do not indicate the same characteristics.

Either an IBM-supplied external writer or a user-written writer can process the output. The external writer must be started by the operator to have the data written to an output device. If you want to know more about how to write an external writer routine, refer to **OS/VS2 System Programming Library: Job Management,** GC28-0627.

Delaying the Writing of an Output Data Set

Data sets can be delayed from normal printing or delayed for inspection from a time sharing terminal prior to actually printing on that terminal by specifying reserved classes and by coding the HOLD parameter. For example, the installation can direct the delayed printing of a very large data set to prevent monopolizing an output device until smaller data sets are written. If a data set requires special forms that are not immediately available, it can be held until the operator supplies those forms. When HOLD=YES is specified on the DD statement, the data set is placed on a hold queue until the operator releases it. Notify the operator (using the NOTIFY parameter for TSO or the MESSAGE statement for JES2) when that data set is ready for processing because no message will be sent to the operator. The data set can be released by the operator or time-sharing user for printing.

Suppressing the Writing of an Output Data Set

Whether writing an output data set by coding the SYSOUT parameter or the UNIT parameter, you can suppress the writing of the data set by defining it as a dummy data set. This is useful when testing a program and you do not want data sets printed until you are sure they will contain meaningful output. Suppressing the writing of a data set saves processing time.

If you are routing an output data set by coding the SYSOUT parameter, code the DUMMY parameter to define the data set as a dummy data set. When DUMMY is coded, the SYSOUT parameter is ignored and the data set is not written.

You can also suppress the writing of an output data set by specifying a particular installation-defined class defined to delete the data set before it is printed. This technique is used by the installation to suppress the output of started tasks such as START and MOUNT commands.

If the device on which the data set will be written is specified in the UNIT parameter, you can assign the data set a dummy status by coding DUMMY or by assigning the data set name NULLFILE. All parameters other than DUMMY or DSNAME=NULLFILE and DCB are ignored; no units are assigned to the data set. When the program requests that the data set be written, the request is recognized but no data is transmitted. The facility is available by use of the basic sequential access method (BSAM) or queued sequential access method (QSAM) in a request to write a dummy data set. If any other access method is used, the job is terminated.

Limiting Output Records

The number of logical records in the output data set can be limited by specifying a maximum number of records through the use of the OUTLIM parameter. For example, a program is printing and goes into an endless loop. You can anticipate this problem and only have a maximum number of records printed before having the system discontinue the output processing.

Requesting Page Overflow Processing

JES2 will automatically limit the number of lines printed per page, thus preventing printing over the edge of the form, if requested either by the installation during JES2 generation or by the programmer coding LINECT or the JOBPARM statement. The installation specified number of lines per page can be overridden by the JOBPARM LINECT parameter or line limiting can be turned off by coding LINECT=0. Set the line count sufficiently large to prevent unwanted page ejects for output from programs that provide page eject carriage control parameters.

Interpretation of Punched Output

Cards punched on a 3525 card punch from output spooled by JES2 will be interpreted if you code FUNC=I as a DCB subparameter on the SYSOUT card and if the spooled output is processed by a JES2 writer rather than the external writer. The FUNC=I subparameter will be ignored if the spooled output is processed by the JES2 writer onto a card punch other than the 3525. You could check with the installation to determine if a special output class has been set aside for 3525 output. Card interpretation by the external writer is an operator specified function. Output to be interpreted should be placed in a class designated by the installation as a punch with interpretation class.

JES2 Support of the 3211 Indexing Feature

You can specify that output that is printed by the JES2 writer onto a 3211 printer be indexed to the right or to the left by coding the IDNEX or LINDEX parameters, respectively, on the OUTPUT statement. These parameters will be ignored if the output is processed by the external writer or is processed to a device other than a 3211. Determine whether an output class has been set aside to designate output to be processed by a JES2 writer onto a 3211 printer by asking the installation's system programming staff.

Requesting Multiple Copies of an Output Data Set

You can control the number of hard copies produced by the SYSOUT data sets. As many as 255 copies of an output data set are obtained by coding the COPIES parameter on the SYSOUT DD statement defining the data set or on the JES2 OUTPUT control statement. As many as 255 copies of the entire job related output are obtained by coding the COPIES parameter on the JES2 JOBPARM control statement.

If you request multiple copies of job related output by coding the OUTPUT or SYSOUT DD statements and the JOBPARM control statement, JES2 output processing will give the multiple of the requested amount for each SYSOUT data set. For example, if you request two copies of the entire job output (code COPIES=2 on the JOBPARM statement) and three copies of a certain output data set (code COPIES=3 on a SYSOUT DD statement or OUTPUT control statement), you will receive two copies of the entire job output but will receive a total of six copies of the SYSOUT data set. If the data set has been written directly to an output device, held, spun off, or processed by an external writer, however, it is no longer a job related data set and is not affected by the COPIES parameter on the JOBPARM statement. In this example, you would receive three copies of the requested output data set.

Requesting Forms and Print Chain Control

When requesting that an output data set be printed, you can give JES2 special instructions on how to print the data set. You can request:

- A special output form.
- A special character set, when output is being printed by a 3211 or 1403 printer with the universal character set.
- A specific image, which controls how many lines per inch are printed and the length of the form, when the data set is written to a 3211 printer.
- A specific carriage control tape, when the data set is written to a 1403 printer.

Requesting a Special Output Form

Special forms are requested for output data set printing by including the form name in the SYSOUT parameter on the DD statement defining the data set or on the OUTPUT control statement. For example, assign a data set to an output class to be routed to a printer and specify the data set be printed on a special form. (For example, code SYSOUT=(A,,FMS2).) JES2 and the external writer insure that the proper form is mounted.

The entire job can be printed on a special form by coding the FORMS parameter on the JOBPARM statement. If you code a forms name on either the SYSOUT or the OUTPUT statements, it will override the forms name in the JOBPARM statement.

Requesting a Special Character Set

Universal character set (UCS) features are requested by coding the UCS parameter on a DD statement defining an output or SYSOUT data set or by coding UCS on the OUTPUT control statement for SYSOUT data sets. You can request UCS features for different sets of characters to be printed for various applications.

To request a special character set for a 3211 or 1403 printer, specify the code identifying the character set in the UCS parameter or the OUTPUT statement. The codes for the IBM standard special character sets are in Figure 10.

1403	3211	Characteristics
AN	A11	Arrangement A, standard EBCDIC character set, 48 characters
HN	H11	Arrangement H, EBCDIC character set for FORTRAN and cobol, 48 characters
	G11	ASCII character set
PCAN		Preferred alphameric character set, arrangement A
PCHN		Preferred alphameric character set, arrangement H
PN	P11	PL/I alphameric character set
QN		PL/I preferred alphameric character set for scientific applications
RN		Preferred character set for commercial applications of FORTRAN and COBOL
SN		Preferred character set for text printing
TN	T11	Character set for text printing, 120 characters
XN		High-speed alphameric character set for 1403, Model 2
YN		High-speed preferred alphameric character set for 1403, Model 3 or N1

Figure 10. Special Character Sets for the 1403 and 3211 Printers (JES2)

Note: Where two values exist (for the 1403 and 3211 printers), either can be coded and JES2 will select the set corresponding to the device onto which the data set is printed.

Not all of these character sets may be available at your installation. In addition, the installation can design character sets to meet special needs and assign a unique code to them. See the system programming staff for a complete list of available character sets for the installation.

Requesting a Specific Image

Specific images (for example, the number of lines per page or number of characters per line) for a 3211 printer are requested by coding an image identifier in the FCB parameter in JCL or by coding FCB on the OUTPUT control statement. The FCB parameter can also specify a specific carriage control tape for the 1403 printer for JES2 output processing only (it is ignored by the external writer).

IBM provides four standard FCB images, STD1, STD2, 6, and 8. STD1 and 6 specify that six lines per inch are to be printed on an 11 inch form. STD2 and 8 specify that eight lines per inch are to be printed on an 8.5 inch form. (Do not specify STD1 and STD2 for JES2 processing unless instructed by your installation). Additional FCB images can be specified by the installation.

Controlling Output Destination

JES2 allows you to submit jobs to a central computing center from a work station and to route output to work stations.

The default output location is the submitting location, either a remote work station or the central site (destination of LOCAL). To receive the output at the submitting location, simply assign output data sets to any output class (with the SYSOUT parameter) and messages from your job to an output class (with the MSGCLASS parameter). JES2 at remote stations offers most of the same options for writing data sets that are requested when submitting the job at the central computing center. You can request:

- That a data set be held until the operator requests that it be printed.
- That a special output form be used by specifying a form name in the SYSOUT parameter.
- That multiple copies of the data set be used.

Whether at a remote station or at the central computing center, you can also request that a data set be routed to another destination. To route an output data set to another destination, code the identification of that destination in the DEST parameter on the DD statement defining the data set or code DEST on the OUTPUT statement. If you code a destination on either the SYSOUT or the OUTPUT statements, it will override the destination in the ROUTE statement. Work stations are identified by a destination identification that has been established by the system programmer. The destination parameter will cause output to be routed to local printers or punches or to any remote station.

Example of Obtaining Output (JES2 only)

This example shows the use of JES2 and JCL statements that can be used to obtain output.

```
/*PRIORITY  5
//OUTJOB    JOB     BAKER,PERFORM=100,MSGCLASS=J
/*JOBPARM   COPIES=2,LINECT=20,ROOM=233,FORMS=GRN1
/*OUTPUT    PSET DEST=PRINTER8,FCB=STD3,FORMS=2PRT,UCS=TN
/*SETUP     253194
//STEP1     EXEC    PGM=TESTSYSO
//DD1       DD      DSN=DATA,UNIT=2314,VOL=SER=SCHLIB,
//                  DISP=(OLD,KEEP),SPACE=(TRK,(5,2))
//DD2       DD      DSN=&TEMP,UNIT=2314,DISP=(NEW,DELETE),
//                  SPACE=(TRK,(10,5))
//DD3       DD      SYSOUT=(A,,PSET)
//DD4       DD      SYSOUT=(A,,GRPH)
//DD5       DD      SYSOUT=L
```

1. The job will be selected at priority level 5.

2. The job will run in performance group 100; the meaning of 100 is defined by the installation. All system messages are to be written to output class J.

3. The JOBPARM statement indicates that:

   a. Two copies of the entire job related output will be printed.
   b. No more than 20 lines per page will be printed (LINECT=20).
   c. The programmer's office number is 233. This appears on the separator page and is used for distributing output.
   d. Forms name GRN1 is the name of the form to be used by all data sets unless a specific form is defined on a DD statement.

4. The OUTPUT statement indicates that:

   a. PSET is the code that, when indicated on a DD statement, causes all parameters on the OUTPUT statement to override default parameters.
   b. The destination for the output is a printer and is number 8 if it is local print/punch routing; otherwise, PRINTER8 is equalvalent to LOCAL.
   c. If the printer has the forms control buffer feature, STD3 must be the name of a member of SYS1.IMAGELIB. STD3 defines the special forms control buffer image to be used for processing the job.
   d. Forms name 2PRT is the name of the forms for data sets coding PSET in the SYSOUT parameter.
   e. TN means text printing on a 1403 printer.

5. The SETUP statement indicates that volume 253194 should be mounted before this job begins processing.

6. SYSOUT data sets and message class are printed on green (GRN) paper except DD3 and DD4. The DD4 SYSOUT data set is printed on graph (GRPH) paper; the DD3 SYSOUT data set is on 2 part paper.

Routing a Job Through the System (JES3 only)

The job entry subsystem 3 (JES3) reads a job into the system, satisfies the requirements requested on JCL and JES3 statements, optionally preschedules JES3 supported devices, selects the job for execution, and controls the processing of SYSOUT data sets. JES3 automatically performs most of these services, but by coding JCL and JES3 parameters you can influence how these services are performed. For example, JES3 schedules a job for execution but you can customize how and when the job is processed by coding one or more of the parameters on the JES3 MAIN statement. The MAIN SYSTEM parameter is used to direct a job to a specific processor in a loosely-coupled multiprocessing environment and the MAIN SETUP parameter is used to modify JES3 device selection algorithms. In loosely-coupled multiprocessing systems, processors are connected by channel-to-channel adapters that pass information among the JES3 system operating on each processor and between global and local processors are connected by shared direct access devices that contain JES3 and system control blocks and user data. One processor, the global, controls job selection for all processors in the system. The other processors are local processors and/or MVT or VS2/1 systems that are configured as ASP main processors.

To ensure that one job is selected before another, use dependent job control (DJC). To ensure that a job is scheduled by a certain time, use deadline scheduling (MAIN DEADLINE). To hold a job for any other purpose, such as availability of input data, code TYPRUN=HOLD on the JOB statement or use the HOLD parameter on the MAIN statement.

MVS includes support for controlling the processing rate of jobs and job steps. The installation defines a certain number of performance groups. Each of these defines a particular processing rate to be used for associated jobs or job steps. To associate a job or job step with an MVS performance group, code the PERFORM parameter on either the JOB or EXEC statements.

This section contains six topics:

- Scheduling a Job
- Selecting a Processor
- Allocating Devices
- Selecting a Job
- Passing Information to the Job in Execution
- Restarting a Job

Scheduling a Job

JES3 controls the selection of jobs for processing. When a job is read into the system, it is initially placed on a spooling disk pack. The JCL and JES3 statements are checked for syntax errors and if they are correct, JES3 determines allocation requirements for the job. JES3 device selection takes place next. Devices are selected based on device requirements for JES3-managed devices established in the JCL. Any necessary volumes that require mounting are requested. (More information on this subject is found in the Allocating Devices section.) Once all JES3-managed devices are selected and the first volume on each device is mounted (unless deferred mounting is requested or implicit high watermark setup is used), the job is placed in the queue for execution. (Implicit high watermark allocates a minimum number of devices to run a job.)

When JCL and JES3 statements have syntax errors, appropriate error messages are issued and the job is terminated. When the job has JES3 allocation errors, error messages are issued and execution is bypassed.

The execution queue is logically divided into groups of job classes specified by the installation and within each job class group, jobs are placed according to their job priority. Jobs in the same job class group with the same job priority are placed in the execution queue in the order they were read into the system. The various job class groups are assigned priorities by the installation. JES3 starts system initiators on each processor and assigns them a job class group to process based on the installation priorities. It selects jobs from any class assigned to it. Jobs are selected by job class, processor eligibility, workload balancing, and priority order as described in the section, "Selecting a Job".

Selecting a Processor

JES3 usually automatically selects a processor for a job based on device, volume, and data set dependencies known to it. However, if any of the dependencies are not known to JES3, the job can be processed incorrectly or can fail. The next section, "Allocating Devices," discusses these dependencies in more detail. There can also be processor dependencies; that is, a special system feature such as an emulator, non-standard catalog, or system-managed device, that JES3 will not recognize unless you define which processor or control program is required on the SYSTEM and TYPE parameters on the MAIN statement. The MAIN SYSTEM parameter specifies the processor and the MAIN TYPE parameter specifies the control program for the job.

The MAIN SYSTEM subparameters, JGLOBAL and JLOCAL, request a specific VS2 processor; ASP requests an ASP main processor. To specify particular processors or exclude particular processors, code the main-name value on the MAIN SYSTEM parameter for each processor.

The MAIN TYPE subparameters, MVT and VS2/1, request a specific control program on an ASP main processor; VS2 requests a specific control program for either a global or local processor.

It is not necessary to specify both SYSTEM and TYPE unless you want to exclude particular processors. For example, TYPE=VS2,SYSTEM=/x indicates that the job can execute on any VS2 processor except x.

Not all classes are eligible to run on all processors; therefore, make sure that the job class for the job is eligible before selecting a specific processor.

A job is flushed if it specifies a job class (on the JOB or MAIN statements) and a specific process(s) (on the SYSTEM and TYPE subparameters on the MAIN statement) that are incompatible. A processor(s) is defined for each valid job class on the CLASS initialization statement during JES3 initialization. For example, if a job specifies CLASS=C and SYSTEM=SY1, then the processor SY1 must have been defined on the CLASS initialization statement for class C.

Allocating Data Resources

Data resources, that is, devices, data sets, and volumes that are required for each DD request, are allocated either by JES3 or by the system according to DSNAME, DISP, and UNIT on the DD statement. If your data set is an existing data set and specifies or requires a unit managed by JES3, JES3 will allocate the request on a job basis before the job executes by examining the request in relation to other data requests in this and other jobs. Otherwise, the system will allocate the request on a step basis as the step enters execution.

Devices are divided into three catagories in a JES2-controlled system: system-managed, jointly managed, or JES3-managed. The following chart indicates what type of devices are eligible for each type of allocation.

How Managed	Attribute of Device	
	Permanently Resident	Removable
System-managed	X	X
Jointly managed	X	
JES3-managed		X

JES3 allocation (job setup, high watermark setup, and explicit setup explained later in this topic) will utilize JES3-managed devices and jointly managed devices. System allocation will utilize system-managed and jointly managed devices. The system programmer defines the devices that are in each catagory managed by either jointly or by JES3.

The system and JES3 must determine which one will handle the device allocation. The first consideration is, is the data set name permanently resident (as defined by the system programmer)? If it is permanently resident and no volume is specified, the system allocates the request. If the data set is permanently resident and a volume is specified, it is handled like all other requests that are not permanently resident. If the data set is not permanently resident, the volume is a specific request, and the unitname is assigned to JES3, then JES3 allocates the request. Otherwise, the system will allocate it. All nonspecific, non-private direct access devices are allocated by the system. Refer to **OS/VS2 System Programming Library: Job Management**, GC28-0627, for additional information on JES3 and system allocation. Refer to "Requesting Units and Volumes" earlier in this book for a brief discussion of system allocation.

Types of JES3 Setup

JES3 supports three types of setup: job setup, high watermark setup, and explicit setup.

Job setup. Job setup results in allocation of all JES3-managed units required in the job. By specifying SETUP=JOB on the MAIN statement, JES3 will mount the initial volumes necessary to run all steps before the job executes. When volumes are no longer needed, they will be demounted and the devices deallocated (that is, made available for use by another job). If FREE=CLOSE is specified, the deallocation takes place when the data set is closed.

High watermark setup. High watermark setup attempts to allocate a minimum number of devices to run the job. SETUP=THWS, SETUP=DHWS, and SETUP=HWS on the MAIN statement define whether the high watermark setup is for tapes, disks, or both. When volumes are no longer needed, they can be demounted and the devices deallocated (that is, made available for use by another job). If FREE=CLOSE is specified, the deallocation takes place when the data set is closed. When it is advantageous to use fewer devices for a job, high watermark setup is preferable to job setup. In Figure 11, two volumes A and K, are mounted for use in STEP1 and then demounted when not in use until they are needed in STEP4. They are mounted in STEP4 on any available device.

Explicit setup. Explicit setup is user directed and can allocate more than the minimum number of devices requested to run the job, sometimes eliminating remounts of volumes. SETUP=ddname or SETUP=/ddname on the MAIN statement specifies explicit setup and the ddname request to be setup or to be removed from consideration for setup. An advantage of explicit setup over high watermark setup is that volumes can be forced to remain mounted on devices until they are no longer needed. However, there is one disadvantage if explicit setup is specified: there is no early deallocation of devices. Job setup and high watermark setup can deallocate devices at the end of any step if the devices are no longer needed. Explicit setup, however, allocates a certain number of devices before job execution and does not deallocate any until the job completes execution.

If Figure 11, four devices are allocated for both tape and disk instead of the three allocated using high watermark setup. By explicitly requesting that certain volumes be mounted, volumes A and K can avoid being deallocated and remounted for the last step.

Devices and Volumes to be Allocated	Three Types of JES3 Setup																								
	Job Setup (SETUP=JOB)											*High Watermark Setup*[1] (SETUP=HWS)						*Explicit Setup* (SETUP=ddname)							
	Tape						Disk					Tape			Disk			Tape				Disk			
Volumes on Devices Set Up Prior to Execution	A	B	C	D	E	F	K	L	M	N	O	A	B	D	K	L	N	A	B	C	D	K	L	M	N
Steps in a Job[2] STEP1 tape volume=A, B disk volume=K, L	■	■	▨	▨	▨	▨	■	■	▨	▨	▨	■	■	▨	■	■	▨	■	■	▨	▨	■	■	▨	▨
STEP2 tape volume=B, C, D disk volume=K	▨	■	■	■	▨	▨	■	▨	▨	▨	▨	■ C	■	■	■	▨	▨	▨	■	■	■	■	▨	▨	▨
STEP3 tape volume=D disk volume=L, M, N	▨	□	□	■	▨	▨	▨	■	■	■	▨	▨	▨	■	■ M	■	■	▨	▨	▨	■	▨	■	■	■
STEP4 tape volume=A, E, F disk volume=K, N, O	■	□	□	□	■	■	■	□	□	■	■	■ A	■ E	■ F	■ O	■ K	■	■	▨	■ E	■ F	■	▨	■ O	■
Total devices used by the job for setup	6 Tape						5 Disk					3 Tape			3 Disk			4 Tape				4 Disk			

LEGEND:

■ The device is allocated and in use

▨ The device is allocated but not in use

□ The device is no longer needed and can be deallocated

[1] High watermark setup can express combinations of tape and disk allocations.
HWS request allocation of the minimal number of devices required to run the job.
THWS requests high watermark setup for tapes and job setup for disks.
Job setup requests units for every unique volume in the job.
DHWS requests high watermark setup for disks and job setup for tapes.
Job setup requests units for every unique volume in the job.

[2] Volumes mounted after STEP1 are indicated by placing the volume name in the box for the step in which it is allocated. For example, in high watermark setup, volume C is mounted at STEP2.

Figure 11. Example of JES3 Setup

To avoid holding devices until the step needs them for any of the forms of JES3 allocation, use dependent job control. See the topic, "Dependent Job Control," later in section to determine how to split a job into smaller, dependent jobs for execution.

Selecting a Job

Jobs are selected for execution according to processor eligibility, job class, job processing balancing, and priority order. A job must first be eligible for a particular processor, then selection is by class (as defined by installation criteria) and optionally by workload characteristics and by priority. Processor eligibility is discussed in the section, "Selecting a Processor."

Assigning a job to a job class. A job class is a description of the type of job being submitted; that is, production, testing, and so forth. It is established by the installation and has no inherent meaning except as the installation has defined it. It is used by the installation for scheduling jobs on eligible processors. To assign a job to a job class, code the CLASS parameter on the JOB statement or the CLASS parameter on the MAIN statement. If neither of these parameters are coded, the job will be assigned an installation-defined standard class default.

Establishing job processing balance. The MAIN IORATE parameter specifies a value for the job to determine the mix of jobs for each processor. It defines the relationship between CPU-bound processing and I/O-bound processing for that job which is expressed as being high, medium, or low I/O. JES3 attempts to provide a balance of CPU-bound and I/O-bound jobs to improve the scheduling of jobs for execution. The MAIN IORATE parameter regulates how a job is scheduled as contrasted with the PERFORM parameter on either the JOB or EXEC statement that regulates how a job executes. The PERFORM parameter is discussed in the section, "Performance of Jobs and Job Steps."

Assigning a priority to a job. Within a job class group, jobs are selected for execution according to job priority. Jobs with the same priority are placed in a first in/first out order. Specify job priority by coding the PRTY parameter on the JOB statement.

The priority order for jobs can be changed by the operator, by priority aging, or by deadline scheduling. How the operator changes priority is discussed in the JES3 operator's reference.

Priority aging allows JES3 to increase the priority of a job after it has been passed over by JES3 an installation-specified number of times because of an insufficient number of devices or contention for a volume or data set. The installation defines priority aging; it cannot be specified using JCL.

Deadline scheduling allows you to specify a time of day when the job should be scheduled. If the job is not scheduled by this time, JES3 will increase the priority of the job at installation-defined intervals until it is scheduled. For more information on deadline scheduling, refer to the next section.

In addition to job selection, raising a job's priority will cause the job to be given preferential treatment in JES3 device selection. For more information on JES3 device selection, see "Allocating Devices."

Deadline Scheduling

When a job must be scheduled by a certain time of the day, week, month, or year, specify this on the MAIN DEADLINE parameter. By indicating that there are time restrictions, you influence the priority of the job and help insure that the job will be scheduled when necessary. For example, a job must be shceduled every Friday by 2 p.m. to calculate the payroll. Request that the job be scheduled by that time by coding //*MAIN DEADLINE=(1400,A,6,WEEKLY). The subparameter values mean the following:

1400 is 2 p.m. on a 24-hour clock.
A defines the deadline type that determines the periodic increment of the job's priority (the meaning for A is defined by the installation).
6 is the sixth day of the week (the first day is Sunday; the seventh day is Saturday).
WEEKLY is the cycle indicating the frequency of scheduling this job.

The purpose of deadline scheduling is to allow submission of a job at its true priority level and have JES3 schedule it to best use the available resources. The priority level will be increased only if the job is not scheduled on time. For example, if you work first shift and submit a job at the end of the day, you do not need results until the next morning. Indicate that the job must be scheduled by 7 a.m. and assign an initial lower priority, then the job can be scheduled at any time. If it has not been scheduled a few hours before the 7 a.m. deadline, the priority will be increased periodically to increase the job's chances for being selected by 7 a.m.

If you have requested that a job be scheduled by a certain time on a certain day and the job is submitted after the deadline time, the priority of the job is incremented to the same level it would have been if it had been submitted prior to the deadline and not completed.

Postponing Job Selection

It is possible that resources other than those managed by JES3 will not be available; for example, you may want to read a job before all input is available. In this case, delay the job's selection by coding TYPRUN=HOLD on the JOB statement or HOLD=YES on the MAIN statement. When delaying a job's initiation, the job remains on the selection queue but cannot be selected for processing until the operator releases the job. Notify the operator when to release the job on the JES3 OPERATOR statement or on the JCL command statement. When the operator releases the job, it is again eligible for selection.

Performance of Jobs and Job Steps

To regulate the execution performance of a job, associate a job or job step with a performance group. The installation defines performance groups that determine the rate at which a given job will have access to the CPU, storage, and I/O channels. Most performance groups designate good processing rates under light system workload conditions. However, when the system workload is moderate or heavy, some performance groups will have significantly lower processing rates than others. The installation defines the performance groups needed to meet the response requirements of its various users and will probably publish this information for your use. Associate the performance group with a job or job step by coding a performance group number on the PERFORM parameter on the JOB or EXEC statements. The PERFORM parameter regulates how a job executes as contrasted with the MAIN IORATE parameter that regulates how a job is scheduled. The MAIN IORATE parameter is described in the section, "Selecting a Job."

For further information concerning system performance, refer to **OS/VS2 System Programming Library: Initialization and Tuning Guide**, GC28-0681.

Assigning a Dispatching Priority to Job Steps

For most jobs run on MVS, the job's dispatching priority will default to an automatic priority group (APG) instead of being assigned. The automatic priority group function is an algorithm that the system resources manager will use to attempt to increase system throughput by dynamically adjusting the dispatching priority.

If you do assign a dispatching priority, code the DPRTY parameter on the EXEC statement. This parameter has two values that the system uses in the following formula to calculate the dispatching priority:

```
(valuel x 16) + value2 = step's dispatching priority
```

If valuel is not coded, the system assumes the APG value for the default. (Value2 has a default of 11.) If the DPRTY parameter is omitted completely, or if it is equal to the APG value, the step has the same dispatching priority as the APG value. A job run on an ASP main processor can have the dispatching priority be the default execution priority.

Execution Priority (for ASP Main Processors only)

If MAIN JPRTY=JOB is coded, the execution priority default is the same as the value specified on the PRTY parameter. If MAIN JPRTY=JES3 is coded, the PRTY parameter on the JOB statement value is not the default execution priority. The default is the priority value stated on the CLASS initialization statement. A job run on MVS will ignore any JPRTY value.

Dependent Job Control

Dependent job control (DJC) is used when jobs must be executed in a specific order determined by job dependencies. There are several reasons for requiring one job to process before another. For example, in JES3, data set information is fetched from the catalog before the job is scheduled. If JOBA changes or adds to a catalog that JOBB will refer to, use dependent job control to ensure that JOBA runs before JOBB is processed by JES3 allocation. Another reason for using DJC is to achieve better device utilization. If a job requires only one device for the first four steps but requires five devices for the fifth step, break the job into two jobs (one for the first four steps and one for the fifth step). Use DJC to make the second job dependent on the first; that is, the second job can run only after the first job has completed. DJC is also useful in controlling the scheduling of jobs that have data dependencies.

To define a dependent job net, submit a NET statement with each job. The NET statement identifies a job's net and specifies the dependency that must be satisfied before the job can be scheduled. Jobs normally must wait for scheduling until a predecessor job completes. Jobs that depend on one or more predecessor jobs to complete are called successor jobs. To specify the number of predecessor/successor relationships of a given job in a net, specify the number of predecessor jobs on the NHOLD parameter and the name of each successor job in the RELEASE parameter of the NET statement. The number of predecessors is the number of jobs immediately prior to the job dependent upon other jobs completing; the number of successors is the total number of all jobs remaining to be processed in the net that depend on this job completing.

A normal or abnormal predecessor completion can be the requirement established for going to the next job. For example, JOBAB might not be requested unless the predecessor job abnormally terminates. The NORMAL and ABNORMAL parameters on the NET statement specify the kind of predecessor completion required for the successor dependent job to execute.

The number of immediate predecessor jobs that must complete before a job is released for scheduling, including jobs from another network that are predecessors to the dependent job, are specified on the NHOLD parameter. When this parameter is defined, the job is placed into dependent job control hold status when it enters the system. A job is made eligible for JES3 allocation and scheduling when its NHOLD count, which is decremented when each predecessor job completes execution or by the operator, becomes zero. However, the NHOLD value can be decremented before the predecessor job completes execution by issuing a special WTO (write-to-operator) in the predecessor job problem program. Refer to **OS/VS2 System Programming Library: Job Management**, GC28-0627, for the format of the write-to-operator command.

To place jobs in operator hold that are in a dependent job net, code the NET OPHOLD parameter. This parameter action prevents scheduling of the job until it is explicitly released from hold by the operator.

Upon either normal or abnormal completion of a predecessor job, a successor job can have its NHOLD count decremented, can be flushed from the system, or can be retained pending operator action. If it is flushed, the job and all of its successor jobs (and their successor jobs) are canceled, printed, and flushed from the system. If it is retained in the system in the held state, the NHOLD count is not decremented and the job and all of its successor jobs are suspended from scheduling until either the predecessor is resubmitted or the operator decrements the NHOLD. You can control external dependencies by setting the NHOLD value one greater than normally assigned and asking the operator to decrement the NHOLD count when the dependency is satisfied.

Early setup of successor job resources is indicated on the RELSCHCT parameter. It allows a job to enter JES3 allocation before all precedessor jobs have completed. The job is then placed in a hold status until all of its predecessors complete processing. Early setup of successor job resources is invoked when the NHOLD count becomes less than or equal to the RELSCHCT count. This option must not be used with jobs that have catalog dependencies. Coding the RELSCHCT parameter can tie up devices and data sets for an extended period of time, so it should be used carefully.

Dependencies can be established between jobs in different nets. To indicate that a job in one network is the predecessor to a job in another network, specify the NETREL parameter. See the of dependent job control example on the following pages to show the use of the NETREL parameter.

Devices can be dedicated to a dependent job net by coding the DEVPOOL parameter. When the DEVPOOL parameter is coded in the first job in a net, (it is ignored if not coded in the first job) the devices specified are dedicated for device allocation and volume mounting only by jobs in the same net. To release these devices prior to all jobs completing in the network, code the DEVRELSE parameter. This parameter may be specified on one or more jobs in the net, except the first job. The first completing job that contains DEVRELSE=YES will cause the dedicated devices to be released. If no such job is encountered, the devices are released when the net is purged.

How to Code NET Statements

When a job is part of a net, the number of predecessor jobs and the names of all successor jobs must be indicated on the NET statement. A diagram is a good way to graphically show the relationship of jobs in a net. Once a net of dependent jobs have been described in a diagram, the dependencies can be listed in a table and then translated into NET statements. (See the following three examples.) The following is a guideline for defining dependent job control nets:

1. Draw a diagram of the net, connecting dependent jobs with lines indicating the flow of job dependencies. Give the net a name (such as EXAM1) to identify the net; this becomes the NETID parameter value.
2. List the jobname of each job in the net in the order of their dependencies on one another. Note next to each jobname the number of predecessors to the job, including predecessors of other job-nets, if applicable. The number of predecessors becomes the NHOLD parameter value. If early setup scheduling is desired, specify it as RS=count (RELSCHCT=count) where count specifies setup of a dependent job's resources before all of its predecessors have completed execution.
3. List the disposition of each successor jobname based on normal or abnormal predecessor completion.

4. List the successor jobnames for each job in the diagram. If there is a successor in a different net, then list the successor jobname and successor net-id in parentheses. The successors become the RELEASE parameter values.
5. Construct the necessary NET statements based on the diagram.

One way to verify the net is to execute the IEFBR14 program for each job in the net, simulating normal and abnormal completions. The general format for each job of the net is:

```
//jobname       JOB
//*NET  your specific parameters
//STEP1     EXEC        PGM=IEFBR14
/*
```

In this way, all DJC net functions and definitions can be tested without using actual jobs.

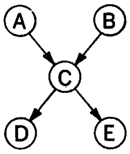
Examples of Dependent Job Control

Instead of coding the full name of the parameters for every job, the following example includes the short form for each parameter.

Parameter	Short Form
NETID	ID
NHOLD	HC
RELEASE	RL
NORMAL	NC
ABNORMAL	AB
OPHOLD	OH
RELSCHCT	RS
NETREL	NR

1. A simple net

   Given: five jobs, A, B, C, D, and E.

NETID EXAM1	Jobname	Predecessors (NHOLD)	Successors (RELEASE)
	A	0	job C
	B	0	job C
	C	2	jobs D,E
	D	1	none
	E	1	none

How to code EXAM1:

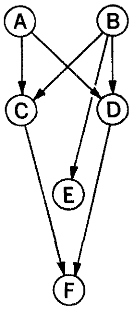
Jobname	Control	Statement
A	//*NET	NETID = EXAM1,RELEASE = (C)
B	//*NET	NETID = EXAM1,RELEASE = (C)
C	//*NET	NETID = EXAM1,NHOLD = 2,RELEASE = (D,E)
D	//*NET	NETID = EXAM1,NHOLD = 1
E	//*NET	NETID = EXAM1,NHOLD = 1

If the system scheduled this net of jobs with defined dependencies, each of the five jobs would have to run consecutively. By using JES3 dependent job control, jobs A and B can run concurrently, followed by job C, and then jobs D and E can run concurrently.

2. Multiple predecessor jobs

Given: six jobs, A, B, C, D, E, and F.

the NETID is EXAM2.

NETID EXAM2	Jobname	Predecessors (NHOLD)	Successors (RELEASE)	Disposition
	A	0	jobs C,D	

	B	0	jobs C,D,E	AB = R (retain job)
				NC = D (decrement job)

	C	2	job F	AB = R (retain job)
				NC = D (decrement job)

	D	2	job F	AB = F (flush job)
				NC = D (decrement job)

	E	1	job F	AB = R (retain job)
				NC = D (decrement job)

	F	3	none	AB = R (retain job)
				NC = D (decrement job)

How to code EXAM2:

Jobname	Control Statement	
A	//*NET	NETID = EXAM2,RELEASE = (C,D)
B	//*NET	NETID = EXAM2,RELEASE = (C,D,E)
C	//*NET	NETID = EXAM2,RELEASE = (F),NHOLD = 2
D	//*NET	NETID = EXAM2,RELEASE = (F),NHOLD = 2,ABNORMAL = F
E	//*NET	NETID = EXAM2,RELEASE = (F),NHOLD = 1
F	//*NET	NETID = EXAM2,NHOLD = 3

If either job A or B abnormally terminates, job D is flushed from the system and causes job F to be flushed. Jobs C and E remain in the system. In this situation, the predecessor should be corrected and resubmitted to the system. When it completes normally, its successors, C and E, are made eligible for scheduling.

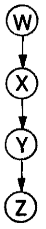
3. Complex network

Given: two networks, EXAM4 and EXAM3.

EXAM4 contains four jobs, W,X,Y, and Z.

EXAM3 contains ten jobs, A,B,C,D,E,F,G,H,I, and J.

The net to be released (NETREL) for job I is EXAM1, the release jobname is Y.

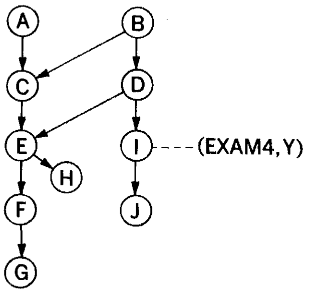
EXAM4	Jobname	Predecessors (NHOLD)	Successors (RELEASE)	Disposition
	W	0	job X	

	X	1	job Y	AB = R (retain job)
				NC = D (decrement job)

	Y	1	job Z	AB = F (flush job)
				NC = D (decrement job)

	Z	1	none	AB = F (flush job)
				NC = D (decrement job)

EXAM3



Jobname	Predecessors (NHOLD)	Successors (RELEASE)	Disposition
A	0	job C	

B	0	jobs C,D	AB = R (retain job)
			NC = D (decrement job)

C	2	job E	AB = R (retain job)
			NC = D (decrement job)

D	1	jobs E,I	AB = R (retain job)
			NC = D (decrement job)

E	2	jobs F,H	AB = R (retain job)
			NC = D (decrement job)

F	1	job G	AB = R (retain job)
			NC = D (decrement job)

G	1	none	AB = R (retain job)
			NC = F (flush job)

H	1	none	AB = F (flush job)
			NC = D (decrement job)

I	1	(EXAM1,Y)
		job J
			AB = R (retain job)
			NC = D (decrement job)

J	1	none	AB = R (retain job)
			NC = D (decrement job)

How to code EXAM4:

Jobname	Control Statement (using short form of parameters)	
W	//*NET	ID = EXAM4,RL = (X)
X	//*NET	ID = EXAM4,RL = (Y),HC = 1
Y	//*NET	ID = EXAM4,RL = (Z),HC = 1,AB = F
z	//*NET	ID = EXAM4,HC = 1,AB = F

How to code EXAM3:

Jobname	Control Statements (using short form of parameters)	
A	//*NET	ID = EXAM3,RL = (C)
B	//*NET	ID = EXAM3,RL = (C,D)
C	//*NET	ID = EXAM3,RL = (E),HC = 2
D	//*NET	ID = EXAM3,RL = (E,I),HC = 1
E	//*NET	ID = EXAM3,RL = (F,H),HC = 2,RS = 1
F	//*NET	ID = EXAM3,RL = (G),HC = 1
G	//*NET	ID = EXAM3,HC = 1,NC = F
H	//*NET	ID = EXAM3,HC = 1,AB = F
I	//*NET	ID = EXAM3,RL = (J),HC = 1,NR = (EXAM1,Y)
J	//*NET	ID = EXAM3,HC = 1

Network Job Processing

Network job processing (NJP) permits two or more JES3 systems to route jobs from one to the other using communication lines. Jobs, individually or in groups, can be scheduled for processing on another system by operator or by JCL. (See **OS/VS2 System Programming Library: Job Management**, GC28-0627, for an explanation of job scheduling by JCL using nonstandard job processing.) The operator specifies what job or classification of jobs are to be scheduled, where the jobs are to be run, and what functions will be executed. For example, a job might execute on another system, but return to the original system for output processing. Or perhaps both execution and output processing will take place at the other system after beginning at the original system. Another possibility is that only output processing will be handled by the other system.

A group or class of jobs is identified by using the NJPCLASS parameter on the MAIN statement. This is a convenient method of identifying a group of jobs eligible to run on another JES3 system. the NJPCLASS parameter has no inherent meaning; it must be defined by the installation.

When the operator tries to schedule a job for processing on a remote JES3 system, network job processing will determine whether the job is eligible for processing. The job may not be eligible if:

- the job is already scheduled for network job processing.
- the job is a member of dependent job control net.
- the function to be processed has already completed.
- the job is currently active (being processed by JES3).

Conditional Execution of Job Steps

Depending on the results of one step of a job, you may not wish to execute subsequent steps — if a compilation fails, you would not want to waste computing time attempting subsequent link-editing or execution steps. Specify tests to determine whether to bypass or execute job steps based on the results from previous steps by coding the COND parameter on the JOB or EXEC statements.

The results of a job step can be reflected in a **return code**, a number from 0 to 4095. The COND parameter can be coded to test the return codes which are issued by the compiler, assembler, and linkage editor programs. Some return codes are standard for certain programs; for example, a return code of 8 issued by a compiler or linkage editor indicates that serious errors were found and execution is likely to fail. In problem programs, assign a number as the return code to signify a certain condition. For example, if STEP1 of a job reads accounts to be processed in subsequent job steps, set a return code of 10 if no delinquent accounts are found. Before STEP3 is executed to process delinquent accounts, test the return code from STEP1; if the return code from STEP1 is 10 — there are no delinquent accounts — skip STEP3. Specify the test to check the return code from STEP1 by coding the COND parameter.

You can also instruct the system to execute a step even if a previous step has abnormally terminated or only if a previous step has abnormally terminated by coding EVEN or ONLY in the COND parameter on a EXEC statement. For example, STEP1 of a job updates records in a data set. If STEP1 abnormally terminates, you want to execute STEP2, which will print the data set. Specify that STEP2 should be executed only if STEP1 abnormally terminates by coding ONLY in the COND parameter on the EXEC statement for STEP2.

Specifying Return Code Tests

In the COND parameter, specify tests to determine if the system should bypass a job step. If the system determines that a comparison is true, the job step is skipped (if COND was coded on the EXEC statement) or all remaining job steps are skipped (if COND was coded on the JOB statement). A bypassed step has a return code of zero (0).

For example, COND=((10,GT),(20,LT)), asks "Is 10 greater than the return code or is 20 less than the return code?" If the return code is 12, neither test is satisfied: no job step is skipped. All the tests specified must be false if processing is to continue without skipping any job steps. If the return code is 25, the first test is still false, but the second test is satisfied: 20 is less than 25. The system will bypass one job step or all remaining job steps, depending on whether the COND parameter was coded on the EXEC statement or on the JOB statement.

Passing Information to the Job in Execution

Some information required by a program may vary from application to application, such as module attributes and options required by the compiler, assembler, and linkage editor programs. To provide this information to the program at the time it is executed, code the PARM parameter on the EXEC statement. The program must include instructions that can retrieve this information. (The exact location and format of the information passed to a processing program are included in **OS/VS2 Supervisor Services and Macro Instructions**, GC28-0683.)

The PARM parameter can also be coded on the EXEC statement of a cataloged or in-stream procedure step. This establishes fields in which information is passed to the job. Override, add, or nullify parameters in a procedure or define symbolic parameters by coding the PARM parameter on the EXEC statement of the job calling a cataloged or in-stream procedure. For more information on the PARM parameter for these features, see "Cataloged and In-stream Procedures."

Identifying the Program to be Executed

All executable programs are members of partitioned data sets (libraries). The library that contains the program can be a temporary library or a private library. In order to execute a program contained in these libraries, code the PGM parameter as the first parameter on the EXEC statement.

Temporary Library

To assemble, link edit, and then execute in a single job, make the output of the linkage editor a member of a partitioned data set. This is accomplished by creating a temporary library; that is, a partitioned data set used to store a program until it is executed in a subsequent job step. When the program is required, refer back to the DD statement that defines the temporary library and the member by coding PGM=*.stepname.ddname or PGM=*.stepname.procstepname.ddname. Also request use of a program that is a member of a temporary library by coding PGM=program name and including a DD statement named JOBLIB or STEPLIB that defines the temporary library. To keep this program available for use by other jobs, make the program a member of a private library. For more information on temporary libraries, refer to the section, "Creating and Using Private and Temporary Libraries."

Private Library

To use a program that is a member of a private library, code PGM=program name and include a DD statement named JOBLIB or STEPLIB that defines the private library. The system automatically looks in the private library for a member with the corresponding name.

A program that resides in a private library can also be executed by coding PGM=*.stepname.ddname or PGM=*.stepname.procstepname.ddname. This can be done only when the named DD statement defines the program as a member of a private library. For more information on private libraries refer to the section, "Creating and Using Private and Temporary Libraries."

The IEFBR14 Program

This program is used to check the syntax of the control statements, allocate space, or satisfy requests for disposition processing prior to execution of a job. To do this, substitute IEFBR14 for the program name on the EXEC statement. When this program is called, it gives a return code of 0 and returns to the calling routine. For an example of the IEFBR14 program, see the the example in the topic "How to Code NET Statement" in this section.

Testing JCL Without Execution

There are two methods for testing JCL other than IEFBR14. The TYPRUN=SCAN parameter on the JOB statement and the PGM=JCLTEST on the EXEC statement both cause the system to scan the JCL for syntax errors without processing the job or setting up devices. Both parameters will check for invalid keywords, illegal characters, parentheses errors, and excessive parameters.

Selecting a Cataloged Procedure Library

You can choose which of the installation specified cataloged procedure libraries will be used for resolving catalog procedure references in the JCL by coding the PROC parameter on the MAIN statement. If this parameter is omitted, the installation standard library, denoted by ST, will be used.

If you want to update a cataloged procedure library, whether or not that library was used to resolve the job's library references, code the UPDATE parameter on the MAIN statement pointing to the library to be updated by that job. JES3 will effectively disable the use of that library, placing all jobs that request it into a held state until the updating job terminates. This prevents the use of the library while the update occurs.

Reading Column Binary Input

Jobs that require input from column binary cards can receive this input directly from the DD statement if JES3 is used by coding the MODE=C DCB subparameter on the DD * or DD DATA statement that precedes the column binary card input and by notifying the operator to read this job into a card reader for which he has specified mode C processing.

The DATASET statement can also be used to read column binary input for jobs to be run on ASP main processors only and for installation-written routines executed as part of nonstandard jobs. This is more fully discussed in **OS/VS2 System Programming Library: Job Management,** GC28-0627.

Restarting a Job

When a job step abnormally terminates, you may have to resubmit the job for execution; this means delay and lost computer time. The operating system provides restart facilities to reduce the effects of abnormal termination.

There are three types of restarts:

- **Step restart,** from the beginning of a job step.
- **Checkpoint restart,** from a checkpoint within a job step. Establish checkpoints in a job step by coding the CHKPT macro instruction for each checkpoint. The CHKPT macro is described. in **OS/VS Data Management Macro Instructions,** GC26-3793.) See also the DD CHKPT parameter. It specifies that checkpoints are to be taken at end of volume for the data set defined by the DD statement on which it is coded.
- **System failure restart,** by specifying the FAILURE=RESTART parameter on the JES3 MAIN statement. In the event the job cannot complete executing because of system failure, JES3 will automatically reschedule the job from the beginning. Other options on the FAILURE parameter are CANCEL, HOLD, and PRINT. All of the values are described on the MAIN FAILURE parameter in the section, "Coding JES3 Statements."

Whether using step restart or checkpoint restart, the restart facility can be automatic or deferred.

Automatic restart: To use automatic restart, code the RD (restart definition) parameter on the JOB or EXEC statement. JES3 creates a job journal for any job specifying the RD parameter. (A job journal is established to hold restart information for each program in execution.) When a system failure occurs or a job step abnormally terminates and you have a job journal, the restart facility allows automatic restart when RD=R is coded on the JOB or EXEC statements. If checkpoints are taken, you can automatically restart at the last checkpoint regardless of whether or not the RD parameter is coded. When a job step abnormally terminates or a system failure occurs while the job is in execution and the installation has not implemented job journaling, these jobs are ineligible for automatic restart.

Deferred restart: To use deferred restart, code the RESTART parameter on the JOB statement. This required parameter specifies a job step or a step of a cataloged procedure and can specify a checkpoint identifier if you are using deferred checkpoint restart. The effect of the parameter is simply to restart the job at the beginning of the specified step or checkpoint. The SYSCHK DD statement is required when a job is being submitted for deferred checkpoint restart and must be placed immediately after a JOBLIB DD statement.

Jobs running on ASP Main Processors: The MAIN JOBSTEP parameter specifies the job step checkpoint option for jobs on ASP main processors only. The checkpoint option will not be taken if JOBSTEP=NOCHKPT is coded or if nothing is coded; the checkpoint will be taken at the end of each job step if JOBSTEP=CHKPT is coded. If a checkpoint is requested, it means that the ASP user can see the output up through the last completely executed step if the system crashes and the job is not restarted. Otherwise, there is no job produced output. The MAIN JOBSTEP parameter is ignored in MVS; the job step checkpoint feature is standard.

Refer to **OS/VS Checkpoint/Restart**, GC26-3784, for a complete description of planning for and using the checkpoint restart facility.

Example of Routine a Job Through the System (JES3 only)

```
//EXAM       JOB
//*MAIN      SYSTEM=( MAIN1 ,MAIN2 ) ,SETUP=( DD1 ,DD2 ) ,
//*FAILURE=RESTART
//STEP1      EXEC     PGM=IEFBR14
//DD1        DD       UNIT=3330,VOL=SER=VOL1,DISP=OLD,
//                    DSN=JES3.EXAM
//STEP2      EXEC     PGM=IEFBR14
//DD2        DD       UNIT=3330,SPACE=( TRK,1 ),VOL=SER=VOL2
```

1. This job is assigned to an installation defined job class default.
2. The selection for processing is based on the priority assigned to the default class.
3. The MAIN statement specifies that this job can be processed on either MAIN1 or MAIN2. The job requires that the volumes associated with the DD1 and DD2 statements must be mounted.

Obtaining Output (JES3 only)

You can request output by coding JCL and JES3 control statements. By coding JCL statements, you can request output data sets, listings of JCL statements, system messages, and abnormal termination dumps. By coding JCL and JES3 statements, you can request special forms processing, routing of output to specific devices, and multiple original printing by data sets within a job. The JES3 statements have the same options as JCL with some additional features such as the FORMAT statement forms overflow, forms control, and multiple data set characteristics.

This section includes five topics:

- Requesting Listings of JCL Statements and System Messages
- Requesting an Abnormal Termination Dump
- Writing Output Data Sets
- Controlling Output Destination
- Remote Job Processing

Requesting Listings of JCL Statements and System Messages

The system produces messages about a job concerning allocation of units and volumes, disposition of data sets, and termination of job steps and the job. Request that these messages and/or the JCL statements from the job and from cataloged procedures called by the job be included on an output listing.

By coding the MSGLEVEL parameter on the JOB statement, you inform the system of what statements and messages you want included on the output listing. (The notation used on the output listing to identify cataloged and in-stream procedure statements is described in the chapter "Using Cataloged and In-stream Procedures.")

By coding the MSGCLASS parameter on the JOB statement, you assign messages and JCL statements to an output class. A default is assigned if MSGCLASS is not coded.

The JES3 FORMAT statement allows you to specify the ddname of the DD statement that defines the output data set characteristics you want to specify. If you want system messages, code DDNAME=SYSMSG; if you want the jclfile including statement messages, code DDNAME=JESJCL; or if you want JES3 and system operator messages (job log), code DDNAME=JESMSG.

Requesting an Abnormal Termination Dump

To obtain a dump in the event of abnormal termination of a job step, code a DD statement defining a dump data set. The name of the DD statement must be either SYSABEND or SYSUDUMP. If both are present, the last occurance will be used.

The SYSABEND or SYSUDUMP DD statements can provide a dump containing the processing program's virtual storage area, the system nucleus, the entire system queue area, all local system queue areas, and any active link pack area (LPA) modules for the failing task. If the generalized trace facility (GTF) is active in the system and performing an internal trace, you receive GTF trace records. If GTF is active but performing an external trace, no trace information is included in the dump. Determine what dump features are wanted in addition to the installation defaults and define them in a dump option list. How to do this is explained in the **OS/VS2 System Programming Library: Supervisor**, GC28-0628.

Descriptions of dumps and information on reading dumps are included in the **OS/VS2 System Programming Library: Debugging Handbook**, GC28-0632.

To have the dump printed, either assign the dump to an output class in the SYSOUT parameter on the DD statement or code the UNIT parameter and specify the printer you want. To store the dump, define the data set as you would any other data set, code the DSNAME, DISP, UNIT, and VOLUME parameters. If the data set will go to a direct access device, code the SPACE parameter.

If a private data set is specified and more than one dump is possible, the data set should be specified with a disposition of MOD as it will be closed after each dump.

Writing Output Data Sets

There are two ways to write output data sets:

- Assign the data set to an output class.
- Specify the device on which the output should be written.

When you assign a data set to an output class, it is handled by JES3. The data set is first written to the JES3 spool device and then written to the final output device by either JES3 or an external writer. When you specify the device on the UNIT parameter, if the device is available, it is exclusively assigned to your job and under the control of your program.

Assigning Output Data Sets to Output Classes

Output classes include output with simila: characteristics that are written to the same device. There are 36 possible output classes that can be coded on either the SYSOUT or MSGCLASS parameters. The letter and number names have no inherent meaning; — each installation defines its own output classes and can assign special processing characteristics for each class. For example, output class W might contain low priority output; class X might contain output to be printed on a special form (eliminating the need to request the form directly); class J might be reserved for high-volume output. If you want the output data set and messages from the job to be printed on the same output listing, specify SYSOUT=* or the same output class in the SYSOUT parameter as specified for messages in the MSGCLASS parameter.

The installation can designate certain SYSOUT data sets as reserved. Reserved classes can cause the data sets to be held; that is, not sent to JES3 output processing. If the output class specified for the MSGCLASS parameter is not designated as a reserved class, it will not be held and none of the job's data sets assigned to reserved classes will be held. Data sets can be explicitly held by coding either the HOLD=YES JCL parameter or the HOLD parameter on the ALLOCATE and FREE TSO commands. (Refer to **OS/VS2 TSO Command Language Reference**, GC28-0646 for information on the TSO commands.) Jobs are released from the hold state for the entire job by the operator or by the time-sharing user, with the OUTPUT TSO command. By using reserved classes, the controlling of the holding or not holding of all desired print data sets is done by means of the MSGCLASS parameter on the JOB statement.

Specifying the Device

To write an output data set without using JES3 output service, code the UNIT parameter on the DD statement defining the device on which the data set is written. The system will allocate the device exclusively to the job if the device is available; no other job can write output to that device until it is released. Jobs cannot share an output device as they can when the output is assigned to output classes.

Data management routines write the output from the program to the device specified in the UNIT parameter. Specifying a particular output device in the UNIT parameter generally is not the most efficient method for obtaining system output.

Processing Output Classes

Using JES3 is an efficient way to write output. JES3 supports the use of local and remote printers and punches as devices on which output classes are written. An external writer supports tape and direct access devices and user-written writer routines.

Output will be printed on the same listing if such parameters as CLASS, FORMS, FCB, UCS, and DEST have similar characteristics for all data sets and a user-written writer is not specified.

For an external writer, the operator will determine what data sets will be selected. When an external writer is specified, an IBM-supplied writer or a user-written writer will receive the output. The external writer must be started by the operator to have the data written to an output device. If you want to know more about how to write an external writer routine, refer to **OS/VS2 System Programming Library: Job Management**, GC28-0627.

Output data sets to be written to a 3540 diskette must be assigned to an output class that is processed by the diskette writer (an external writer) as described in **OS/VS2 IBM 3540 Programmer's Reference**, GC24-5111. For the diskette writer to receive data sets, the JES3 initialization deck must specify the SYSOUT classes to be reserved for diskette output. To write data sets on a diskette, the operator must start the diskette writer to a 3540 device.

Delaying the Writing of an Output Data Set

Data sets can be delayed from normal printing or delayed for inspection from a time sharing terminal prior to actually printing on that terminal by specifying reserved classes (as discussed next) and by coding the HOLD parameter. For example, the installation can direct the delayed printing of a very large data set to prevent monopolizing an output device until smaller data sets are written. If a data set requires special forms that are not immediately available, it can be held until the operator supplies those forms. When HOLD=YES is specified on the DD statement, the data set is placed on a hold queue until the operator releases it. Notify the operator (using the OPERATOR statement for JES3) when that data set is ready for processing because no message will be sent to the operator. The data set must be released by the operator or time-sharing user for printing.

Suppressing the Writing of an Output Data Set

Whether writing an output data set by coding the SYSOUT parameter or the UNIT parameter, you can suppress the writing of the data set by defining it as a dummy data set. This is useful when testing a program and you do not want data sets printed until you are sure they will contain meaningful output. Suppressing the writing of a data set saves processing time.

If you are routing an output data set by coding the SYSOUT parameter, code the DUMMY parameter to define the data set as a dummy data set. When DUMMY is coded, the SYSOUT parameter is ignored and the data set is not written.

You can suppress the writing of an output data set by specifying particular installation-defined class defined to delete the data set before it is printed. This technique is used by the installation to suppress the output of started tasks such as START and MOUNT commands. You can also suppress the writing of an output data set by specifying COPIES=0 on the FORMAT PR or PU (print or punch) statements.

If the device on which the data set will be written is specified in the UNIT parameter, you can assign the data set a dummy status by coding DUMMY or by assigning the data set name NULLFILE. All parameters other than DUMMY or DSNAME=NULLFILE and DCB are ignored; no units are assigned to the data set. When the program requests that the data set be written, the request is recognized but no data is transmitted. The facility is available by use of the basic sequential access method (BSAM) or queued sequential access method (QSAM) in a request to write a dummy data set. If any other access method is used, the job is terminated.

Limiting Output Records

The number of logical records in the output data set can be limited by specifying a maximum number of records through the use of the OUTLIM parameter on the DD statement. For example, a program is printing and goes into an endless loop. You can anticipate this problem and only have a maximum number of records printed before having the system discontinue the output processing.

To limit the printed or punched output of a job, specify the estimated number of lines of output or the estimated number of cards associated with your job's output by coding the LINES and CARDS parameters on the MAIN statement. This information is used by JES3 to monitor output and take whatever action is specified if you exceed the estimates. These actions request that the operator receive a warning (the WARNING subparameter), that the job is canceled (the CANCEL subparameter), or that the job is canceled with a storage dump (the DUMP subparameter). (Initialization parameter values are used if you omit the estimates.)

Requesting Multiple Copies of an Output Data Set

You can control the number of hard copies produced by the SYSOUT data sets. As many as 255 copies of an output data set are obtained by coding the COPIES parameter on the SYSOUT DD statement defining the data set or on the JES3 FORMAT PR control statement.

Requesting Forms and Print Control

When requesting that an output data set be written, you can give JES3 special instructions on how to write the data set. You can request:

- A special output form.
- A special character set, when output is being printed by a 3211 or 1403 printer with the universal character set.
- A specific image, which controls how many lines per inch are printed and the length of the form, when the data set is written to a 3211 printer.
- A specific carriage control tape, when the data set is written to a 1403 printer.
- A test for printer overflow and spacing.
- Interpretation of punch output on the 3525.

Requesting a Special Output Form

Special forms are requested for output data set printing by including the form name in the SYSOUT parameter on the DD statement defining the data set or on the FORMAT control statement. For example, assign a data set to an output class to be routed to a printer and specify the data set be printed on a special form. (For example, code SYSOUT=(A,,FMS2).) JES3 and the external writer insure that the proper form is mounted.

Requesting a Special Character Set

Universal character set (UCS) features are requested by coding the UCS parameter on a DD statement defining an output or SYSOUT data set or by coding the TRAIN parameter on the FORMAT PR control statement for SYSOUT data sets. You can request UCS features for different sets of characters to be printed for various applications.

To request a special character set for a 3211 or 1403 printer, specify the code identifying the character set in the UCS parameter or the FORMAT statement. The codes for the IBM standard special character sets are in Figure 12.

1403	3211	Characteristics
AN	A11	Arrangement A, standard EBCDIC character set, 48 characters
HN	H11	Arrangement H, EBCDIC character set for FORTRAN and COBOL, 48 characters
GN	G11	ASCII character set
PCAN		Preferred alphameric character set, arrangement A
PCHN		Preferred alphameric character set, arrangement H
PN	P11	PL/1 alphameric character set
QN		PL/1 preferred alphameric character set for scientific applications
QNC		PL/1 preferred alphameric character set for commercial applications
RN		Preferred character set for commercial applications of FORTRAN and COBOL
SN		Preferred character set for text printing
TN	T11	Character set for text printing, 120 characters
XN		High-speed alphameric character set for 1403, Model 2
YN		High-speed preferred alphameric character set for 1403, Model 3 or N1

Figure 12. Special Character Sets for the 1403 and 3211 Printers (JES3)

Note: Where two values exist (for the 1403 or 3211 printers), either can be coded and JES3 will select the set corresponding to the device onto which the data set is printed.

Not all of these character sets may be available at your installation. In addition, the installation can design character sets to meet special needs and assign a unique code to them. See the system programming staff for a complete list of available character sets for the installation.

Requesting a Specific Image

Specific images (for example, the number of lines per page or number of characters per line) for a 3211 printer are requested by coding an image identifier in the FCB parameter in JCL or by coding the CARRIAGE parameter on the FORMAT PR control statement. The FCB parameter can also specify a specific carriage control tape for the 1403 printer for JES3 output processing only (it is ignored by the external writer).

IBM provides two standard FCB images, STD1 and STD2. STD1 specifies that six lines per inch are to be printed on an 11 inch form. STD2 specifies that eight lines per inch are to be printed on an 8.5 inch form. (Do not specify STD1 and STD2 for JES3 processing unless instructed by your installation.) Additional FCB images can be specified by the installation.

Requesting Forms Overflow and Printer Spacing

You can prevent the printing of a data set across the folds in the forms by coding the OVFL parameter on the JES3 FORMAT PR statement. An example of this is having many SYSMSG data sets that have been printed one after another.

The FORMAT CONTROL parameter specifies the type of forms control used. You can force single or double spacing or indicate that the carriage control character is the first character of each logical record in the data set. You might force single spacing, for example, when testing the first character of each logical record to see if all the characters indicate the spacing required on an actual run. By coding the PROGRAM parameter, you are specifying that you want to use the DCB RECFM value. OVFL should not be specified when PROGRAM is used.

Requesting Punch Output Interpretation on a 3525

Punched output may or may not be interpreted depending on the installation-defined standard for the SYSOUT class. You can specify punched output to be interpreted by coding the INT=YES parameter on the JES3 FORMAT PR statement. If you omit the device name that specifies a 3525I, JES3 attempts to find one for the output. If you specify a non-interpreting punch device, output is punched on it but not interpreted.

Cards punched on a 3525 card punch from output spooled by JES3 will be interpreted if you code FUNC=I as a DCB subparameter on the SYSOUT card and if the spooled output is processed by a JES3 writer rather than the external writer. The FUNC=I subparameter will be ignored if the spooled output is processed by the JES3 writer onto a card punch other than the 3525. You should check with the installation to determine if a special output class has been set aside for 3525 output. Card interpretation by the external writer is an operator specified function. Output to be interpreted should be placed in a class designated by the installation as a punch with interpretation class.

Controlling Output Destination

JES3 allows you to submit jobs to a central computing center from a work station and to route output (submitted anywhere) to work stations.

When submitting a job from a local CPU or a work station, the output is returned to the place where it is submitted unless you code ORG or you specifically route the output; simply assign output data sets to an output class (with the SYSOUT parameter) and messages from the job to an output class (with the MSGCLASS parameter). JES3 at remote stations offers most of the same options for writing data sets that are requested when submitting the job at the central computing center. You can request:

- That a data set be held until the operator requests that it be printed.
- That a special output form be used by specifying a form name in the SYSOUT parameter.
- That multiple copies of the data set be used.

Whether at a remote station or at the central computing center, you can also request that a data set be routed to another destination. To route an output data set to another destination, code the identification of that destination in the DEST parameter on the DD statement defining the data set, code the MAIN ORG statement, or code the FORMAT PR or PU DEST parameters. Work stations are identified by a destination identification that has been established by the system programmer. The DEST parameter on the DD statement and the DEST parameter on the FORMAT PR and PU statements route individual data sets to a remote destination (work station), a local destination (central computing center), or a specific local device. For more information on TSO support on ASP main processors, see the next section.

TSO on an ASP Main Processor

TSO users on an ASP main processor who want to use special FORMAT AC options or retrieve data from other than an AC class and users who want to route data sets to TSO users on an ASP main processor must code the FORMAT AC statement. This statement defines output to be accessed, output destination, and other parameters concerning output handling. If the data set is processed at any time by the ASP main processor, regardless of where the job is processed, you must code the FORMAT AC statement.

Remote Job Processing

Jobs can be submitted to JES3 for processing from remote binary synchronous work stations using remote job processing (RJP). Any job submitted from a remote work station will, by default, have its output (print and punch) returned to the originating work station unless JES3 has been instructed to do otherwise using FORMAT or MAIN ORG statements. The remote user has almost all the capabilities of the local JES3 user with the restriction that column binary input and output can not be used. In addition, you can not uniquely specify printer overflow specifications.

Routing output to other destinations is also possible using the DEST parameter on the FORMAT statement and the DEST JCL parameter. Refer to the previous section for more information.

Example of Obtaining Output (JES3 only)

This example shows the use of JES3 and JCL statements that can be used to obtain output.

```
//OUTJOB    JOB      BAKER,PERFORM=100,MSGCLASS=J
//*FORMAT   PR,DDNAME=,COPIES=2,FORMS=GRN1
//*FORMAT   PR,DDNAME=DD3,DEST=PRINTER8,CARRIAGE=STD3,
//*FORMS=2PRT,TRAIN=TN
//STEP1     EXEC     PGM=TESTSYSO
//DD1       DD       DSN=DATA,UNIT=2314,VOL=SER=SCHLIB,
//                   DISP=(OLD,KEEP),SPACE=(TRK,(5,2))
//DD2       DD       DSN=&TEMP,UNIT=2314,DISP=(NEW,DELETE),
//                   SPACE=(TRK,(10,5)
//DD3       DD       SYSOUT=(A)
//DD4       DD       SYSOUT=(A,,GRPH)
//DD5       DD       SYSOUT=L
```

1. The job will run in performance group 100; the meaning of 100 is defined by the installation. All system messages are to be written to output class J.
2. The first FORMAT statement indicates that:
   a. All print data sets (according to class) with no FORMAT statements will be printed according to the parameters on this statement unless the output class defines specific processing characteristics (DDNAME is coded without a name).
   b. Two copies are printed.
   c. Forms name GRN1 and two copies are to be used by all data sets unless a specific form or number of copies is defined on a DD statement or by class by the installation.
3. The second FORMAT statement indicates that:
   a. The destination for the output is a printer that has an installation-defined name of PRINTER8.
   b. If PRINTER8 has the forms control buffer feature, STD3 must be the name of a member of SYS1.IMAGELIB. STD3 defines the special forms control buffer image or carriage tape to be used for processing the job.
   c. Forms name 2PRT is the name of the forms for DD3.
   d. TN means text printing on a 1403 printer.

Special Data Sets

Data sets can be defined to satisfy a special purpose. Such data sets are usually defined with a special ddname, a specific data set name, or a specific parameter.

This section includes seven topics:

- Creating and Using Private and Temporary Libraries
- Defining a Dummy Data Set
- Using Virtual Input/Output (VIO) for Temporary Data Sets
- Entering Data Through the Input Stream
- VSAM Data Sets
- Creating and Retrieving Indexed Sequential Data Sets
- Creating and Retrieving Generation Data Groups

Creating and Using Private and Temporary Libraries

A library is simply a partitioned data set — a data set in direct access storage that is divided into partitions, called members, each of which can contain a program or part of a program. Each partitioned data set contains a directory (or index) that the control program can use to locate a program in the library. All programs that can be executed must exist in a library; that is, they must be members of a partitioned data set.

A private library is a partitioned data set that contains user-written programs. You inform the system that a program exists in a private library by coding a DD statement defining that library. You can define a private library to be used throughout the job by coding a DD statement with the ddname JOBLIB, or define a library to be used in a specific step by coding a DD statement with the ddname STEPLIB.

A temporary library is a partitioned data set created in the job to store a program, as a member of the partitioned data set, until it is executed in a following step. For example, if in the job you want to assemble, linkage edit, and then execute a program, make the output of the linkage editor a member of a library. Any library that created and deleted in the same job is a temporary library.

Code the PGM parameter as the first parameter on the EXEC statement to execute a program contained in a library. If the program exists in a private library, code PGM=program name and either a JOBLIB or STEPLIB DD statement. If the program exists in a temporary library, code either PGM=*.stepname.ddname or PGM=*.stepname.procstepname.ddname. Ddname is a temporary library created in and pointed to by stepname and procstepname. They identify the job step or job step and procedure step defining the library. If you define a private library, the system looks in that library for the program you want executed.

This chapter describes how to code JCL statements to create or retrieve private and temporary libraries. Complete information on creating a partitioned data set, adding members to and deleting members from a partitioned data set, is included in **OS/VS Data Management Services Guide**, GC26-3783.

Creating a Private Library

Use the JOBLIB DD statement to create a private library. The JOBLIB DD statement must appear immediately after the JOB statement — do not use the ddname JOBLIB unless you are defining a private library. The library defined with a JOBLIB DD statement is automatically available to every step in the job. (The STEPLIB DD statement is included among the DD statements in a step and is available only to that step unless you pass the library or redefine it in subsequent steps; since the library on a JOBLIB DD statement is available to every step, it is easier to create a library with the JOBLIB DD statement.)

When creating the library on the JOBLIB DD statement, you are creating a partitioned data set. Steps in the job must add members to the library before those members (programs) can be used by subsequent steps.

On the JOBLIB DD statement, assign the library a name in the DSNAME parameter, give unit and volume information in the UNIT and VOLUME parameters (a partitioned data set must be contained on one direct access volume; if, however, you make a nonspecific volume request, you need not code the VOLUME parameter), request space for the entire library in the SPACE parameter, and assign a data set status and disposition in the DISP parameter. Code NEW as the data set status and either CATLG or PASS as the data set disposition. When specifying CATLG, the library is cataloged, available throughout the job, and kept at the end of the job. When specifying PASS, the library is available throughout the job, but is deleted at job termination. (If you do not code a disposition, or code a disposition other than CATLG or PASS, the system assumes PASS.) You must also code the DCB parameter if complete data control block information is not included in the data set label.

Adding Members to a Private Library

Add members to the library in job steps within the job by coding a DD statement that defines the library and names the member to be added to the library. In the DSNAME parameter, follow the library name with the name of the program being added to the library, for example, DSNAME=LIBRARY(PROGRAM). Do not code the SPACE parameter; requested space for the entire library on the JOBLIB DD statement. In the DISP parameter, specify MOD as the data set status; the partitioned data set already exists since you created it in the JOBLIB statement, and you are lengthening it with a new member. If you cataloged the library in the JOBLIB DD statement, that is, coded DISP=(NEW,CATLG), do not respecify CATLG when adding a member: you need not code a disposition at all. For a cataloged library, you do not have to specify unit and volume information, except in one instance: if you are adding a member to the library in the first step of the job, supply unit and volume information; the library is not cataloged until the first step completes the execution. Refer to the JOBLIB DD statement for unit and volume information by coding VOL=REF=*.JOBLIB.

In the following example, JOBLIB DD statement creates a library named GROUPLIB;STEP1 adds the program RATE to the library; STEP2 calls the program RATE:

```
//EG          JOB     MSGLEVEL=1
//JOBLIB      DD      DSNAME=GROUPLIB,DISP=(NEW,CATLG),
//                    UNIT=2314,VOL=SER=727104,
//                    SPACE=(CYL,(50,3,4))
//STEP1       EXEC    PGM=FIND
//ADDPGMD     DD      DSNAME=GROUPLIB(RATE),DISP=OLD,
//                    VOL=REF=*.JOBLIB
//STEP2       EXEC    PGM=RATE
```

In STEP1, the system looks for the program named FIND in SYS1.LINKLIB — the private library created on the JOBLIB DD statement does not actually exist until a member is added to it. In STEP2, the system looks for the program named RATE first in the private library.

Retrieving an Existing Private Library

If you are retrieving several programs from one library (several steps in the job will be using the library), use the JOBLIB DD statement to define the library: the library will be available in every step of the job for which you do not code a STEPLIB DD statement. The JOBLIB DD statement must appear immediately after the JOB statement. To make a library available in a single step, define the library on a STEPLIB DD statement. The STEPLIB DD statement is included with the DD statements for a step (in no specific order) and is available only to that step, unless you pass the library and retrieve it in a subsequent step. Use the ddnames JOBLIB and STEPLIB only when defining private libraries.

The system will search for a program in the private library you define. If both JOBLIB and STEPLIB DD statements appear in a job, the STEPLIB definition has precedence, that is, the private library defined by the JOBLIB DD statement is not searched for any step that contains the STEPLIB definition. If you want JOBLIB definition ignored but the step does not require use of another private library, define a system library on the STEPLIB DD statement:

```
//STEPLIB    DD       DSNAME=SYS1.LINKLIB,DISP=SHR
```

Retrieve a private library as you would any partitioned data set: if the library is cataloged, or in the case of a STEPLIB definition, passed from a previous step, you need not specify unit and volume information; otherwise, you must code the UNIT and VOLUME parameters.

For both cataloged and uncataloged libraries, code: the DSNAME parameter, specifying the name of the library; the DCB parameter, if complete data control block information is not included in the data set label; and the DISP parameter, specifying data set status and disposition. Normally, you will want to specify SHR as the data set status: SHR indicates that the data set is old, but also allows other jobs to simultaneously use the library. All references to the library in the job must specify SHR if the data set is to be shared; do not code SHR, however, if you will be adding members to the library in the job. (A more thorough discussion of sharing a data set is included in the chapter "Insuring Data Set Integrity.") Code PASS as the data set disposition for a library defined on the JOBLIB DD statement: PASS makes the library available throughout the job. (If you do not code a disposition, the system assumes PASS.) For a library defined on a STEPLIB DD statement, code any valid disposition, depending on how you want the data set treated after its use in the job step: for example, if the library is not cataloged, and you want it to be cataloged, code CATLG; if you want the library deleted, code DELETE.

The following job includes both JOBLIB DD and STEPLIB DD statements:

```
//CAMILLE    JOB      MSGLEVEL=1
//JOBLIB     DD       DSNAME=LIB5.GRP4,DISP=SHR
//STEP1      EXEC     PGM=FIND
//STEP2      EXEC     PGM=GATHER
//STEPLIB    DD       DSNAME=ACCOUNTS,DISP=(SHR,KEEP),
//                    UNIT=2314,VOL=SER=727104
```

In STEP1, the system searches the library named LIB5.GRP4, defined on the JOBLIB DD statement, for the program named FIND. In STEP2, the system searches the library named ACCOUNTS, defined on the STEPLIB DD statement, for the program named GATHER.

Add a program to an existing library by coding a DD statement in a job step that defines the library and names the program to be added — see "Adding Members to a Private Library" for details on coding this DD statement. The new member must be added to the library before it can be executed (the step that adds the program to the library must precede the step that calls the program). Do not code SHR as the data set's status when modifying the library.

Concatenating Private Libraries

If the job uses programs contained in several libraries, you can concatenate these libraries on one JOBLIB DD statement or one STEPLIB DD statement; all the libraries concatenated must be existing libraries. Omit the ddname from all the DD statements defining the libraries, except the first:

```
//JOBLIB     DD       DSNAME=D58.LIB12,DISP=(SHR,PASS)
//           DD       DSNAME=D90.BROWN,DISP=(SHR,PASS),
//                    UNIT=3330,VOL=SER=411731
//           DD       DSNAME=A03.EDUC,DISP=(SHR,PASS)
```

This entire group must appear immediately after the JOB statement. When concatenating libraries using STEPLIB as the ddname, the entire group appears as part of the DD statements for the step.

The system will search the libraries for the program in the order in which the DD statements defining the libraries are coded.

Using Private Catalogs

Use Access Method Services to define private user catalogs, as explained in **OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide**, GC26-3838. The primary function of the special ddnames STEPCAT and JOBCAT is to change the order of the search of the catalogs to cause the STEPCAT and JOBCAT catalogs to be searched first. JOBCAT applies to each step of a job in which a STEPCAT has not been specified. To locate a data set, VSAM searches catalogs in the following order:

1. User catalogs specified in the current job step (STEPCAT), or user catalogs specified in the current job (JOBCAT), if no user catalogs are specified for the job step.
2. A CVOL or user catalog indicated by the first qualifier of the data set name, if any.
3. The master catalog.

Temporary Libraries

Temporary libraries are libraries that are created and deleted within the job. It is not necessary to define a temporary library on a JOBLIB DD or STEPLIB DD statement: simply code a DD statement creating a partitioned data set and adding the program to it in the step that produces the program. You can then retrieve this program in a subsequent step. (You can also use the VIO facilities to define temporary data sets. For more information, refer to "Defining a VIO Temporary Data Set" later in this section.)

For example, STEP2 illustrated below calls the program IEWL, which linkage edits object modules to form a load module that can be executed. Place the results of the linkage edit step in a library so that a subsequent step can use those results. Since the results are not a program other jobs will call, it is logical to place the program in a temporary library:

```
//STEP2     EXEC    PGM=IEWL
//RESULT    DD      DSNAME=&&PARTDS(PROG),UNIT=2314,
//                  DISP=(NEW,PASS),SPACE=(1024,(50,20,1))
//STEP3     EXEC    PGM=*.STEP2.RESULT
```

Call the program in STEP3 by naming the step in which the library was created and the name of the DD statement that defines the program as a member of a library. If STEP2 had called a procedure, and the DD statement named RESULT was included in PROCSTEP3 of the procedure, you would code PGM=*.STEP2.PROCSTEP3.RESULT.

Defining a Dummy Data Set

To save processing time, you might not want a data set to be processed every time the job is executed. For example, while testing a program, you might want to suppress the writing of an output data set until you are sure it will contain meaningful output; you might want to skip the reading of a data set to be used only once a week. When defining a dummy data set, input/output operations are bypassed, disposition processing is not performed, and devices and storage are not allocated to the data set.

Define a dummy data set by:

- Coding the DUMMY parameter on the DD statement.
- Assigning the data set name NULLFILE in the DSNAME parameter on the DD statement.

Coding the DUMMY Parameter

Code DUMMY as the first parameter on the DD statement. DUMMY is a positional parameter: it must precede all keyword parameters on the DD statement.

When the DUMMY parameter is coded, all other parameters on the DD statement, with the exception of the DCB parameter, are ignored. (The parameters are checked for syntax, however; if a parameter is coded incorrectly, a JCL error message is issued.) Therefore, although you can code UNIT, VOLUME, and DISP, no devices or external storage is allocated to the data set and no disposition processing is performed. The DCB parameter must be coded if you would code it for normal I/O operations. For example, when an OPEN routine requires a BLKSIZE specification to obtain buffers and BLKSIZE is not specified in the DCB macro instruction, you should supply this information in the DCB parameter on the DD statement.

When a DD statement that overrides a procedure DD statement contains the DUMMY parameter, all of the parameters coded on the procedure DD statement are nullified, except for the DCB parameter.

If you request unit or volume affinity with a dummy data set, the data set requesting affinity is assigned a dummy status. (Unit and volume affinity is described in the chapter "Requesting Units and Volumes.")

When you want the data set to be processed, replace the DD statement containing the DUMMY parameter with a DD statement containing the parameters required to define the data set. When a procedure DD statement contains the DUMMY parameter, nullify it by coding the DSNAME parameter on the overriding DD statement and assigning a data set name other than NULLFILE.

Coding DSNAME=NULLFILE

Assigning the name NULLFILE in the DSNAME parameter has the same effect as coding DUMMY. The data set is assigned a dummy status; no devices or storage is allocated and no disposition processing is performed. All parameters except for DSNAME and DCB are ignored. (Code the DCB parameter when defining a dummy data set if you would code it for normal I/O operations.)

When you want the data set to be processed, replace the name NULLFILE with another data set name. (Assigning names to data sets is described under "Specifying the DSNAME Parameter.")

Requests to Read or Write a Dummy Data Set

When the program asks to read a dummy data set, an end-of-data-set exit is taken immediately. When the program requests that the data set be written, the request is recognized but no data is transmitted. VSAM supports dummy data sets for both read and write processing. Otherwise, use the basic sequential access method (BSAM) or queued sequential access method (QSAM) when requesting to write a dummy data set; if any other access method is used, the job is terminated.

If you define a data set as a dummy data set, the DISP parameter, if coded, is ignored and disposition processing is not performed.

Using Virtual Input/Output (VIO) for Temporary Data Sets

Temporary data sets can be handled by a new facility called virtual I/O (VIO). (VIO processing does not apply to nontemporary data sets.) Data sets for which VIO is specified reside within the paging space; however, to a problem program and the access method, the data sets appear to reside on some other real direct access storage device.

During system generation, new and/or existing unit names can be defined as eligible for VIO. These unit names can be coded on a DD statement defining a data set to specify VIO processing for any system-named temporary data set.

Defining a VIO Temporary Data Set

The DD statement for a VIO data set is similar to the DD statement for a conventional temporary data set, with the following exceptions:

- The UNIT keyword in the VIO DD statement must specify a name that has been defined as eligible for VIO.
- If the SPACE parameter is not coded for virtual I/O data sets, the default value is 10 primary and 50 secondary blocks with an average block length of 1000. Up to a one volume limit, you will always obtain the full amount of space requested (that is, the primary quantity plus fifteen secondary requests). If the primary quantity for space is larger than the simulated volume, the job will fail. If the primary request is met, but the secondary request is greater than one volume, you will get up to one volume. When allocating by average block length for a VIO data set, the secondary request is determined by the average block length specified in the SPACE parameter.
- VIO does not support ISAM or VSAM, so you can not specify ISAM or VSAM indicators in the DSORG parameter of a DD statement for a VIO data set. The "area" of an ISAM data set cannot be specified in the DSNAME parameter.
- The DISP parameter must be specified as NEW or PASS when creating a data set. Do not specify KEEP or CATLG any time for the DISP parameter.
- The DSNAME parameter need not be coded, but if it is, it must only be specified in &name form.
- Volume serial numbers cannot be specified for VIO. A VIO data set will be allocated to non-VIO if any of the above exceptions are violated, except the SPACE parameter request.
- The unit count subparameter of the UNIT parameter is ignored.

Backward References to VIO Data Sets

If the referring DD statement (VOL=REF=) defines a temporary data set and refers to a DD statement that defines a VIO data set, the data set is assigned to external page storage as a VIO data set.

If the referring DD statement requests unit affinity but does not define a temporary data set, the referring statement assumes the unit specification of the DD statement to which reference is made, but not the VIO status.

The following examples assume that the user-assigned group name SYSDA and the device type name 3330 have been defined at system generation with the UNITNAME macro instruction as group names eligible for VIO processing.

The data sets defined by the following DD statements are assigned to external page storage for VIO processing:

```
//DD1         DD       UNIT=SYSDA
```

```
//DD2         DD       UNIT=3330
```

```
//DD3          DD       DSN=&&A,DISP=(NEW),SPACE=(CYL,(30,10)),UNIT=SYSDA
```

```
//DD1          DD       UNIT=SYSDA
//DD2          DD       VOL=REF=*.DD1
```

```
//DDA          DD       UNIT=SYSDA
//DDB          DD       VOL=REF=*.DDA,UNIT=3330
```

In each of the following examples, the data set defined on the first DD statement is assigned to external page storage for VIO processing. The second DD statement does not request VIO because it defines a nontemporary data set.

```
//DD1          DD       UNIT=SYSDA
//DD2          DD       DSN=NONTEMP,DISP=(,KEEP),
//                      VOL=REF=*.DD1,SPACE=(CYL,10)
```

```
//DD1          DD       UNIT=SYSDA
//DD2          DD       DSN=TEMP,DISP=(,KEEP),VOL=SER=665431,
//                      SPACE=(CYL,10),UNIT=AFF=DD1
```

Using Virtual Input/Output (VIO) to Pass Temporary Data Sets Among Job Steps

VIO data sets are passed the same as conventional data sets. For example, the following JCL statements show the DD statements required by VIO for a job with compilation, linkage editor, and go steps. The VIO data sets in the various job steps are defined as system-named temporary data sets. The unit name PAGEDEV has been defined as eligible for VIO with the UNITNAME macro instruction during system generation.

```
(1) //ASM         EXEC     PGM=IFOX00
    ---
    ---
    //ASM.SYSGO   DD       DSN=&&OBJ,UNIT=PAGEDEV,DISP=(NEW,PASS)
(2) //LKED        EXEC     PGM=IEWL
    //SYSLIN      DD       DSN=&&OBJ,DISP=(OLD,DELETE)
    //            DD       DDNAME=SYSIN
    //SYSLMOD     DD       DSN=&&LOAD(A),DISP=(NEW,PASS),UNIT=PAGEDEV,
    //                     DCB=DSORG=PO
    ---
    ---
(3) //GO          EXEC     PGM=*.LKED.SYSLMOD
```

Entering Data Through the Input Stream

You can enter data through the input stream by coding either the * or DATA parameters on the DD statements. The DD * statement precedes data in an input stream; the DD DATA statement precedes data in an input stream when the data contains JCL statements. The DLM parameter allows the use of a delimiter other than /* to terminate data defined in the input stream. Code this parameter on either the DD * or DD DATA parameters.

You can include several distinct groups of data in the input stream. Two types of data are for job steps specifying a program name or for job steps that call a cataloged or in-stream procedure. However, cataloged and in-stream procedures cannot contain DD statements defining data in the input stream.

VSAM Data Sets

Virtual Storage Access Method (VSAM) is an access method of OS/VS for use with direct-access storage. It is different from all other access methods and you need to take certain precautions when coding VSAM data sets. You can use JCL parameters to identify cataloged VSAM data sets and to specify options for them. To process a VSAM data set, specify a DD statement in the form:

```
//ddname     DD       DSNAME=dsname,DISP={OLD}
                                         {SHR}
```

The DSNAME parameter specifies the name of the cluster to which the data set you are processing belongs. The DISP parameter must specify either OLD or SHR because the data set is cataloged. You cannot use JCL to create VSAM data sets; you must use Access Method Services commands. VSAM data sets cannot be passed within a job.

Some DD parameters and subparameters have different meanings for VSAM data sets. For example, VSAM data sets are described by the access-method control block (ACB), not the DCB. Therefore, the DCB parameter is not applicable to VSAM. Parameters that can be used without modification are explained in Figure 13; parameters that either should not be used or should be used only with caution are explained in Figure 14. The STEPCAT and JOBCAT facilities identify user catalogs. These parameters are similarly used for all data sets and are discussed in this section under "Creating and Using Private Libraries."

VSAM has one JCL parameter of its own: AMP. The AMP parameter takes effect when the data set defined by the DD statement is opened. It has subparameters for:

- Overriding operands specified with the ACB, EXLST, or the GENCB macro instructions.
- Supplying operands missing from the ACB or GENCB macro instruction.
- Indicating checkpoint/restart options.
- Indicating options when using ISAM macro instructions to process a key-sequenced data set.
- Indicating that the data set is a VSAM data set when you specify unit and volume information or DUMMY in a DD statement.
- Indicating that you want VSAM to supply storage dumps of the access-method control block(s) that identify this DD statement.

Parameter	Subparameter	Comment
DDNAME	*ddname*	Works as in OS/VS.
DISP	SHR	Indicates that you are willing to share the data set with other jobs. This subparameter alone, however, does not guarantee that sharing will take place. See *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide* for a full description of data-set sharing.
	OLD	Works as in OS/VS.
	PASS	Works as in OS/VS if a key-sequenced data set and its index don't reside on unlike devices.
DSNAME	*dsname*	Works as in OS/VS.
DUMMY		Works as in OS/VS, except that an attempt to read results in an end-of-data condition, and an attempt to write results in a return code that indicates the write was successful. If specified, AMP='AMORG' must also be specified.
UNIT	*address*	Must be the address of a valid device for VSAM (2305, 2314, 3340, 3330V, 3330). If not, OPEN will fail.
	type	Must be a type supported by VSAM. If not, OPEN will fail.
	group	Must be a group supported by VSAM. If not, OPEN will fail.
	p	There must be enough units to mount all of the volumes specified. If sufficient units are available, UNIT=p can improve performance by avoiding the mounting and demounting of volumes.
	unit count	If the number of devices requested is greater than the number of volumes on which the data set resides, the extra devices are allocated anyway. If a key-sequenced data set and its index reside on unlike devices, the extra devices are allocated evenly between the unlike device types. If the number of devices requested is less than the number of volumes on which the data set resides but greater than the minimum number required to gain access to the data set, the devices over the minimum are allocated evenly between unlike device types. If devices beyond the count specified are in use by another task but are shareable and have mounted on them volumes containing parts of the data set to be processed, they will also be allocated to this data set.
	DEFER	Works as in OS/VS.
VOLUME	PRIVATE	Works as in OS/VS.
	SER	The volume serial number(s) used in the Access Method Services DEFINE command for the data set must match the volume serial numbers in the VOLUME=SER specification when the data set is defined. After a VSAM data set is defined, the volume serial number(s) need not be specified on a DD statement to retrieve or process the data set. If, however, VOLUME=SER and UNIT=type are specified, only those volumes specifically named are initially mounted. Other volumes may be mounted when they're needed if at least one of the units allocated to the data set is not shareable or the unit count is equal to the total number of volumes allocated to the data set. A unit is unshareable when unit count is less than the number of volume serial numbers specified or when DEFER is specified.

Figure 13. DD Parameters Used With VSAM

Parameter	Subparameter	Comment
DATA		Because there is no way to get VSAM data into the input stream, this parameter is not applicable to VSAM.
DCB	All	The access-method control block, not the DCB, describes VSAM data sets; therefore, the DCB parameter is not applicable to VSAM. An access-method control block is generated by an ACB or GENCB macro, and can be modified by a MODCB macro.
DISP	CATLG	VSAM data sets are cataloged and uncataloged as a result of an Acess Method Services command; if CATLG is coded, a message is issued, but the data set is not cataloged.
	DELETE	VSAM data sets are deleted as a result of an Acess Method Services command; if DELETE is coded, a message is issued, but the data set is not deleted.
	MOD	For VSAM data sets, MOD is treated as if OLD were specified, except for processing with an ISAM program, in which case MOD indicates resume load.
	KEEP	Because KEEP is implied for VSAM data sets, it need not be coded.
	NEW	VSAM data spaces are initially allocated as a result of the Access Method Services DEFINE command. If NEW is specified, OS/VS also allocates space, and it is never used by VSAM. Moreover, an Access Method Services request for space may fail if the DISP=NEW acquisition of space causes too little space to remain available.
	UNCATLG	VSAM data sets are cataloged and uncataloged as a result of Access Method Services commands; if UNCATLG is coded, a message is issued, but the data set is not uncataloged.
DSNAME	*dsname(areaname)*	The name is used; areaname is ignored.
	dsname(generation)	The name is used; generation is ignored.
	dsname(member)	The name is used; member is ignored.
	All temporary *dsnames*	Because VSAM data sets are built by Access Method Services, which uses the data-set name supplied in the DEFINE command, temporary names cannot be used with VSAM.
	All backward DD references of the form **.ddname*	If the object referred to is a cluster and the data set and index reside on unlike devices, the results of a backward DD reference are unpredictable.
LABEL	BLP, NL, NSL	Because these subparameters have no meaning for direct-access devices, they do not apply for VSAM data sets, which all reside on direct-access storage.
	IN	Because IN is used to override DCB subparameters and the DCB parameter does not apply to VSAM data sets, IN does not apply.
	OUT	Because OUT is used to override DCB subparameters and the DCB parameter does not apply to VSAM data sets, OUT does not apply.
	NOPWREAD	The password-protection bit is set for all VSAM data sets, regardless of the PASSWORD/NOPWREAD specification in the LABEL parameter.
	PASSWORD	The password-protection bit is set for all VSAM data sets, regardless of the PASSWORD/NOPWREAD specification in the LABEL parameter.
	SL, SUL	Although these parameters apply to direct-access storage devices, SL is always used for VSAM, whether you specify SL, SUL, or neither.

Figure 14. DD Parameters You Should Avoid With VSAM (Part 1 of 2)

Parameter	Subparameter	Comment
SPACE		VSAM data spaces are initially allocated as a result of the Access Method Services DEFINE command. If SPACE is specified, therefore, an extent is allocated that is never used by VSAM. Moreover, an Access Method Services request for space may fail as a result of the SPACE acquisition of space.
SYSOUT		If SYSOUT is coded with a mutually exclusive parameter (for example, DISP), the job step is terminated with an error message.
UCS	All	Because this parameter applies only to unit-record devices, it does not apply to VSAM.
UNIT	AFF	You must use this subparameter carefully. If the cluster components, the data and its index, reside on unlike devices, the results of UNIT=AFF are unpredictable.
VOLUME	REF	You must use this subparameter carefully. If the referenced volumes are not a subset of those contained in the catalog record for the data set, the results are unpredictable.
	vol seq number	Results are unpredictable.
	vol count	This subparameter is used to request some number of nonspecific volumes. Because all VSAM volumes must be specifically defined before processing, volcount is not applicable to VSAM data sets.
		Because there is no way to get VSAM data into the input stream, this parameter has no application with VSAM.

Figure 14. DD Parameters You Should Avoid With VSAM (Part 2 of 2)

Creating and Retrieving Indexed Sequential Data Sets

Indexed sequential (ISAM) data sets are created and retrieved using special subsets of DD statement parameters and subparameters. Each data set can occupy up to three different areas of space:

1. Prime area — This area contains data and related track indexes. It exists for all indexed sequential data sets.
2. Overflow area — This area contains overflow from the prime area when new data is added. It is optional.
3. Index area — This area contains master and cylinder indexes associated with the data set. It exists for any indexed sequential data set that has a prime area occupying more than one cylinder.

Indexed sequential data sets must reside on direct access volumes. The data set can reside on more than one volume and the device types of the volumes may in some cases differ.

Creating an Indexed Sequential Data Set

One to three DD statements can be used to define a new indexed sequential data set. When using three DD statements to define the data set, each DD statement defines a different area and the areas must be defined in the following order:

1. Index area.
2. Prime area.
3. Overflow area.

When using two DD statements to define the data set, the areas must be defined in the following order:

1. Index area.		1. Prime area. (optionally, Index area)
	or	
2. Prime area.		2. Overflow area.

When using one DD statement to define the data set, you are defining the prime area and, optionally, the index area.

When more than one DD statement is used to define the data set, assign a ddname only to the first DD statement; the name field of the other statements must be blank.

The only DD statement parameters that can be coded when defining a new indexed sequential data set are the DSNAME, UNIT, VOLUME, LABEL, DCB, DISP, and SPACE parameters. When to code each of these parameters and what restrictions apply are described in the following paragraphs.

The DSNAME Parameter

The DSNAME parameter is required on any DD statement that defines a new temporary or nontemporary indexed sequential data set. To identify the area you are defining, you follow the DSNAME parameter with the area: DSNAME=name(INDEX). DSNAME=name(PRIME), or DSNAME=name(OVERFLOW). If you are using only one DD statement to define the data set, code DSNAME=name(PRIME) or DSNAME=name.

When reusing previously allocated space to create an ISAM data set, the DSNAME parameter must contain the name of the old data set to be overlaid.

The UNIT Parameter

The UNIT parameter is required on any DD statement that defines a new indexed sequential data set unless VOLUME=REF=reference is coded. You must request a direct access device in the UNIT parameter and must not request DEFER.

If there are separate DD statements defining the prime and index areas, request the same number of direct access devices for the prime area as there are volumes specified in the VOLUME parameter. You request only one direct access volume for an index area and one for an overflow area.

A DD statement for the index area or overflow area can request a device type different than the type requested on the other statements.

Another way to request a device is to code UNIT=AFF=ddname (except for new data sets), where the named DD statement requests the direct access device or device type you want.

The VOLUME Parameter

The VOLUME parameter is required only if you want an area of the data set written on a specific volume or the prime area requires the use of more than one volume. (If the prime area and index area are defined on the same statement, you cannot request more than one volume on the DD statement.) Either supply the volume serial number or numbers in the VOLUME parameter or code VOLUME=REF=reference. In all cases, the VOLUME parameter can be used to request a private volume (PRIVATE).

Note: If a new ISAM data set is being created with a nonspecific volume request and its DSNAME already exists on a volume eligible for allocation, the job may fail due to duplicate names on the volume. If the volume selected for the new data set already contains a data set with the same name, the job fails. If the old data set with a duplicate name resides on another volume than the one selected for the new data set, however, the new data set is not affected and will be added to the volume. Failure of this type can be corrected by either scratching the old data set or renaming the new data set before resubmitting the job.

The LABEL Parameter

The LABEL parameter need only be coded to specify a retention period (EXPDT or RETPD) or password protection (PASSWORD).

The DCB Parameter

The DCB parameter must be coded on every DD statement that defines an indexed sequential data set. At minimum, the DCB parameter must contain DSORG=IS or DSORG=ISU. Other DCB subparameters can be coded to complete the data control block if it has not been completed by the processing program. When more than one DD statement is used to define the data set, code all the DCB subparameters on the first DD statement. Code DCB=*.ddname on the remaining statement or statements; ddname is the name of the DD statement that contains the DCB subparameters.

When reusing previously allocated space and recreating an ISAM data set, desired changes in the DCB parameter must be coded on the DD statement. Although you are creating a new data set, some DCB subparameters cannot be changed if you want to use the space the old data set used. The DCB subparameters you can change are: BFALN, BLKSIZE, CYLOFL, DSORG, KEYLEN, LRECL, NCP, NTM, OPTCD, RECFM, and RKP.

The DISP Parameter

If you are creating a new data set and not reusing preallocated space, the DISP parameter need only be coded if you want to keep, DISP=(,KEEP), catalog, DISP=(,CATLG), or pass, DISP=(,PASS), the data set. If reusing previously allocated space and recreating an ISAM data set, code DISP=OLD. The newly created data set will overlay the old one.

In order to catalog the data set when DISP=(,CATLG) is coded or pass the data set when DISP=(,PASS) is coded, the data set must be defined on only one DD statement. If the data set was defined on more than one DD statement and the volumes on which the data set now resides correspond to the same device type, use the Access Method Services DEFINE command to catalog the data set. Refer to the **OS/VS Access Method Services**, GC26-3836 publication for details.

The SPACE Parameter

The SPACE parameter is required on any DD statement that defines a new indexed sequential data set. Use either the recommended nonspecific allocation technique or the more restricted absolute track (ABSTR) technique. If more than one DD statement is used to define the data set, all must request space using the same technique.

Nonspecific Allocation Technique

You must request the primary quantity in cylinders (CYL). When the DD statement that defines the prime area requests more than one volume, each volume is assigned the number of cylinders requested in the SPACE parameter.

One of the subparameters of the SPACE parameter, the "index" subparameter, is used to indicate how many cylinders are required for an index. When one DD statement is used to define the prime and index areas and you want to explicity state the size of the index, code the "index" subparameter.

The CONTIG subparameter can be coded in the SPACE parameter. However, if CONTIG is coded on one of the statements, it must be coded on all of them.

You cannot request a secondary quantity for an indexed sequential data set. Also, you cannot code the subparameters RLSE, MXIG, ALX, and ROUND.

Absolute Track Technique

The number of tracks requested must be equal to one or more whole cylinders. The address of the beginning track must correspond with the first track of a cylinder other than the first cylinder on the volume. When the DD statement that defines the prime area requests more than one volume, space is allocated for the prime area beginning at the specified address and continuing through the volume and onto the next volume until the request is satisfied. (This can only be done if the volume table of contents of the second and all succeeding volumes is contained within the first cylinder of each volume.)

One of the subparameters of the SPACE parameter, the "index" subparameter, is used to indicate how many tracks are required for an index. The number of tracks specified must be equal to one or more cylinders. When one DD statement is used to define the prime and index areas and you want to explicity state the size of the index, code the "index" subparameter.

Note: If the indexed sequential data set is to reside on more than one volume and an error is encountered as the volumes are being allocated to the data set, follow this procedure before resubmitting the job: Use the IEHPROGM utility program to scratch the data set labels on any of the volumes to which the data set was successfully allocated. This utility program is described in the chapter "The IEHPROGM Program" in **OS/VS Utilities**, GC35-0005.

Area Arrangement of an Indexed Sequential Data Set

When creating an indexed sequential data set, the arrangement of the areas is based on two criteria:

1. The number of DD statements used to define the data set.
2. What area each DD statement defines.

An additional criterion is used when you do not include a DD statement that defines the index area:

3. Is an index size coded in the SPACE parameter on the DD statement that defines the prime area?

Figure 23 in the "Reference Tables" section illustrates the different arrangements that can result based on the criteria listed above. In addition, it indicates what restrictions apply on the number and types of devices that can be requested.

Retrieving an Indexed Sequential Data Set

If all areas of an existing indexed sequential data set reside on volumes of the same device type, you can retrieve the entire data set with one DD statement. If the index or overflow resides on a volume of a different device type, use two DD statements. If the index and overflow reside on volumes of different device types, use three DD statements to retrieve the data set. The DD statements are coded in the following order:

1. First DD statement - defines the index area
2. Second DD statement - defines the prime area
3. Third DD statement - defines the overflow area

The only DD statement parameters that can be coded when retrieving an indexed sequential data set are the DSNAME, UNIT, VOLUME, DCB, and DISP parameters. When to code each of these parameters and what restrictions apply are described in the following paragraphs.

The DSNAME Parameter

The DSNAME parameter is always required. Identify the data set by its name, but do not include the term INDEX, PRIME, or OVFLOW. If the data set was passed from a previous step, identify it by a backward reference.

The UNIT Parameter

The UNIT parameter must be coded unless the data set resides on one volume and was passed. You identify in the UNIT parameter the device type and how many of these devices are required.

If the data set resides on more than one volume and the volumes correspond to the same device type, you need only one DD statement to retrieve the data set. Request one device in the UNIT parameter per volume. If the index or overflow area of the data set resides on a different type of volume than the other areas, you must use two DD statements to retrieve the data set. On one DD statement, request the device type required to retrieve the index or overflow area. On the other DD statement, request the device type and the number of devices required to retrieve the prime area and the overflow area if the overflow area resides on the same device type. If the index and the overflow areas reside on different device types from the prime area, a third DD statement is needed.

The VOLUME Parameter

The VOLUME parameter must be coded unless the data set resides on one volume and was passed from a previous step. Identify in the VOLUME parameter the serial numbers of the volumes on which the data set resides. Code the serial numbers in the same order as they were coded on the DD statements used to create the data set.

The DCB Parameter

The DCB parameter must be coded unless the data set was passed from a previous step. The DCB parameter must always contain DSORG=IS or DSORG=ISU. Other DCB subparameters can be coded to complete the data control block if it has not been completed by the processing program.

The DISP Parameter

The DISP parameter must always be coded. The first subparameter of the DISP parameter must be SHR or OLD. You can, optionally, assign a disposition as the second subparameter.

Examples of Creating and Retrieving an Indexed Sequential Data Set

The following job creates an indexed sequential data set on one 3330 volume.

```
//ISAMJOB   JOB     ,,MSGLEVEL=(1,1),PERFORM=25
//STEP1     EXEC    PGM=INCLUDE
//DD1       DD      DSN=DATASET1(INDEX),DISP=(NEW,KEEP),UNIT=3330,
//                  VOL=SER=777777,SPACE=(CYL,(10),,CONTIG),
//                  DCB=(DSORG=IS,RECFM=F,LRECL=80,RKP=1,KEYLEN=8)
//          DD      DSN=DATASET1(PRIME),DISP=(NEW,KEEP),UNIT=3330,
//                  VOL=REF=*.DD1,SPACE=(CYL,(25),,CONTIG),DCB=*.DD1
//          DD      DSN=DATASET1(OVFLOW),DISP=(NEW,KEEP),UNIT=3330,
//                  VOL=REF=*.DD1,SPACE=(CYL,(25),,CONTIG),DCR=*.DD1
```

The following job includes the DD statements required to retrieve the indexed sequential data set created above.

```
//RETRISAM  JOB     ,,MSGLEVEL=(1,1),PERFORM=25
//STEP1     EXEC    PGM=RETRIEVE
//DDISAM    DD      DSN=DATASET1,DCB=DSORG=IS,UNIT=3330,DISP=OLD,
//                  VOL=SER=777777
```

The following job creates an indexed sequential data set on one 3330 and two 2314 volumes.

```
//ISAMJOB   JOB     ,,MSGLEVEL=(1,1),PERFORM=25
//STEP1     EXEC    PGM=IEFISAM
//DDISAM    DD      DSN=DATASET2(INDEX),DISP=(NEW,KEEP),UNIT=3330,
//                  VOL=SER=888888,SPACE=(CYL,10,,CONTIG),DCB=(DSORG=IS,
//                  RECFM=F,LRECL=80,RKP=1,KEYLEN=8)
//          DD      DSN=DATASET2(PRIME),DISP=(,KEEP),UNIT=2314,
//                  VOL=SER=999999,SPACE=(CYL,10,,CONTIG),DCB=*.DDISAM
//          DD      DSN=DATASET2(OVFLOW),DISP=(,KEEP),UNIT=2314,
//                  VOL=SER=AAAAAA,SPACE=(CYL,10,,CONTIG),DCB=*.DDISAM
```

The following job includes the DD statements required to retrieve the indexed sequential data set created above.

```
//RERISAM    JOB      ,,MSGLEVEL=(1,1),PERFORM=25
//STEP1      EXEC     PGM=IEFISAM
//DDISAM     DD       DSN=DATASET2,DCB=DSORG=IS,DISP=OLD,UNIT=3330,
//                    VOL=SER=888888
//           DD       DSN=DATASET2,DCB=DSORG=IS,DISP=OLD,UNIT=(2314,2),
//                    VOL=SER=(999999,AAAAAA)
```

Creating and Retrieving Generation Data Sets

A generation data set is one of a collection of successive, historically related, cataloged data sets known as a generation data group. The system keeps track of each data set in a generation data group as it is created so that new data sets can be chronologically ordered and old ones easily retrieved.

To create or retrieve a generation data set, identify the generation data group name in the DSNAME parameter and follow the group name with a relative generation number. When creating a generation data set, the relative generation number tells the system whether this is the first data set being added during the job, the second, the third, etc. When retrieving a generation data set, the relative generation number tells the system how many data sets have been added to the group since this data set was added.

A generation data group can consist of cataloged sequential, partitioned, and direct data sets residing on tape volumes, direct access volumes, or both. If the generation data group resides on more than one device type, all generations cannot be retrieved together. Generation data sets can have like or unlike DCB attributes and data set organizations. If the attributes and organizations of all generations in a group are identical, the generations can be retrieved together as a single data set (up to 255 data sets can be retrieved in this way).

Building a Generation Data Group Base Entry

Before defining the first generation data set, build a generation data group base entry in a VSAM or OS CVOL catalog. This provides for as many generation data sets (up to 255) as you would like to have in the generation data group. The system uses the base to keep track of the chronological order of the generation data sets. Use the Access Method Services DEFINE command to build generation data group bases in a VSAM catalog. This command is described in **OS/VS Access Method Services**, GC26-3836.

Another requirement of generation data groups is that a data set label list exist on the same volume as the catalog. The system uses this label to refer to DCB attributes when you define a new generation data set. There are two ways to satisfy this requirement: (1) create a model data set label before defining the first generation data set; or (2) use the DCB parameter to refer the system to an existing cataloged data set each time you define a new generation data set.

Creating a Model Data Set Label

To create a model data set label, define a data set and request that it be placed on the same volume as the generation data group base. This ensures that there is always a data set label on the same volume as the catalog to which the system can refer.

The name assigned to the data set can be the same or different than the name assigned to the generation data group. (If you assign the same name for both, the data set associated with the model data set label cannot be cataloged.) Request a space allocation of zero tracks or cylinders. The DCB attributes that can be supplied are DSORG, OPTCD, BLKSIZE, LRECL, KEYLEN, and RKP.

You need not create a model data set label for every generation data group whose indexes reside on the same volume. Instead, create one model data set label to be used by any number of generation data groups. When creating a generation data set, specify the name of the model in the DCB parameter and follow the name with a list of all the DCB subparameters required for the new generation data set that are different than specified in the model; that is, DCB=(dsname,list of attributes).

Referring the System to a Cataloged Data Set

If there is a cataloged data set that resides on the same volume as the generation data group index and you are sure that data set will exist as long as you are adding data sets to the generation data group, you need not create a model data set label. When creating a generation data group, specify the name of the cataloged data set in the DCB parameter by coding DCB=dsname. If all the DCB attributes are not contained in the label of the cataloged data set, or if you want to override certain attributes, follow the data set name with these attributes; that is, DCB=(dsname,list of attributes).

Creating a Generation Data Set

When defining a new generation data set, always code the DSNAME, DISP, and UNIT parameters. Other parameters you might code are the VOLUME, SPACE, LABEL, and DCB parameters.

The DSNAME Parameter

In the DSNAME parameter, code the name of the generation data group followed by a number enclosed in parentheses. This number must be 1 or greater. If this is the first data set you are adding to a particular generation data group during the job, code +1 in parentheses. Each time during the job you add a data set to the same generation data group, increase the number by one.

Any time you refer to this data set later in the job, use the same relative generation number as was used earlier. At the end of the job, the system updates the relative generation numbers of all generations in the group to reflect the additions.

Note: Unpredictable results can occur if you use a relative generation number that causes the actual generation number to exceed G9999.

The DISP Parameter

New generations are assigned a status of NEW and a disposition of CATLG in the DISP parameter; that is, DISP=(NEW,CATLG).

The UNIT Parameter

The UNIT parameter is required on any DD statement that defines a new generation data set unless VOLUME=REF=reference is coded. In the UNIT parameter, identify the type of devices you want (tape or direct access).

The SPACE Parameter

The SPACE parameter is coded only when the generation data set is to reside on a direct access volume.

The LABEL Parameter

You can specify label type, password protection (PASSWORD), and a retention period (EXPDT or RETPD) in the LABEL parameter. If the data set will reside on a tape volume and is not the first data set on the volume, specify a data set sequence number.

The DCB Parameter

A model data set label that has the same name as the group name may exist. If this is so, and if the label contains all the attributes required to define this generation, you need not code the DCB parameter. If all the attributes are not contained in the label, or if you want to override certain attributes, code DCB=(list of attributes).

If a model data set label has a different name than the group name and if the label contains all the attributes required to define this generation data set, only the name of the data set associated with the model data set label need be coded. Code the name in the DCB parameter, that is, DCB=dsname. If all the attributes are not contained in the label, or if you want to override certain attributes, follow the data set name with these attributes; that is, DCB=(dsname,list of attributes).

If a model data set label does not exist, you must code the name of a cataloged data set that resides on the same volume as the generation data group index. If all the attributes are not contained in the label for this data set, or if you want to override certain attributes, follow the data set name with these attributes.

Retrieving a Generation Data Set

To retrieve a generation data set, always code the DSNAME and DISP parameters. Other parameters you might code are the UNIT, LABEL, and DCB parameters.

The DSNAME Parameter

In the DSNAME parameter, code the name of the generation data group followed by a number enclosed in parentheses. The number coded depends on how many new generation data sets have been added to the group since this generation data set was added. If none have been added prior to the job, code a zero (0). If one has been added prior to the job, code (-1). Reduce the number by 1 until you determine the present relative generation number of the data set, then code this number.

Any time you refer to this data set later in the job, use the same relative generation number as was used earlier, even if another generation has been added during the job.

Note: Relative generation numbers are based on the catalog as it existed at the start of the job, plus any changes made by cataloging new members of the data set during the job.

If you want to retrieve all generations of a generation data group as a single data set, or retrieve all generations of a generation data group by concatenation, in order, starting with the most recent data set and with unit affinity to the most recent data set, specify the generation data group name without a generation number; for example, DSNAME=WEEKLY.PAYROLL. You can retrieve all generations by concatenating them only if the attributes and organization of all generations are identical.

The DISP Parameter

The DISP parameter must always be coded. The first subparameter of the DISP parameter must be OLD, SHR, or MOD. You can, optionally, assign a disposition as the second subparameter. The second subparameter must be specified for a generation data group. You should avoid coding PASS as the second subparameter when you retrieve all generations of a generation data group as a single data set. In all such retrievals the unit and volume information for each generation level is obtained from the catalog, and not from the pass mechanism.

The UNIT Parameter

Code the UNIT parameter when you want more than one device assigned to the data set. Code the number of devices you want in the unit count subparameter, or, if the data set resides on more than one volume and you want as many devices as there are volumes, code P in place of the unit count subparameter.

The VOLUME Parameter

You can assign a volume in the VOLUME parameter or let the system assign one for you. The VOLUME parameter can also be used to request a private volume (PRIVATE) and to indicate that more volumes can be required (volume count). A volume serial number for an old generation data group is ignored; the value used is in the catalog.

The LABEL Parameter

Code the LABEL parameter when the data set has other than standard labels. If the data set resides on a volume and is not the first data set on the volume, specify the data set sequence number.

The DCB Parameter

Code the DCB parameter when the data set has other than standard labels and DCB information is required to complete the data control block.

Submitting a Job for Restart

Certain rules apply when you refer to generation data sets in a job submitted for restart (the RESTART parameter is coded on the JOB statement).

For step restart: If step restart is performed, generation data sets that were created and cataloged in steps preceding the restart step must not be referred to in the restart step or in steps following the restart step by means of the same relative generation numbers that were used to create them. Instead, you must refer to a generation data set by means of its present relative generation number. For example, if the last generation data set created and cataloged was assigned a generation number of +2, it would be referred to as 0 in the restart step and in steps following the restart step. In this case, the generation data set assigned number of +1 would be referred to as -1.

For checkpoint restart: If generation data sets created in the restart step were kept instead of cataloged, that is, DISP=(NEW,CATLG,KEEP) was coded, you can, during checkpoint restart, refer to these data sets and generation data sets created and cataloged in steps preceding the restart step by means of the same relative generation numbers that were used to create them.

Example of Creating and Retrieving Generation Data Sets

The following job step includes the DD statements that could be used to add three data sets to a generation data group.

```
//STEPA      EXEC     PGM=PROCESS
//DD1        DD       DSNAME=A.B.C( +1 ),DISP=( NEW,CATLG ),UNIT=2400,
//                    VOL=SER=13846,LABEL=( ,SUL )
//DD2        DD       DSNAME=A.B.C( +2 ),DISP=( NEW,CATLG ),UNIT=3330,
//                    VOL=SER=10311,SPACE=( 480,( 150,20 ) )
//DD3        DD       DSNAME=A.B.C( +3 ),DISP=( NEW,CATLG ),UNIT=2314,
//                    VOL=SER=28929,SPACE=( 480,( 150,20 ) ),
//                    DCB=( LRECL=120,BLKSIZE=480 )
```

The first two DD statements do not include the DCB parameter; therefore, a model data set label must exist on the same volume as the generation data group index and must have same name as the generation data group (A.B.C). Since the DCB parameter is coded on the third DD statement, the attributes LRECL and BLKSIZE, along with the attributes included in the model data set label, are used.

The following job includes the DD statements required to retrieve the generation data sets defined above when no other data sets have been added to the generation data group.

```
//JWC        JOB      CLASS=B
//STEP1      EXEC     PGM=REPORT9
//DDA        DD       DSNAME=A.B.C( -2 ),DISP=OLD,LABEL=( ,SUL )
//DDB        DD       DSNAME=A.B.C( -1 ),DISP=OLD
//DDC        DD       DSNAME=A.B.C( 0 ),DISP=OLD
```

Cataloged and In-Stream Procedures

Applications that require many control statements and are used on a regular basis can be considerably simplified through the use of cataloged and in-stream procedures. A cataloged procedure is a set of job control statements that are placed in a partitioned data set known as the procedure library; an in-stream procedure is a set of job control statements that are placed in the input stream within a job. You can execute a procedure simply by specifying its name on an EXEC statement in your job. This section describes how to write and use cataloged and in-stream procedures.

This section includes three topics:

- Writing Cataloged and In-Stream Procedures
- Using Cataloged and In-Stream Procedures
- Using Symbolic Parameters

Writing Cataloged and In-Stream Procedures

Cataloged and in-stream procedures are simply the job control statements needed to perform an application. A procedure contains one or more procedure steps, each step consisting of an EXEC statement that identifies the program to be executed and DD statements defining the data sets to be used or produced by the program. The program requested on the EXEC statement must exist in a private or the system library. If you do request a program that is contained in a private library, the procedure step calling that program must include a a DD statement with the ddname STEPLIB that defines the private library; the STEPLIB DD statement is described in the chapter, "Creating and Using Private and Temporary Libraries."

Cataloged and in-stream procedures cannot contain:

- EXEC statements that refer to other cataloged or in-stream procedures;
- JOB, delimiter, or null statements;
- DD statements defining private libraries to be used throughout the job (DD statements with the ddname JOBLIB);
- DD statements defining data in the input stream (statements including the * or DATA parameters).
- Any JES2 or JES3 control statements; they are ignored.

Identifying an In-Stream Procedure

To identify an in-stream procedure, code the PROC and PEND job control statements.

On the PROC statement, which must be the first statement in an in-stream procedure, assign the procedure a name. This name is the name that a programmer codes to call the procedure. Optionally, you can also assign default values to symbolic parameters contained in the procedure and code comments. (A symbolic parameter is a symbol preceded by an ampersand that stands for a parameter, a subparameter, or a value in a procedure; including symbolic parameters in a procedure is described in detail in the chapter "Using Symbolic Parameters.") If you do not assign default values to symbolic parameters on the PROC statement, you cannot code comments. The simplest form of the PROC statement, to identify an in-stream procedure named PAYROLL, would be:

```
//PAYROLL   PROC
```

The PEND statement marks the end of the in-stream procedure. You can include a name on the PEND statement and comments, but these are optional. Both of the following examples are acceptable:

```
//ENDPROC    PEND    end of in-stream procedure
//           PEND
```

The following example illustrates an in-stream procedure named SALES consisting of two procedure steps. Note that STEP2 includes a STEPLIB DD statement to define the private library in which the program JUGGLE can be found.

```
//SALES      PROC
//STEP1      EXEC    PGM=FETCH
//DD1A       DD      DSNAME=RECORDS( BRANCHES ),DISP=OLD
//DD1B       DD      DSNAME=RECORDS( MORGUE ),DISP=MOD
//STEP2      EXEC    PGM=JUGGLE
//STEPLIB    DD      DSNAME=PRIV.WORK,DISP=OLD
//DD2A       DD      SYSOUT=A
//           PEND
```

Placing a Cataloged Procedure in a Procedure Library

The major difference between cataloged and in-stream procedures is where they are placed. Cataloged procedures must be placed in a procedure library before being used. In-stream procedures are placed within the job that calls them. A procedure library is simply a partitioned data set containing cataloged procedures. IBM supplies a procedure library named SYS1.PROCLIB, but the installation can have additional procedure libraries with different names. When a programmer calls a cataloged procedure, he receives a copy of the procedure; therefore, a cataloged procedure can be used by more than one programmer simultaneously.

To add a procedure to a procedure library, use the IEBUPDTE utility program. You can also use the IEBUPDTE utility to permanently modify an existing procedure. (Before modifying an existing cataloged procedure, however, you must notify the operator; he must delay the execution of jobs that might use the procedure library while it is being updated.) Details on using the IEBUPDTE utility are included in **OS/VS Utilities**, GC35-0005. Before placing a cataloged procedure in a procedure library, test it without overriding any parameters to ensure that the procedure statements are symtactically correct. Additionally, test the procedure by first running it as an in-stream procedure.

No special job control statements are used to identify a cataloged procedure. The PEND statement is never used and the PROC statement is optional. You need code the PROC statement as the first statement in a cataloged procedure only when you want to assign default values to symbolic parameters. The name of the PROC statement is not necessarily the name of the cataloged procedure; you assign the procedure a name when adding it to the procedure library.

Allowing for Changes in Cataloged and In-Stream Procedures

The usefulness of cataloged and in-stream procedures is destroyed if a programmer who uses the procedure has to permanently modify the procedure every time he wants to make a change. When writing a procedure, you can define, as symbolic parameters, those parameters, subparameters and values that are likely to vary each time the procedure is used. For details on coding symbolic parameters, see the chapter "Using Symbolic Parameters."

Using Cataloged and In-Stream Procedures

To use a cataloged or in-stream procedure, specify the procedure name on an EXEC statement. You can modify the procedure by adding DD statements, overriding, adding, or nullifying parameters on EXEC and DD statements, and assigning values to symbolic parameters. Calling and modifying procedures is explained in greater detail in the following paragraphs.

How to Call Cataloged and In-Stream Procedures

To call a cataloged or in-stream procedure, you identify the procedure on the EXEC statement of the step calling the procedure by coding as the first operand on the EXEC statement.

- The procedure name.
- PROC= the procedure name.

A cataloged procedure must exist in the procedure library before you attempt to use it. JES2 or JES3 is responsible for fetching cataloged procedures. Refer to "Routing a Job Through the System" to see how JES2 or JES3 determines what library to select. When using an in-stream procedure, include the procedure, beginning with a PROC statement and ending with a PEND statement, with the job control language for the job; the procedure must follow the JOB statement but appear before the EXEC statement that calls it. You can include as many as fifteen uniquely named in-stream procedures in one job and can use each procedure as many times as you wish in the job.

To call a cataloged procedure named PROCESSA, you would code:

```
//CALL       EXEC    PROCESSA        or
//CALL       EXEC    PROC=PROCESSA
```

On the EXEC statement, you can also code changes you would like to make for this execution of the procedure.

Modifying Cataloged and In-Stream Procedures

You can modify a procedure by:

- Assigning values to or nullifying symbolic parameters contained in the procedure.
- Overriding, adding, or nullifying parameters on EXEC and DD statements in the procedure.
- Adding DD statements to the procedure.

All changes you make are in effect only during the current execution of the procedure. For a discussion of symbolic parameters, see the chapter "Using Symbolic Parameters." Other modifications are described in the following sections.

Modifying Parameters on an EXEC Statement

To override, add, or nullify a parameter on an EXEC statement in a procedure, identify on the EXEC statement that calls the procedure the parameter you are changing, the name of the EXEC statement on which the parameter appears, and the change to be made:

```
//CALL      EXEC    procedurename,parameter.procstepname=value
```

When overriding a parameter, the value coded for the parameter on the EXEC statement calling the procedure replaces the value assigned in the procedure. When adding a parameter, that parameter is used in the execution of the procedure step. When nullifying a parameter, you do not follow the equal sign with a value; the value assigned to the parameter in the procedure is ignored. All changes made are in effect only for the current execution of the procedure.

You can make more than one change to each EXEC statement in the procedure, and you can change parameters on more than one EXEC statement in the procedure. You cannot, however, change the PGM parameter. When making changes on different steps in the procedure, do not code all changes for one procedure step before changes to a subsequent step.

For example, the first three EXEC statements in a procedure named IRISH are:

```
//STEP1      EXEC     PGM=YEATS,PARM='*14863'
//STEP2      EXEC     PGM=NOLAN
//STEP3      EXEC     PGM=SYNGE,TIME=(2,30)
```

and you want to make the following changes:

- Nullify the PARM parameter in STEP1.
- Add the COND parameter, specifying the test (8,LT), in STEP2.
- Change the time limit in the TIME parameter in STEP3 to 4 minutes.

On the EXEC statement calling the procedure, you would code:

```
//CALL       EXEC     IRISH,PARM.STEP1=,
//                    COND.STEP2=(8,LT),TIME.STEP3=4
```

You can omit naming the procedure step when changing a parameter. When you do this, the procedure is modified as follows:

- If the PARM parameter is coded, it applies only to the first procedure step. If a PARM parameter appears in a later EXEC statement in the called procedure, it is nullified.
- If the TIME parameter is coded, it applies to the total procedure. If the TIME parameter appears on any of the EXEC statements in the called procedure, it is nullified.
- If any other parameter is coded, it applies to every step in the called procedure. Nullifying the parameter on the EXEC statement calling the procedure causes the parameter to be ignored on every EXEC statement in the procedure; if you assign a value to the parameter on the EXEC statement calling the procedure, the parameter is overridden where it appears in the procedure and added to EXEC statements in the procedure on which it does not appear.

For example, assume the EXEC statements in the procedure named COMPUTE are:

```
//STEP1      EXEC     PGM=LIST,TIME=(1,30)
//STEP2      EXEC     PGM=UPDATE,RD=NC,TIME=2
//STEP3      EXEC     PGM=CHECK,RD=RNC,COND=ONLY
```

You want to make the following changes:

1. Assign a time limit of 4 minutes to the entire procedure; TIME parameters on individual EXEC statements in the procedure will be nullified.

2. Allow automatic step restart for each step of the job by coding RD=R. The RD parameter will be added to the first step of the job and will override the RD parameters in STEP2 and STEP3.

To call the procedure and make these changes, you would code:

```
//CALL       EXEC     COMPUTE,TIME=4,RD=R
```

During the processing of the JCL statements for the job, the EXEC statements appear as:

```
//STEP1      EXEC     PGM=LIST,RD=R
//STEP2      EXEC     PGM=UPDATE,RD=R
//STEP3      EXEC     PGM=CHECK,RD=R,COND=ONLY
```

Any parameter changes that affect every step of the job (by omitting the procedure step name) must be coded on the EXEC statement calling the procedure before changes to parameters on different steps (that is, you include the procedure step name). Time will be a total of four minutes, each step using the remaining amount of time available from the total. If more than four minutes is required, the step will abnormally terminate.

Modifying Parameters on a DD Statement

To override, add, and nullify parameters on a DD statement in a procedure, you include a DD statement containing the changes you want to make after the EXEC statement that calls the procedure. The name of the DD statement containing the changes is composed of the procedure step name and the ddname of the DD statement in the procedure:

```
//procstepname.ddname   DD   parameter=value
```

When overriding a parameter, the value you code replaces the value assigned to the parameter in the procedure. You can also override a parameter in the procedure by coding a mutually exclusive parameter on the DD statement containing the changes. (A table of mutually exclusive parameters on the DD statement is included in this publication as Figure 18.) When adding a parameter, the parameter is added to the DD statement in the procedure for the current execution of the procedure. When nullifying a parameter, you do not follow the equal sign with a value; that parameter in the procedure is ignored. You do not have to nullify a parameter when you are replacing it with a mutually exclusive parameter. All changes you make are in effect only for the current execution of the procedure.

You can change more than one parameter on a DD statement and you can change parameters on more than one DD statement in the procedure. However, the DD statements containing the changes must be coded in the same order as the corresponding DD statements in the procedure. Test all new procedures without overriding any parameters to ensure that the procedure statements are syntactically correct.

For example, the first two steps of the cataloged procedure TEA are:

```
//STEP1     EXEC    PGM=SUGAR
//DD1A      DD      DSNAME=DRINK,DISP=(NEW,DELETE),
//                  UNIT=2400,VOL=SER=568998
//DD1B      DD      UNIT=SYSSQ
//STEP2     EXEC    PGM=LEMON
//DD2A      DD      UNIT=2314,DISP=(,PASS),
//                  SPACE=(TRK,(20,2))
```

You want to make the following changes:

1. Change the dispositon on the DD statement named DD1A to CATLG.
2. Change the unit on the DD statement named DD1B to TAPE.
3. Change the SPACE parameter on the DD statement named DD2A to SPACE=(CYL,(4,1)).

When calling the procedure, you would code:

```
//CALL          EXEC    TEA
//STEP1.DD1A    DD      DISP=(NEW,CATLG)
//STEP1.DD1B    DD      UNIT=TAPE
//STEP2.DD2A    DD      SPACE=(CYL,(4,1))
```

When changing DCB subparameters, you need code only those subparameters you are changing. The DCB subparameters you do not code (and for which you do not code a mutually exclusive subparameter) remain unchanged. For example, a DD statement named DD1 in a procedure step named STEP1 contains DCB=(BUFNO=1,BLKSIZE=80,RECFM=F,BUFL=80). To change the block size to 320 and the buffer length to 320, you would code:

```
//STEP1.DD1     DD      DCB=(BLKSIZE=320,BUFL=320)
```

The subparameters BUFNO and RECFM remain unchanged.

To nullify the DCB parameter, you must nullify each subparameter. For example, if a DD statement in a procedure contains DCB=(RECFM=FB,BLKSIZE=160,LRECL=80), you must code DCB=(RECFM=,BLKSIZE=,LRECL=) in order to nullify the DCB parameter.

To nullify the DUMMY parameter, code the DSNAME parameter on the overriding DD statement and assign a data set name other than NULLFILE. To nullify all the parameters on a DD statement other than DCB, code DUMMY on the overriding DD statement. (The DUMMY parameter is described in detail in the chapter, "Defining a Dummy Data Set.")

Modifying Parameters on DD Statements that Define Concatenated Data Sets

When a concatenation of data sets is defined in a cataloged procedure and you attempt to override the concatenation with one DD statement, only the first (named) DD statement is overridden. To override others, you must include an overriding DD statement for each DD statement; the DD statements in the input stream must be in the same order as the DD statements in the procedure. The second and subsequent overriding statements must not be named. If you do not wish to change one of the concatenated DD statements, leave the operand field blank on the corresponding DD statement in the input stream. (This is the only case where a blank operand field for a DD statement is valid.)

For example, suppose you are calling a procedure that includes the following sequence of DD statements in STEPC:

```
//DD4        DD      DSNAME=A.B.C,DISP=OLD
//           DD      DSNAME=STRP,DISP=OLD,UNIT=2314,VOL=SER=X12182
//           DD      DSNAME=TYPE3,DISP=OLD,UNIT=2314,VOLUME=SER=BL1421
//           DD      DSNAME=A.B.D,DISP=OLD
```

To override the DD statements that define the data sets named STRP and A.B.D, you would code:

```
//STEPC.DD4 DD
//           DD      DSNAME=INV.CLS,DISP=OLD
//           DD
//           DD      DSNAME=PAL8,DISP=OLD,UNIT=2314,VOL=SER=125688
```

Adding DD Statements to a Procedure

You can add DD statements to a procedure when calling the procedure. These additional DD statements are in effect only during the current execution of the procedure.

To add a DD statement to a procedure step, follow the EXEC statement that calls the procedure and any overriding DD statements for that step with the additional DD statement. The ddname of the DD statement identifies the procedure step to which this statement is to be added and must be assigned a name that is different from all the ddnames in the procedure step. If you do not identify the procedure step in the ddname, the system assumes you are adding the DD statement to the first step of the procedure.

For example, the first step of a cataloged procedure named MART is:

```
//STEP1      EXEC    PGM=DATE
//DDM        DD      DSN=BPS(MEMG),DISP=OLD,
//                   UNIT=2314,VOLUME=SER=554982
//DDN        DD      UNIT=SYSSQ
```

You want to make the following changes:

1. Change the UNIT parameter on the statement named DDN to UNIT=180.
2. Add a DD statement, specifying UNIT=181.

When calling the procedure, you would code:

```
//           EXEC    PROC=MART
//STEP1.DDN  DD      UNIT=180
//STEP1.DDO  DD      UNIT=181
```

Identifying Procedure Statements on an Output Listing

You can request that cataloged and in-stream procedure statements be included on the output listing by coding 1 as the first subparameter in the MSGLEVEL parameter on the JOB statement. (For a description of the MSGLEVEL parameter, see "Requesting Listings of JCL Statements and System Messages.")

Procedure statements are identified on the output listing as illustrated in Figures 15 and 16. The output listing will also show the symbolic parameters and the values assigned to them.

Columns 1,2,3	
XX	cataloged procedure statement you did not override
X/	cataloged procedure statement you did override
XX*	cataloged procedure statement, other than a comment statement, that the system considers to contain only comments
***	comment statement, JES2, and JES3 statements

Figure 15. Identification of Cataloged Procedure Statements on the Output Listing

Columns, 1,2,3	
++	in-stream procedure statement you did not override
+/	in-stream procedure statement you did override
++*	in-stream procedure statement, other than a comment statement, that the system considers to contain only comments
***	comment statement, JES2, and JES3 statements

Figure 16. Identification of In-stream Procedure Statements on the Output Listing

Using Symbolic Parameters

In order to be modified easily, cataloged and in-stream procedures can contain symbolic parameters. A symbolic parameter is a symbol preceded by an ampersand that stands for a parameter, a subparameter, or a value. In the following procedure step, the symbolic parameters are underlined:

```
//STEP1     EXEC    PGM=UPDATE,ACCT=(PGMG,&DEPT)
//DD1       DD      DSNAME=INIT,UNIT=&DEVICE,SPACE=(CYL,(&SPACE,10))
//DD2       DD      DSNAME=CHNG,UNIT=2400,DCB=BLKSIZE=&LENGTH
```

When this procedure is executed, every symbolic parameter must either be assigned a value or nullified; the changes are in effect only for the current execution of the procedure. Therefore, the procedure can be modified each time it is executed, without being permanently changed. Details on how to assign values to or nullify symbolic parameters are included under "Assigning Values to and Nullifying Symbolic Parameters." How to include symbolic parameters when writing a cataloged or in-stream procedure is described in the next section, "Defining Symbolic Parameters When Writing a Procedure."

Defining Symbolic Parameters When Writing a Procedure

Any parameter, subparameter, or value in a procedure that can vary each time the procedure is called is a good candidate for definition as a symbolic parameter. For example, if different values can be passed to a processing program by means of the PARM parameter on one of the EXEC statements, you could define the PARM field as one or more symbolic parameters, for example, PARM=&ALLVALS or PARM=&DECK&CODE.

The symbolic parameter itself is one to seven alphameric and national (#,@,$) characters preceded by a single ampersand. The first character must be alphabetic or national. Since a single ampersand defines a symbolic parameter, you code double ampersands when not defining a symbolic parameter. For example, if you want to pass 543&LEV to a processing program by means of the PARM parameter, you must code PARM='543&&LEV'. The system treats the double ampersand as if a single ampersand had been coded, and only one ampersand appears in the results.

Keyword parameters that can be coded on the EXEC statement (such as ACCT, COND, and PARM) cannot be used as the name of a symbolic parameter. For example, you can not code &REGION=200K or REGION=&REGION on the EXEC statement, but you can code REGION=&SIZE.

The definitions used to signify symbolic parameters should be consistent in all the cataloged and in-stream procedures at an installation. For example, every time the programmer is to assign his department number to a symbolic parameter, no matter which procedure he is calling, the symbolic parameter could be defined as &DEPT. In different procedures, you could code ACCT=(43877,&DEPT) and DSNAME=LIBRARY.&DEPT.TALLY. The programmer would assign his department number to the symbolic parameter wherever that symbolic parameter appears in a procedure.

The same symbolic parameter can appear more than once in a procedure, as long as the value assigned to the symbolic parameter is a constant in the procedure. Therefore, you could use & DEPT more than once in a procedure, if the department number to be assigned is the same in each use. But if you have two DD statements and include a symbolic parameter for the primary quantity of the space request on each DD statement, you would not want to use the same symbolic parameter, since the requests for primary quantity could be different for the two data sets. Only one value can be assigned to each symbolic parameter used in a procedure; if you assign more than one value to a symbolic parameter, only the first value is used and that value is substituted wherever the symbolic parameter occurs.

Assigning Default Values to Symbolic Parameters

You can assign default values to the symbolic parameters coded in the procedure on the PROC statement. The PROC statement must always appear as the first statement in an in-stream procedure; the PROC statement must be coded as the first statement in a cataloged procedure only if you want to assign defaults. Generally, you should assign defaults to every symbolic parameter in a procedure to limit the amount of coding necessary each time the procedure is called. See the next section, "Assigning Values to and Nullifying Symbolic Parameters", for details.

Assigning Values to and Nullifying Symbolic Parameters

When a procedure containing symbolic parameters is used, each symbolic parameter must either be assigned a value or nullified. Symbolic parameters are assigned values or nullified in one of two ways:

- the programmer who uses the procedure codes the symbolic parameter on the EXEC statement calling the procedure, either assigning it a value or nullifying it;
- the programmer who writes the procedure assigns a default value to or nullifies the symbolic parameter on the PROC statement, which must be the first statement in an in-stream procedure and can be the first statement in a cataloged procedure.

The default assigned to a symbolic parameter on a PROC statement is overridden when that symbolic parameter is assigned a value or nullified on the EXEC statement that calls the procedure.

Default values are not necessarily assigned to symbolic parameters in a procedure. Before using any procedure, find out what symbolic parameters are used, the meaning of each symbolic parameter, and what default, if any, is assigned. The PROC statement is optional in cataloged procedures; if the PROC statement is not included, no default values can be assigned to symbolic parameters in the procedure.

You need not code the symbolic parameters in any specific order when you assign values to or nullify them.

Assigning a Value to a Symbolic Parameter

To assign a value to symbolic parameter, you code:

```
symbolic parameter=value
```

Omit the ampersand that precedes the symbolic parameter in the procedure. For example, if the symbolic parameter &NUMBER appears on a DD statement in the procedure, code NUMBER=value on the PROC statement (if you are writing the procedure and assigning defaults) or on the EXEC statement that calls the procedure (if you are using the procedure and want this value to be in effect only for the current execution of the procedure).

There are some rules for assigning values to symbolic parameters:

- The length of the value assigned is limited only in that the value cannot be continued onto another statement. However, when a symbolic parameter is concatenated with other information (for example, a data set name is LIBRARY.&DEPT..MACS), the combined length of the value you assign and the concatenated information cannot exceed 120 characters.
- If the value contains special characters, enclose the value in apostrophes (the enclosing apostrophes are not considered part of the value). If the special characters include apostrophes, each apostrophe must be shown as two consecutive apostrophes.
- If more than one value is assigned to a symbolic parameter as a default on the PROC statement, only the first value encountered is used; likewise, if more than one value is assigned to a symbolic parameter on an EXEC statement, only the first value encountered is used.
- If a symbolic parameter is a positional parameter followed by other parameters in the statement, it should be followed in the procedure by a period instead of a comma; for example:

```
//DEFINE    DD      &POSPARM.DSN=ATLAS,DISP=OLD
```

- A value of literal blanks, that is, VALUE=' ', should not be used to nullify a symbolic parameter.

Symbolic parameters that are keyword subparameters should appear in the procedure without a preceding comma; for example:

```
VOLUME=SER=(111111&SERNO)
```

This is necessary so that, if the symbolic parameter is nullified, a leading or trailing comma will not cause a JCL syntax error. (For a more complete discussion of this, see "Caution Concerning Leading and Trailing Commas.")

In these cases, you must include a comma when you assign a value to the symbolic parameter; that is:

```
POSPARM='DUMMY,'
SERNO=',222222'
```

Since the comma is a special character, the value must then be enclosed in apostrophes.

Nullifying a Symbolic Parameter

To nullify a symbolic parameter, code:

```
symbolic parameter=
```

Omit the ampersand that precedes the symbolic parameter in the procedure and do not follow the equal sign with a value.

For example, a DD statement in an in-stream procedure named TIMES is:

```
//DD8         DD       UNIT=3211,UCS=&UCSINFO
```

If you are writing the procedure and want to nullify &UCSINFO as a default on the PROC statement, code:

```
//TIMES       PROC     UCSINFO=
```

If you are calling the procedure, and no default was assigned to &UCSINFO, or if &UCSINFO was assigned a value on the PROC statement, nullify the parameter on the EXEC statement that calls the procedure by coding:

```
//CALL        EXEC     TIMES,UCSINFO=
```

Caution Concerning Leading and Trailing Commas

All symbolic parameters must be assigned values or nullified before the procedure is executed. (When you write a procedure, you can assign default values to the symbolic parameters, or the programmer can assign values when he calls the procedure; for details, see "Assigning Values to and Nullifying Symbolic Parameters.") When a symbolic parameter is nullified, a delimiter, such as a leading or trailing comma, is not automatically removed. Only when the symbolic parameter is a positional subparameter followed by other subparameters should the comma remain. In other cases, the remaining comma will cause a syntax error.

For example, you code for a unit request:

```
UNIT=(2314,&MORE,DEFER)
```

If &MORE is nullified, the comma before it must remain, since the unit count subparameter is positional and a comma must indicate its absence if other subparameters follow. When &MORE is nullified, the parameter will appear as:

```
UNIT=(2314,,DEFER)
```

However, if you code:

```
VOLUME=SER=(111111,&SERNO)
```

and &SERNO is nullified, a leading comma will remain and cause a JCL syntax error. If a symbolic parameter is a positional parameter followed by other parameters in the statement, such as

```
//DEFINE    DD       &POSPARM,DSN=ATLAS,DISP=OLD
```

the comma will remain at the beginning of the operand field if &POSPARM is nullified and again cause a syntax error.

In these cases, you should not code the comma. When a symbolic parameter follows information that does not vary, such as in VOLUME=SER=(111111,&SERNO), you do not have to code any delimiter. The system recognizes the symbolic parameter when it encounters the single ampersand. For this example, you would code:

```
VOLUME=SER=(111111&SERNO)
```

When a value is assigned to the symbolic parameter, a comma must be included in the value, that is, SERNO=',222222'. (Since the comma is a special character, the value is enclosed in single apostrophes.

When a symbolic parameter precedes information that does not vary, a period may be required after the symbolic parameter to distinguish the end of the symbolic parameter from the beginning of the information that does not vary. A period is required after the symbolic parameter when the character following the symbolic parameter is:

- An alphabetic, numeric, or national (#,@,$) character.
- A left parenthesis or a period.

The system recognizes the period as a delimiter and the period does not appear in the procedure after the symbolic parameter is assigned a value or nullified. (A period will appear after the value when two consecutive periods are coded.)

Therefore, you should place a period after a symbolic parameter that stands for a positional parameter followed by other parameters in the statement:

```
//DEFINE    DD       &POSPARM.DSN=ATLAS,DISP=OLD
```

If &POSPARM is nullified, the statement appears as:

```
//DEFINE    DD       DSN=ATLAS,DISP=OLD
```

When assigning a value to & POSPARM, you must include a comma:

```
POSPARM='DUMMY,'
```

These rules are in effect whenever concatenating a symbolic parameter with information that does not vary. For example, place a symbolic parameter after information that does not vary:

- DSNAME=LIBRARY(&MEMBER)
- DSNAME=USERLIB.&LEVEL

In these examples, the system recognizes the symbolic parameter when it encounters the & .

Place a symbolic parameter before information that does not vary:

- PARM='&OPTION+15' &OPTION is not followed by period because of the +.
- DSNAME=&QUAL.246 The period is required because a numeric character follows the symbolic parameter.
- DSNAME=&LIBRARY.(MEMG) The period is required because a left parenthesis follows the symbolic parameter.
- DSNAME=&DOCNO..TXT The period is required because a period follows the symbolic parameter. A single period will appear in the results.

You can also define two or more symbolic parameters in succession without including a comma, for example, PARM=&DECK&CODE. If a comma is desired in the results, a comma must then be included in the value assigned to the symbolic parameter.

Example of a Procedure Containing Symbolic Parameters

The cataloged procedure named TESTPROC contains the following statements:

```
//TESTPROC  PROC    A=IMB406,B=ABLE,C=3330,D=WXYZ1,
//                  E=OLD,F=TRK,G='10,10,1'
//STEP      EXEC    PGM=&A
//DD1       DD      DSN=&B,UNIT=&C,VOL=SER=&D,DISP=&E,
//                  SPACE=(&F,(&G))
```

To execute the above cataloged procedure with certain overrides (change DSN to BAKER, PGM to IEFBR14, DISP to (NEW, KEEP), and leave the remainder of the parameters the same), code the following statements:

```
//TESTJOB   JOB     ,,MSGLEVEL=(1,1),PERFORM=25
//STEPX     EXEC    TESTPROC,A=IEFBR14,B=BAKER,E=(NEW,KEEP)
```

After the symbolic substitution, the statements will look like the following:

```
//STEP      EXEC    PGM=IEFBR14
//DD1       DD      DSN=BAKER,UNIT=3330,VOL=SER=WXYZ1,
//                  DISP=(NEW,KEEP),SPACE=(TRK,(10,10,1))
```

To execute the above cataloged procedure and change DD1 to resemble a temporary scratch space.

```
//TESTJOB   JOB     ,,MSGLEVEL=(1,1),PERFORM=25
//STEPX     EXEC    TESTPROC,A=IEFBR14,B=,C=2314,D=,E=
```

After the symbolic substitution, the statements will look like the following:

```
//STEP      EXEC    PGM=IEFBR14
//DD1       DD      DSN=,UNIT=2314,VOL=SER=,DISP=,SPACE=(TRK,(10,10,1))
```

Coding JCL Statements

There are certain rules common to all parameters. Syntax rules define how to code each parameter; that is, what is required or optional for the specific purpose or process you are requesting. Certain fields on the control statements are common to most parameters, such as, the name field, the operation field, and the operand field. Special characters can be coded on the parameters if you follow guidelines established in the rules for coding.

Notation for Defining Control Statement Parameters

The formats of the parameters described in this publication for the JOB, EXEC, DD, JES2, and JES3 statements appear at the beginning of the chapter on the corresponding parameter. Notations used in the format descriptions are described below.

1. Uppercase letters and words are coded on the control statement exactly as they appear in the format description, as well as the following characters:

ampersand	&
asterisk	*
comma	,
equal sign	=
parenthesis	()
period	.

2. Lowercase letters, words, and symbols appearing in the format description represent variables for which specific information is substituted when the parameter is coded.

   For example, CLASS=jobclass is the format description for the CLASS parameter. When you code the CLASS parameter on a JOB statement, you substitute a number for the word "jobclass".

3. Braces {} are a special notation and are never coded on a control statement. Braces are used to group related items; they indicate that you must code one of the items.

   For example, $\left\{\begin{matrix}\text{TRK}\\ \text{CYL}\\ \text{block size}\end{matrix}\right\}$ is part of the format description for the SPACE parameter.

   When coding the SPACE parameter, you must code either TRK, CYL, or a substitute for "block size", which would be a number.

4. Brackets [] are a special notation and are never coded on a control statement. Brackets indicate that the enclosed item or items are optional and you can code one or none of the items.

   For example, [,DEFER] is part of the format description for the UNIT parameter. When you code the UNIT parameter, you can include ,DEFER in the UNIT parameter or omit it.

   An example of more than one item enclosed in brackets is

   $\left[\begin{matrix}\text{EXPDT=yyddd}\\ \text{RETPD=nnnn}\end{matrix}\right]$

   which is part of the format description for the LABEL parameter. When coding the LABEL parameter, you can include either EXPDT=yyddd or RETPD=nnnn in the LABEL parameter or omit both.

Sometimes, one of a group of items enclosed in brackets is a comma. Code the comma when none of the other items in the group is used and a following part of the parameter is still to be coded.

```
For example,   ┌,progname┐  [,form number]
               └,        ┘
```

is part of the format description for the SYSOUT parameter. When you code the SYSOUT parameter, you have the option of coding both "progname" and ",form number", omitting both, or coding only one. The comma enclosed in brackets with ",progname" must be coded when ",progname" is not coded but ",form number" is coded; that is, you would code: ,,form number.

5. An ellipsis...(three consecutive periods) is a special notation and is never coded on a control statement. An ellipsis is used to indicate that the preceding item can be coded more than once in succession.

   For example, COND=((code,operator),...) is the format description for the COND parameter on the JOB statement. The ellipsis indicates that (code,operator) can be repeated.

6. Two consecutive periods (..) are used to concatenate symbolic parameters to other information. For example, &DEPT..MACS is the symbolic parameter. &DEPT=D58. Therefore, the actual value is D58MAC.

Fields in JCL Control Statements

Every control statement is logically divided into different fields. There are four fields — name field, operation field, operand field, comments field — but not all of the control statements can contain all of these fields. Figure 17 shows the fields for each statement.

Statement	Columns 1 and 2	Fields
JOB	//	name operation (JOB) operand[1] comments[2]
EXEC	//	name[1] operation (EXEC) operand comments[2]
DD	//	name[1] operation (DD) operand comments[2]
PROC (cataloged)	//	name[1] operation (PROC) operand comments[2]
PROC (in-stream)	//	name operation (PROC) operand[1] comments[2]
PEND	//	name[1] operation (PEND) comments[1]
Command	//	operation (command) operand comments[2]
Delimiter	/*	comments[1]
Null	//	
Statement	**Columns 1, 2, 3**	**Field**
Comment	//*	comments

[1] Optional

[2] Optional -- If operand(s) are not coded, comments cannot be coded.
If operand(s) are coded, comments are optional.

Figure 17. JCL Control Statement Fields

The **name field** identifies the control statement so that other statements and system control blocks can refer to it. The name field is 1 to 8 alphameric and national (#,@,$) characters; the first character must be alphabetic or national. The name field must begin in column 3.

The **operation field** specifies the type of control statement, or, in the case of the command statement, the command. The operation field must follow the name field and must be preceded and followed by at least one blank.

The **operand field** contains parameters separated by commas. The operand field must follow the operation field and must be preceded and followed by at least one blank. The operand field is described in more detail in the next chapter "Parameters in the Operand Field."

The **comments field** contains any information deemed helpful by the person who codes the control statement. The comments field must follow the operand field and must be preceded by at least one blank. The operand field can be continued; it does not have to be completed before you add the comments field.

Control statement fields — except the name field, which must begin in column 3 — can be coded in free form. Free form means that the fields need not begin in a particular column. Separate each field with a blank; the blank serves as a delimiter between fields.

Except for the comment statement, which can be coded through column 80, fields cannot be coded past column 71. If the total length of the fields will exceed 71 columns, you must continue the fields onto one or more succeeding statements. How to continue fields is described under "Continuing Control Statements."

Parameters in the Operand Field

The operand field is made up of two types of parameters: one type is characterized by its position in the operand field in relation to other parameters (a positional parameter); the other type is positionally independent with respect to others of its type, and is characterized by a keyword followed by an equal sign and variable information (a keyword parameter). Both positional parameters and the variable information associated with keyword parameters can assume the form of a list of several items (subparameters) of information.

All positional and keyword parameters and subparameters coded in the operand field must be separated from one another by commas.

Positional parameters must be coded first in the operand field in a specific order. The absence of a positional parameter is indicated by a comma coded in its place. However, if the absent parameter is the last one, or if all later positional parameters are also absent, you need not code replacing commas. If all positional parameters are absent from the operand field, you need not code any replacing commas.

Keyword parameters can be used anywhere in the operand field with respect to one another. Because of this positional independence, you need not indicate the absence of a keyword parameter.

A positional parameter or the variable information in a keyword parameter sometimes assumes the form of a **list of subparameters**. Such a list may be composed of both positional and keyword subparameters that follow the same rules and restrictions as positional and keyword parameters. You must enclose a subparameter list in parentheses, unless the list reduces to a single subparameter.

The EXEC statements and DD statements in cataloged procedures can contain one other type of parameter — a **symbolic parameter**. A symbolic parameter is characterized by a name preceded by an ampersand (&); a symbolic parameter stands as a symbol for a parameter, a subparameter, or a value. Symbolic parameters allow you to make any information in the operand field of a procedure EXEC statement or DD statement variable. A value to be assumed by a symbolic parameter may be coded on the EXEC statement that calls the procedure. This value is in effect only while the procedure is being executed. For a detailed discussion on how to use symbolic parameters in a set of control statements that you plan to catalog as a procedure, refer to the section "Using Symbolic Parameters."

Continuing Control Statements

When the total length of the fields on a control statement will exceed 71 columns, you must continue the fields onto one or more succeeding statements.

The command, comment, delimiter, and null statements cannot be continued.

You can continue the operand field or the comments field of other JCL statements. To continue either of these fields, you must follow the continuation conventions.

To continue the operand field:

1. Interrupt the field after a complete parameter or subparameter, including the comma that follows it, at or before column 71.
2. Comments can be included by following the interrupted field with at least one blank.
3. Code a nonblank character in column 72 when you are continuing a comments field. Optionally, code any nonblank character in column 72 for all other continued statements. If you do not code a character in column 72 when continuing the operand field, the system treats the next statement as a continuation statement as long as you follow the conventions outlined in items 4, 5, and 6.
4. Code the identifying characters // in columns 1 and 2 of the following statement.
5. Continue the interrupted operand beginning in any column from 4 through 16. If you begin coding after column 16, the system assumes that no other operands are present and treats any characters you code as a comment field.
6. If there is a nonblank in column 3, the system assumes that this is a new statement. The job fails and an error message is issued saying no continuation is found.

To continue the comments field:

1. Interrupt the comment at a convenient place before column 72.
2. Code a nonblank character in column 72.
3. Code the identifying characters // in columns 1 and 2 of the following statement.
4. Continue the comments field beginning in any column after column 3.

Any control statements in the input stream, other than a comment statement, that the system considers to contain only comments have //* in columns 1 through 3 on an output listing. Any control statements in a cataloged procedure, other than a comment statement, that the system considers to contain only comments have XX* in columns 1 through 3 on an output listing. For a comment statement, *** appears in columns 1 through 3 on an output listing. Any control statements in an instream procedure show ++ in columns 1 and 2 of an output listing.

Character Sets

Job control statements are coded using a combination of the characters from three different character sets. The contents of each of the character sets are described in Figure 18.

Character Set	Contents	
Alphameric	Alphabetic	A through Z
	Numeric	0 through 9
National	"At" sign	@
	Dollar sign	$
	Pound sign	#
Special	Comma	,
	Period	.
	Slash	/
	Apostrophe	'
	Left parenthesis	(
	Right parenthesis	)
	Asterisk	*
	Ampersand	&
	Plus sign	+
	Hyphen	-
	Equal sign	=
	Blank	

Figure 18. Character Sets

When coding any special characters, certain rules must be followed. These rules and the use of special characters are described next.

Using Special Characters

Special characters are used in the job control language to:

1. Delimit parameters (the comma).
2. Delimit fields (the blank).
3. Perform syntactical functions. (For example, the appearance of && as the first two characters following DSNAME= tells the system that a temporary data set name follows. The appearance of / in the UNIT parameter, UNIT=293/5, tells the system that a specific device is desired.)

Sometimes you can code a special character that does not satisfy one of the three uses of special characters. In most of these cases, indicate that special characters are being used by enclosing the item that contains the special characters in apostrophes (5-8 punch), for example, ACCT=‘123+456’. If one of the special characters is an apostrophe, you must code two consecutive apostrophes (two 5-8 punches) in its place, for example, ‘O“NEILL’.

The following list contains those parameters that can have special characters as part of their variable information, and indicates when the apostrophes are not required.

1. The accounting information on the JOB statement. The account number and additional accounting information can contain hyphens without being enclosed in apostrophes.
2. The programmer's name on the JOB statement. The programmer's name can contain periods without being enclosed in apostrophes.
3. The checkid field in the RESTART parameter on the JOB statement may contain an *.
4. The ACCT parameter on the EXEC statement. The ACCT parameter can contain hyphens and plus zero without being enclosed in apostrophes.
5. The PARM parameter on the EXEC statement may contain an ampersand for symbolic parameters.
6. The DSNAME parameter on the DD statement. The DSNAME parameter can contain hyphens without being enclosed in apostrophes. If the DSNAME parameter contains a qualified name, it can contain periods without being enclosed in apostrophes. If the DD statement identifies a generation of a generation data group, the generation number in the DSNAME parameter can contain a plus or minus (hyphen) sign without being enclosed in apostrophes. If the DD statement defines a temporary data set, the DSNAME parameter can contain, as the first two characters, ampersands without being enclosed in apostrophes. If the DD statement defines a member of a partitioned data set, a generation of a generation data group, or an area of an indexed sequential data set, the DSNAME parameter contains parentheses that enclose the member name, generation number, or area name; these parentheses are not enclosed in apostrophes.
7. The volume serial number in the VOLUME parameter on the DD statement. The volume serial number can contain hyphens without being enclosed in apostrophes.

The JOB Statement

Control Statement

The JOB statement marks the beginning of a job and, when jobs are stacked in the input stream, marks the end of the control statements for the preceding job.

```
//jobname   JOB     operands     comments
```

The JOB statement consist of the characters // in columns 1 and 2, and four fields — the name, operation (JOB), operands, and comments fields.

Rules for Coding

- Code a JOB statement for each job. Code a unique jobname in every JOB statement. The jobname must consist of 1 through 8 alphameric and national (#,@,$) characters; the first character must be alphabetic or national.
- The are two types of parameters that can be coded on the JOB statement:

Positional parameters, which must precede any keyword parameters and must be coded in the following order.

accounting information
programmer's name

Keyword parameters, which can be coded in any order after the positional parameters. Any of the following keyword parameters can be coded on the JOB statement.

ADDRSPC
CLASS
COND
MSGCLASS
MSGLEVEL
NOTIFY
PERFORM
PRTY
RD
REGION
RESTART
TIME
TYPRUN

- All parameters in the operand field are optional unless the account number and programmer's name parameters are required by the installation.
- If you code no parameters in the operand field of the JOB statement, code no comments.

Sample JOB Statements

```
//ALPHA     JOB     843,LINLEE,CLASS=F,MSGLEVEL=(1,1)
//LOS       JOB     ,BROWNLY,TIME=(4,30),MSGLEVEL=(2,0)
//MART      JOB     1863,RESTART=STEP4
//TRY8      JOB
```

The Accounting Information Parameter—*positional, optional (according to installation procedures)*

The accounting information parameter identifies an account number and any information that may be required by the installation.

For information on how to add accounting facilities, refer to **OS/VS System Management Facilities (SMF)**, GC35-0004.

```
([account number][,additional accounting information,...])
```

General Rules for Coding

- This field may also contain JES2 parameters similar to those on the JOBPARM control statement to maintain compatability with HASP.
- When accounting information consists of more than one item, enclose the information in either parentheses or apostrophes, for example, (5438,GROUP6) or '5438,GROUP6'. If you use apostrophes, all accounting information enclosed in the apostrophes in considered as one field.
- If you code an ampersand or an apostrophe as part of the accounting information, you must code them as double characters. For example, '2570''AB'.
- The account number and other accounting information must not exceed 142 characters in total, including the commas that separate the items.
- If you must continue the accounting information on another statement, enclose the information in parentheses.

Special Characters

- If any of the included items contain special characters (except hyphens), either:
  —Enclose the accounting information in apostrophes.
  —Enclose the item in apostrophes and the accounting information in parentheses. The enclosing apostrophes are not considered part of the information. If an apostrophe is part of the data, code two consecutive apostrophes.
- If one of the special characters is an ampersand or apostrophe and you are not defining a symbolic parameter, code two consecutive ampersands or apostrophes in its place.

Examples of the Accounting Information Parameter

```
//JOB43      JOB      D548-8686
```

```
//JOB44      JOB      (D548-8686,'12/8/73',ERICKSON)
```

Accounting number plus additional information; parentheses are required.

The ADDRSPC Parameter—*keyword, optional*

The ADDRSPC parameter indicates whether or not job can be paged.

For further information on the ADDRSPC parameter, see "Requesting Storage."

```
ADDRSPC=   {VIRT}
           {REAL}
```

VIRT
a keyword indicating that the job can be paged.

REAL
a keyword indicating that the job cannot be paged.

Default: If you omit the ADDRSPC parameter, the default is VIRT, unless the installation has changed the default.

General Rules for Coding

- The ADDRSPC parameter coded on a JOB statement will override any ADDRSPC parameter coded on an EXEC statement for that job.
- Requests for real and virtual storage can be made in the same job. Each step will honor the request for either real or virtual storage if there is no ADDRSPC parameter on the JOB statement.

Rule for Coding when Using Real Storage

Code the REGION parameter to specify how much real storage is needed.

Rule for Coding when Using Virtual Storage

The installation provides a default region size if the REGION parameter is not specified when ADDRSPC=VIRT is coded. If the REGION parameter is coded, the value sets the upper boundary to limit region size for variable-length GETMAINs. If the value is exceeded, the job or job step will abnormally terminate.

Examples of the ADDRSPC Parameter

```
//PEH        JOB      ,BAKER,ADDRSPC=VIRT
```

The ADDRSPC parameter requests virtual storage. Since the address space requested is virtual, the area size available to the user is the entire private address space.

```
//DEB        JOB      ERIC,ADDRSPC=REAL,REGION=100K
```

The ADDRSPC parameter requests real storage. The REGION parameter specifies the amount; in this case, 100K.

The CLASS Parameter—*keyword, optional*

The CLASS parameter assigns a job class to each job, depending on the characteristics of the job and the installation's rules for assigning a job class.

For further information on the use of the CLASS parameter, see "Assigning a Job to a Job Class."

```
CLASS=jobclass
```

jobclass
any character A-Z or 0-9, defined by the installation.

Default: Determined by the source of the job; that is, the particular card reader or work station, or whether the job was submitted by a time-sharing user. JES2 and JES3 use the installation-defined default.

When Coding JES3

A valid CLASS parameter on the JES3 MAIN statement overrides a valid CLASS parameter on the JOB statement.

Example of the CLASS Parameter

```
//SETUP     JOB     1249,CORNER,CLASS=M
```

This job is assigned to class M.

The COND Parameter—*keyword, optional*

The COND parameter specifies whether a job will continue processing based on return codes issued by one or more of its job steps. Each test specified by the COND parameter is performed using the return code of a completed job step. If any of the tests are satisfied, the remaining job steps are bypassed and the job is terminated.

For further information on the use of the COND parameter, see "Conditional Execution of Job Steps."

```
COND=((code,operator),...)
```

code
a decimal number from 0 through 4095. This number is compared with the return code issued by each job step.

operator
the type of comparison to be made with the return code. Operators and their meanings are:

GT...greater than
GE...greater than or equal to
EQ...equal to
NE...not equal to
LT...less than
LE...less than or equal to

Rules for Coding

- If you code only one return code test, you need not code the outer parentheses.
- You can code up to eight different return code tests for each job. If specifying more than eight tests, a JCL error message is issued and the job abnormally terminates.
- If you code the COND parameter on the JOB statement and on one or more of the job's EXEC statements, the return code tests requested on the JOB statement take precedence over those requested on the EXEC statements. Therefore, any return code test requested on the JOB statement that is satisfied causes termination of the job, even if the return code test is not satisfied for a particular step.

Examples of the COND Parameter

```
//TYPE      JOB      (611,402),BOURNE,COND=(7,LT)
```

If 7 is less than the return code, the job is terminated. (Any return code less than or equal to 7 allows the job to continue.)

```
//TEST      JOB      501,BAXTER,COND=((20,GE),(30,LT))
```

If 20 is greater than or equal to the return code, or 30 is less than the return code, the job is terminated. (Any code of 21 through 30 allows the job to continue.)

The MSGCLASS Parameter—*keyword, optional*

The MSGCLASS parameter specifies the output class to which system messages and JCL statements for the job are to be written.

For further information on use of the MSGCLASS parameter, see "Obtaining Output" for either JES2 or JES3.

```
MSGCLASS=output class
```

output class
an alphabetic (A-Z) or numeric (0-9) character.

Default: Determined by the source of the job; that is, the particular card reader or work station, or whether the job was submitted by a time-sharing user.

Rule for Coding

System messages and output data sets can be routed to the same output class. To do this, code the same output class in both the MSGCLASS parameter on the JOB statement and the SYSOUT parameter on the DD statements for the data sets. Or, code SYSOUT=* on all DD statements for the SYSOUT data sets you want to default to the MSGCLASS output class of the job.

Examples of the MSGCLASS Parameter

```
//IN          JOB       GEORGE,MSGCLASS=F
```

Specifies an output class.

```
//BOTLE       JOB       MENTLE,MSGLEVEL=(2,0)
```

Specifies no output class. In this case, the output class will default to the MSGCLASS value specified by your installation.

```
//A1403       JOB       MSGCLASS=L
//STEP1       EXEC      PGM=PRINT
//OUTPUT      DD        SYSOUT=L
```

Specifies that a job's system messages MSGCLASS parameter and output data set SYSOUT parameter are to be routed to the same output class.

The MSGLEVEL Parameter—*keyword, optional*

The MSGLEVEL parameter indicates what job output is to be written as part of the output listing. The following output can be requested:

- The JOB statement
- All input job control statements
- All cataloged procedure statements for procedures called by any of the job's steps and the internal representation of procedure statement parameters after symbolic parameter substitution.
- Allocation, disposition, and allocation recovery messages (allocation/termination messages.)

For further information on the MSGLEVEL parameter, see "Obtaining Output" for either JES2 or JES3.

```
MSGLEVEL=( [statements] , [messages] )
```

statements
a number that indicates which job control statements are to be written as output from a job. The choices are:

0 only the JOB statement is to be written.
1 all input job control statements, cataloged procedure statements, and the internal representation of procedure statement parameters after symbolic parameter substitution are to be written.
2 only input job control statements are to be written.

messages
a number that indicates what allocation/termination messages are to be written. Choices are:

0 no allocation/termination messages are to be written, unless the job terminates abnormally.
1 allocation/termination messages are to be written.

Default: For JES2, it is associated by job class and for JES3, it is associated by the operator with the particular reader.

Rule for Coding

If the second (messages) subparameter is omitted, you do not need to code the parentheses.

Examples of the MSGLEVEL Parameter

```
//GD40        JOB       GEORGE,MSGLEVEL=(2,1)
```

Requests that only input statements and all allocation/termination messages be written.

```
//PAUL        JOB       MENTLE,MSGLEVEL=0
```

Requests that only the JOB statement be written.

The NOTIFY Parameter—*keyword, optional*

The NOTIFY parameter is used to request that a message be sent to a user's time-sharing terminal when his background job has completed processing.

```
NOTIFY=user identification
```

user identification
a 1 to 7 alphameric identification of the user to be notified. The first character must be alphabetic.

Rules for Coding

- Code the same user identification that you specify when you start a terminal session (at LOGON).
- **Receiving notification that the job has completed processing.** For JES2, if you are logged on to any processor, you will be immediately notified when the job completes. If you are not logged on, the message will be saved and presented when you log on to the system you originally submitted the job from. For JES3, if you are logged on to the processor you submitted the job from, you will be notified when it completes. If you are not logged on, the message will be saved and presented when you log on to the system you originally submitted the job from.

Example of the NOTIFY Parameter

```
//SIGN      JOB      NOTIFY=POK1,MSGLEVEL=(2,1)
```

When the job "SIGN" has completed processing, a message will be sent to the user "POK1" informing him that his job has completed processing.

The PERFORM Parameter—*keyword, optional*

The PERFORM parameter specifies the performance group definition with which a job is associated.

For information on the performance groups, see "Performance of Jobs and Job Steps" for either JES2 or JES3.

```
PERFORM=n
```

n

a number between 1 and 255 inclusive, identifying a performance group that has been defined by the installation.

Default: The interpreter will obtain a default from the system resources manager and issue a warning message indicating a system default is set.

- For non-TSO jobs, the IBM-supplied default is one (1).
- For TSO jobs, the IBM-supplied default is two (2).
- If PERFORM is specified on the JOB statement, its value will supersede any PERFORM specifications on EXEC statements associated with the job.
- If an invalid performance group is specified, the interpreter will obtain a default from the system resources manager and issue a warning message indicating nonverification and default substitution.
- If no PERFORM parameter appears on the JOB statement and a PERFORM parameter appears on an associated EXEC statement, the parameter value appearing on the EXEC statement will be used during the associated job step.
- If no PERFORM parameter appears on either the JOB or EXEC statements for batch jobs, the performance group default is one.

Example of the PERFORM Parameter

```
//STEP1     JOB     MARLA,CLASS=D,PERFORM=25
```

Class D determines in which class the job will be executed. Once in the system, the job will run in performance group 25. The significance of this performance group is defined by the installation.

Programmer's Name Parameter—*positional, optional (according to installation procedures)*

The programmer's name parameter identifies the person or group responsible for a job.

```
programmer's name
```

Rules for Coding

- If the programmer's name parameter is coded, place it after the accounting information parameter.
- Code the programmer's name parameter before any or all keyword parameters.
- The programmer's name must not exceed 20 characters, including all special characters.
- When the programmer's name contains special characters, other than periods, enclose the name in apostrophes. If the special characters include apostrophes, each apostrophe must be coded as two consecutive apostrophes.
- If the programmer's name parameter is not required, you need not code a comma to indicate its absence.

Examples of the Programmer's Name Parameter

```
//APP        JOB      ,C.L.BROWN
```

Programmer's name, no accounting information.

```
//DELTA          JOB      'T.O''NEILL'
```

Programmer's name containing special characters, no accounting information required. (The leading comma may be optional. Check with your installation.)

```
//#308       JOB      (846349,GROUP12),GREGORY
```

Account number plus additional accounting information and programmer's name.

The PRTY Parameter—*keyword, optional* (JES3 only)

The PRTY parameter specifies a job's initiation or selection priority within its job class group. (For ASP main processors, when the job is initiated, the system will convert the job's priority into dispatching priority so that the job's tasks can compete with other tasks for use of main storage and CPU resources.)

For further information, see "Routing a Job Through the System (JES3 only)".

```
PRTY=priority
```

priority
a number from 0 to 14 indicating a job's priority. The highest priority is 14.

Default: Installation default.

Rule for Coding

If the priority value is not between 0 and 14, a JCL error will occur.

Examples of the PRTY Parameter

```
//#1930      JOB      RICHARDSON,CLASS=C,PRTY=8
```

The job will have an initiation priority of 8 in the job class C.

```
//RING       JOB      WILLIAMS,PRTY=4
```

The job will have an initiation priority of 4.

The RD Parameter—*keyword, optional*

The RD (restart definition) parameter specifies how the step restart facilities are used with the CHKPT macro instruction, and whether automatic restart is permitted or suppressed.

For detailed information on the checkpoint/restart facility, refer to **OS/VS Checkpoint/Restart** GC26-3784.

```
RD= ⎧R  ⎫
    ⎨RNC⎬
    ⎨NC ⎬
    ⎩NR ⎭
```

R

indicates that automatic step restart is permitted.
If the processing program used by a job step does not include a CHKPT macro instruction, coding RD=R allows execution to be resumed at the beginning of the abnormally terminated step.

If the program does include a CHKPT macro instruction, coding RD=R permits automatic step restart if the step abnormally terminates before execution of the CHKPT macro instruction; thereafter, only checkpoint restart can occur.

If you cancel the effects of the CHKPT macro instruction before a checkpoint restart is performed, the request for automatic step restart is again in effect.

RNC

indicates that automatic step restart is permitted and automatic and deferred checkpoint restart are not permitted.

NC

indicates that automatic step restart and automatic and deferred checkpoint restart are not permitted.

NR

indicates that a CHKPT macro instruction can establish a checkpoint, but neither automatic step restart nor automatic checkpoint restart is permitted. Coding RD=NR allows you to resubmit the job at a later time and specify in the RESTART parameter, (on the JOB statement of the resubmitted job) the checkpoint at which execution is to be resumed.

Rules for Coding

- Automatic restart will not be honored if you do not have a job journal (a job journal is an initialization option).
- Even if you do not code the RD parameter, the job is eligible for automatic checkpoint/restart if checkpoints have been issued. However, the job is not eligible for automatic step restart.
- If you code the RD parameter on the JOB statement, any RD parameters coded on the job's EXEC statements are ignored and the value coded on the JOB statement is effective for all steps.
- The RD parameter values NC and RNC can be used to suppress the action of the CHKPT parameter.

Examples of the RD Parameter

```
//JILL       JOB      333,ERIC,CLASS=C,RD=R,MSGLEVEL=(1,1)
```

Permits execution to be automatically restarted with a step that abnormally terminates.

```
//TRY56      JOB      333,ERNEST,RD=RNC,MSGLEVEL=(1,1)
```

Permits execution to be automatically restarted beginning with a step that abnormally terminates; suppresses the action of CHKPT macro instruction.

```
//PASS       JOB      (721,994),PEOPLE,RD=NR,MSGLEVEL=(0,1)
```

Neither automatic step nor checkpoint restart can occur, but CHKPT macro instruction can establish checkpoints.

The REGION Parameter—*keyword, optional*

The REGION parameter specifies the amount of real address space to be allocated to a job.

For further information on the REGION parameter, see "Requesting Storage."

```
REGION=valueK
```

valueK
a number that indicates how many bytes of storage are to be allocated to a job.

Default: the installation-defined default; by job class in JES2 and operator with the particular reader in JES3.

General Rules for Coding

- Code an even number. (If you code an odd number, the system treats it as the next highest even number.)
- When you want to specify a different region size for each job step, code the REGION parameter on the EXEC statements, instead of the JOB statement.
- If you code the REGION parameter on the JOB statement, REGION parameters coded on the job's EXEC statements are ignored.

Rule for Coding when Using Virtual Storage

The installation provides a default region size if the REGION parameter is not specified when ADDRSPC=VIRT is coded. If the REGION parameter is coded, the value sets the upper boundary to limit region size for variable-length GETMAINS. If the value is exceeded, the job or job step will abnormally terminate.

Examples of the REGION Parameter

```
//SANDY     JOB     A23,COFFEE,REGION=100K,ADDRSPC=REAL
```

100K of real storage will be assigned.

```
//ACCT4     JOB     175,FRED,REGION=250K
```

The REGION parameter will be ignored for a job that can be paged and the entire private address space will be assigned unless you have variable-length GETMAIN requests. In that case, the REGION parameter value (250K) will be used as a maximum value for each variable-length GETMAIN request.

The RESTART Parameter—*keyword, optional*

The RESTART parameter indicates that the restart facilities are to be used to resubmit a job for execution. Execution can be restarted at the beginning of a step (step restart) or within a step (checkpoint restart).

For detailed information on the checkpoint/restart facilities, refer to **OS/VS Checkpoint/Restart,** GC26-3784.

```
RESTART=(  {*                      }  [,checkid] )
           {stepname               }
           {stepname.procstepname  }
```

*

indicates that execution is to be restarted at or within the first job step.

stepname

specifies that execution is to be restarted at or within the named job step.

stepname.procstepname

specifies that execution is to be restarted at or within a cataloged procedure step. Stepname is the name of the job step that calls the cataloged procedure, and procstepname is the name of the procedure step.

checkid

specifies the name of the checkpoint at which execution is to be restarted. When checkid is coded, execution is restarted within the specified job step at the named checkpoint. If checkid is not coded, execution is restarted at the specified job step.

Rules for Coding

- Code * in place of stepname.procstepname if the first job step calls a cataloged procedure and execution is to be restarted at or within the first procedure step.
- The first character of stepname must be alphabetic.
- You need not code the parentheses if execution is to be restarted at a job step; that is, if you do not code the checkid subparameter.
- If the checkpoint name contains special characters, the name must be enclosed in apostrophes. If one of the special characters is an apostrophe, identify it by coding two consecutive apostrophes in its place.
- Include the SYSCHK DD statement when execution is to be restarted within a job step. (The SYSCHK DD statement is described in the section on DD statements in this publication.)
- Before resubmitting a job, check all backward references to steps that precede the restart step. Eliminate all backward references for the following keywords: PGM and COND on the EXEC statements, and VOLUME=REF=reference on the DD statements. A backward reference of VOLUME=REF=reference is allowed if the statement to which reference is made includes VOLUME=SER=(serial number,...).

Generation Data Sets

In the restart step or in steps following it, do not use the original relative generation numbers to refer to generation data sets that were created and cataloged in steps preceding the restart step. Instead, refer to a generation data set by its present relative generation number. For example, if the last generation data set created and cataloged was assigned a generation number of +2, refer to it as 0 in the restart step and in steps following the restart step. In this case, refer to the generation data set assigned a generation number of +1 as -1.

If generation data sets created in the restart step were kept instead of cataloged (that is ,DISP=(NEW,CATLG,KEEP) was coded and abnormal termination occurred), refer to generation data sets during checkpoint restart by the same relative generation numbers that were used to create them.

Examples of the RESTART Parameter

```
//LINES      JOB      RESTART=COUNT
```

Specifies that execution is to be restarted at the job step name COUNT.

```
//@LOC5      JOB      RESTART=(PROCESS,CHKPT3)
//SYSCHK     DD       DSN=CHK,UNIT=3330,DISP=OLD
```

Specifies that execution is to be restarted within the job step named PROCESS at the checkpoint named CHKPT3. This JOB statement must be followed by a DD statement named SYSCHK, which defines the data set on which an entry for the checkpoint name CHKPT3 was written.

```
//WORK       JOB      RESTART=(*,CKPT2)
//SYSCHK     DD       DSNAME=CHKPT,UNIT=3330,DISP=OLD
```

Specifies that execution is to be restarted at the checkpoint name CKPT2 in the first job step. This JOB statement is followed by a DD statement name SYSCHK, which defines the data set on which an entry for the checkpoint name CKPT2 was written.

```
//CLIP5      JOB      RESTART=(PAY.WEEKLY,CHECK8)
//SYSCHK     DD       DSN=CHKPT,UNIT=2314,DISP=OLD
```

Specifies that execution is to be restarted within the procedure step named WEEKLY at the checkpoint name CHECK8. PAY is the name of the job step that calls the cataloged procedure that contains the procedure step named WEEKLY. This JOB statement must be followed by a DD statement named SYSCHK, which defines the data set on which an entry for the checkpoint named CHECK8 was written.

The TIME Parameter—*keyword, optional*

The TIME parameter specifies the maximum amount of time that a job may use the CPU. The CPU time used by the job is written on the output listing.

```
TIME=       {( [minutes],[seconds] )}
            {1440                   }
```

minutes
a number that specifies the maximum number of minutes the job can use the CPU. The number of minutes must be less than 1440 (24 hours).

seconds
a number that specifies the maximum number of seconds beyond the specified number of minutes the job can use the CPU, or if no minutes are specified, the maximum number of seconds the job can use the CPU. The number of seconds must be less than 60.

1440
specifies that the job is not to be timed.

Default: For JES2, it is associated by job class and for JES3, it is associated by the operator with the particular reader.

Rules for Coding

- If you code the CPU time limit in minutes only, you need not code the parentheses. If you code the CPU time limit in seconds only, code a comma preceding the seconds to indicate the absence of minutes.
- Code 1440 if the job can use the CPU for 24 hours or more or if any of the job's steps should be allowed to remain in a wait state for more than the established time limit.
- A job that exceeds the specified limit causes termination of the job unless you use a user exit routine to extend the time.
- TIME=0 is not supported. Results are unpredictable when used on the JOB statement.

Examples of the TIME Parameter

```
//SEED       JOB      TIME=(12,10)
```

Specifies that the maximum amount of time the job can use the CPU is 12 minutes, 10 seconds.

```
//TYPE41     JOB      TIME=(,30)
```

Specifies that the maximum amount of time the job can use the CPU is 30 seconds.

```
//FORMS      JOB      TIME=5
```

Specifies that the maximum amount of time the job can use the CPU is 5 minutes.

```
//RAINCK     JOB      TIME=1440
```

Specifies that the job is not timed. Therefore, the job may use the CPU and may remain in wait state for an unspecified period of time.

The TYPRUN Parameter—*keyword, optional*

The TYPRUN parameter specifies special JES2 and JES3 processing. The operator must be informed of what event is to occur. When the event has occurred, the operator releases the job from hold status, thereby allowing it to be selected for processing. The TYPRUN parameter can also specify that the JCL for a job be scanned for syntax errors and, for JES2, that the input deck is converted directly to a SYSOUT data set and scheduled for output processing.

For further information on the TYPRUN parameter, see "Delaying Job Initiation" and "Bypassing Job Initiation."

```
        ⎧HOLD⎫
TYPRUN= ⎨SCAN⎬
        ⎩COPY⎭
```

HOLD

specifies that the job is to be held in the input queue until the operator releases the job.

SCAN

specifies that the JCL for a job is to be scanned for syntax errors but that the job is not to be executed. For example, SCAN will check for invalid keywords, illegal characters, and parentheses errors. SCAN will not check for parameter value errors or excessive parameters in JES2 but will check for these in JES3.

COPY

(For JES2 only) specifies that the input deck (as submitted) is converted directly to a SYSOUT data set and scheduled for output processing. The class of the SYSOUT data set is the same as the message class of the job and can be controlled by the MSGCLASS parameter. This feature is available in JES3 by using nonstandard job processing. See **OS/VS2 System Programming Library: Job Management**, GC28-0627, for information concerning nonstandard job processing.

Example of the TYPRUN Parameter

```
//UPDATE    JOB

//LIST      JOB      TYPRUN=HOLD
```

Jobs UPDATE and LIST are to be submitted for execution. The job UPDATE uses a program that adds and deletes members to a library; the job LIST uses a program that lists the members of a library. For an up-to-date listing of the library, UPDATE must be executed before LIST. This is accomplished by coding TYPRUN=HOLD on the JOB statement for the job named LIST. If a MONITOR JOBNAMES command is issued by you or the operator, the operator is notified on the console when UPDATE has completed processing. The operator releases LIST, which can then be selected for execution.

The EXEC Statement

Control Statement

The EXEC statement is the first statement of each job step and cataloged procedure step. It identifies the program to be executed or the cataloged procedure to be called.

```
//stepname  EXEC    operands     comments
```

The EXEC statement consists of the characters // in columns 1 and 2 and four fields — the name, operation (EXEC), operand, and comments fields.

General Rules for Coding

- Code an EXEC statement for each job step.
- A stepname is optional. However, when you want to perform certain functions, you should code a valid and unique stepname in the name field for each job step within the job. A stepname is necessary to:
  - Make backward references to the step.
  - Override parameters on an EXEC statement or DD statement in a cataloged procedure step, and add DD statements to a cataloged procedure step.
  - Perform a step or checkpoint restart at or within the step.
- The stepname must consist of 1 through 8 alphameric and national (@,#,$) characters. The first character must be an alphabetic or national character.
- The two types of parameters that can be coded in the operand field of the EXEC statement are:

Positional parameters, that must precede any keyword parameter. One of the following two positional parameters can be coded:

PGM
PROC

Keyword parameters, that can be coded in any order after the positional parameter. Any of the following keyword parameters can be coded on the EXEC statement:

ACCT
ADDRSPC
COND
DPRTY
DYNAMNBR
PARM
PERFORM
RD
REGION
TIME

Sample EXEC Statements

```
//STEP4      EXEC     PGM=DREC,PARM='3018,NO'
//           EXEC     PGM=ENTRY,TIME=(2,30)
//FOR        EXEC     PROC=PE489,TIME=4
```

The ACCT Parameter—*keyword, optional*

The ACCT parameter specifies one or more subparameters of accounting information to be passed to the installation's accounting routines.

For further information concerning the accounting routines, see **OS/VS System Management Facilities (SMF)**, GC35-0004.

```
ACCT[.procstepname]=(accounting information,...)
```

accounting information
specifies one or more subparameters established by the installation as accounting information to be passed to the accounting routines.

Rules for Coding

- If the accounting information consists of only one subparameter, you need not code the parentheses.
- The maximum number of characters of accounting information, including the commas that separate the subparameters, is 142.
- If a subparameter contains special characters (other than hyphens), enclose the subparameter in apostrophes. The apostrophes are not considered part of the information. If one of the special characters is an apostrophe, code two consecutive apostrophes in its place.
- If the job step calls a cataloged procedure, the ACCT parameter overrides any ACCT parameters coded in the procedure steps. This pertains to all procedure steps.
- If different steps in a cataloged procedure required different accounting information, code ACCT.procstepname=(accounting information,...) for each step that requires unique accounting information. Accounting information will then pertain only to the named procedure step.

Examples of the ACCT Parameter

```
//STEP1      EXEC    PGM=JP5,ACCT=(LOCATION8,'CHGE+3')
```

Specifies that this accounting information pertains to this job step.

```
//STP3       EXEC    LOOKUP,ACCT=('/83468')
```

Specifies that this information pertains to this job step. Since this step calls a cataloged procedure, the accounting information pertains to all the steps in the procedure.

```
//STP4       EXEC    BILLING,ACCT.PAID=56370,ACCT.LATE=56470,
//                   ACCT.BILL='121+366'
```

Specifies that different accounting information pertains to each of the named procedure steps (PAID,LATE, and BILL).

The ADDRSPC Parameter—*keyword, optional*

The ADDRSPC parameter indicates whether the job step will use virtual or real storage, that is, whether or not the job step can be paged.

For further information on the ADDRSPC parameter, see "Requesting Storage".

AC
AD

```
ADDRSPC=    {VIRT}
            {REAL}
```

VIRT
a keyword indicating that the job step can be paged to virtual storage.

.REAL
a keyword indicating that the job step cannot be paged. The job step must exist in real storage.

Default: If you omit the ADDRSPC parameter, the default is VIRT, unless the installation has changed the default.

General Rule for Coding

- The ADDRSPC parameter coded on a JOB statement will override any ADDRSPC parameter coded on an EXEC statement for that job.
- Requests for real and virtual storage can be made in the same job. Each step will honor the request for either real or virtual storage if there is no ADDRSPC parameter on the JOB statement.

Rule for Coding when Using Virtual Storage

The installation provides a default region size if the REGION parameter is not specified when ADDRSPC=VIRT is coded. If the REGION parameter is coded, the value sets the upper boundary to limit region size for variable-length GETMAINS. If the value is exceeded, the job or job step will abnormally terminate.

Rule for Coding when Using Real Storage

Code the REGION parameter to specify how much storage is needed.

Examples of the ADDRSPC Parameter

```
//CAC1      EXEC    A,ADDRSPC=VIRT
```

The ADDRSPC parameter requests virtual storage. Since the address space requested is virtual, the area size available to the user is the entire private address space.

```
//CAC2      EXEC    B,ADDRSPC=REAL,REGION=80K
```

The ADDRSPC parameter requests real storage. The REGION parameter specifies the amount, in this case, 80K.

The COND Parameter—*keyword, optional*

The COND parameter specifies whether a job step will be executed based on completion codes issued by one or more of the preceding job steps. This parameter allows the specification of conditions for bypassing a job step, as well as for executing a job step.

Each test specified by the COND parameter is performed using the return code of a completed job step. If any of the tests are satisfied, the particular job step is bypassed.

For further information on the use of the COND parameter, see "Conditional Execution of Job Steps."

```
COND=      ( ⎡( code,operator )                       ⎤  ,..[,] ⎡EVEN⎤)
             ⎢( code,operator,stepname )              ⎥         ⎣ONLY⎦
             ⎣( code,operator,stepname.procstepname ) ⎦
```

code
a number from 0 through 4095. This number is compared with the return code issued by all previous steps or a specific step.

operator
the type of comparison to be made with the return code. Operators and their meanings are:

GT...greater than
GE...greater than or equal to
EQ...equal to
LT...less than
LE...less than or equal to
NE...not equal to

stepname
the name of a preceding job step that issued the return code to be tested.

stepname.procstepname
the "stepname"is the name assigned to the step requesting execution of a procedure and "procstepname" is the name of the step within the procedure that issued the return code to be tested.

EVEN
specifies that the job step is to be executed even if one or more preceding job steps have abnormally terminated. If return code tests are to be made and any tests are satisfied, this job step will be bypassed.

ONLY
specifies that the job step is to be executed only if one or more preceding job steps have abnormally terminated. If the current job step specifies that return code tests are to be made and if any tests are satisfied, this job step will be bypassed.

Rules for Coding

- A condition code for a step that does not run is zero (0).
- If COND is coded on the JOB statement, then it will be ignored on the EXEC statement.
- If you code neither EVEN nor ONLY, you can make up to eight tests on return codes issued by preceding job steps or cataloged procedure steps that completed normally. If you code EVEN or ONLY, you can make up to seven tests on return codes. If you specify more than eight tests, a JCL error message is issued and the job fails.
- If you code only EVEN or ONLY, or if you code only one test, you need not code outer parentheses.

- If a job step that specifies the EVEN or ONLY subparameter refers to a data set that was to be created or cataloged in a preceding step, the data set may be incomplete if the step creating it abnormally terminated.
- You can code the EVEN or ONLY subparameters before, between, or after return code tests.
- If you want each return code test to be made on the return code issued by every preceding step, do not code a stepname or procstepname.
- If ONLY is specified on the first job step and a JOBLIB is being used, the unit and volume information are not passed to the succeeding step and the catalog will be searched for the JOBLIB data set.
- If a job step refers to a data set created in a preceding step, that data set will not exist if the preceding step was bypassed. If a data set was cataloged in a preceding job step and you make a backward reference to that data set, unit and volume information for the data set will not be available if the preceding step was skipped.

Code COND on the EXEC statement for any of the following:

- When you want to specify different tests for each job step.
- If a test you specify is true, you want to skip just that one step, rather than bypassing all subsequent steps in the job.
- When you want to name a specific step whose return code is to be tested.
- When you want to specify special conditions for executing a job step.

Examples of the COND parameter

```
//STEP6       EXEC      PGM=BAB,COND=(4,GT,STEP3)
```

If 4 is greater than the return code issued by STEP3 the system will bypass the step. (A return code of 4 or greater from STEP3 allows this step (STEP6) to be executed.) Since neither EVEN nor ONLY is specified, this job step will be automatically bypassed if a preceding step abnormally terminates.

```
//TEST2       EXEC      PGM=BACK,COND=((16,GE),(90,LE,STEP1),ONLY)
```

If 16 is greater than or equal to the return code issued by any of the preceding job steps or if 90 is less than or equal to the return code issued by STEP1, this step will be bypassed. If none of the tests are satisfied and a preceding job step has abnormally terminated, this step will be executed because ONLY is coded.

```
//STP4        EXEC      BILLING,COND.PAID=((20,LT),EVEN),
//                      COND.LATE=(60,GT,FIND),
//                      COND.BILL=((20,GE),(30,LT,CHGE))
```

This example specifies that different return code tests pertain to each of the named procedure steps (PAID, LATE, and BILL). If the return code test specified for the procedure step named PAID is not satisfied, the step will be executed even if a preceding step abnormally terminates.

The DPRTY Parameter--*keyword, optional*

The DPRTY parameter assigns a dispatching priority to a job step. Dispatching priority will be used by the system resources manager in determining the order in which tasks will be executed.

For further information on the use of the DPRTY parameter, see "Assigning a Dispatching Priority to Job Steps" for either JES2 or JES3.

```
DPRTY[.procstepname]=([value1][,value2])
```

value1
a number from 0 through 14 which indicates whether the job step is to have the same priority or a different priority than the job. The job priority is coded on the PRIORITY statement or calculated from values specified in the accounting information on the JOB statement, the JOBPARM values, or an installation default.

value2
a number from 0 through 15 which the system adds to value1 to form the dispatching priority. The system forms the internal priority by converting the value assigned to value1 in the DPRTY parameter.

Default: If you do not code the DPRTY parameter, the job step is assigned the APG priority.

General Rules for Coding

- If you omit value1, you must code a comma preceding value2 to indicate the absence of value1.
- If you omit value2, you need not code the parentheses.

Cataloged Procedures

- You can code the DPRTY parameter on the EXEC statement of a cataloged procedure.
- If a job step calls a cataloged procedure:

To override all DPRTY parameters code the DPRTY parameter on the EXEC statement that calls the cataloged procedure. This will establish one dispatching priority for all steps in the procedure.

To override only certain DPRTY parameters code DPRTY[.procstepname] on the EXEC statement that calls the procedure for each procedure step that you want to override. The dispatching priority will than pertain only to the named procedure step.

Example of the DPRTY Parameter

```
//BP2         EXEC     PGM=FOUR,DPRTY=(13,9)
```

The system uses these numbers to form a dispatching priority for this step. Since the numbers are high, the dispatching priority will be high.

The DYNAMNBR Parameter—*keyword, optional*

The DYNAMNBR parameter specifies that a number of resources can be held in anticipation of reuse. DYNAMNBR can be coded instead of coding several DD DYNAM statements.

For further information on the DYNAMNBR parameter, see "Dynamically Allocating and Deallocating Data Sets."

DPRT
DYN

```
DYNAMNBR[.procstepname]=n
```

procstepname
specifies the procedure step to which "n" applies.

n
specifies the number of DD DYNAM statements that you would otherwise have had to code; from 1 to 1635.

Default: 0

- If DYNAMNBR is coded incorrectly, zero is assumed and a warning message is issued.

Rules for Coding

- The maximum number of DD DYNAMs plus the number of DYNAMNBRs which can be concurrently allocated is 1635.
- If procstepname is omitted, DYNAMNBR applies to all steps in the procedure.

Example of the DYNAMNBR Parameter

```
//STEP1     EXEC     ACCT,DPRTY=(13,9),DYNAMNBR.CALC=12
```

This statement specifies that 12 allocations in the step CALC can be held in anticipation of reuse.

The PARM Parameter—*keyword, optional*

The PARM parameter passes variable information to a program in execution. For further information on the PARM parameter, see **OS/VS2 Supervisor Services and Macro Instructions**, GC28-0683.

```
PARM=value
```

value
up to 100 characters of information which the system is to pass to a processing program.

Rules for Coding

- Before coding the PARM parameter, see figure 12, "Character Sets" for an explanation of an alphameric, national, and special characters.
- If the value contains more than one expression separated by commas, you must enclose it in apostrophes or parentheses; that is, PARM='P1,123,MT5' or PARM=(P1,123,MT5). Enclosing apostrophes and parentheses are not passed to the processing program; commas within apostrophes and parentheses are passed as part of the value.
- If you include special characters in any expression, either (1) enclose the value in apostrophes, or (2) enclose the expression in apostrophes and the value in parentheses; that is, PARM='P50,12'80' or PARM=(P50,'12+80'). (The enclosing apostrophes and parentheses are not passed as part of the value.)
  If one of the special characters is an ampersand and you are not defining a symbolic parameter, code two consecutive ampersands in its place; that is, PARM+'3462&&5'.
  When two apostrophes or two ampersands are coded, only one is passed to the processing program.
- If you must continue the value on another statement, enclose it in parentheses. The continuation comma is considered part of the value field and counts toward the maximum of 100 characters of data. You may not continue any value enclosed in apostrophes.

Calling Cataloged or In-stream Procedures

- If a job step calls a cataloged or in-stream procedure, you can pass information to the first procedure step and nullify all other PARM parameters in the procedure or override some of the PARM parameters contained in the procedure.
- To nullify the PARM parameters in the procedure, code the PARM parameter on the EXEC statement that calls the procedure. The information contained in the PARM parameter is passed to the first procedure step and PARM parameters in all other procedure steps are nullified.
- To override some of the PARM parameters contained in the procedure, code, on the EXEC statement that calls the procedure, PARM.procstepname for each procedure step that you want to override. Information provided in the PARM value will be passed only to the named procedure step.

Example of the PARM Parameter

```
//RUN3        EXEC     PGM=APG22,PARM=(P1,123,'P2=5')
```

Passes the information in the PARM parameter, except the apostrophes and the parentheses, to the processing program name APG22.

```
//            EXEC     PROC81,PARM=MT5
```

Passes this information to the first step of the procedure named PROC81. If any of the other procedure steps in PROC81 contain the PARM parameter, those parameters are nullified.

```
//STP6        EXEC     ASMFCLG,PARM.LKED=(MAP,LET)
```

Passes this information to the procedure step named LKED. If any of the other procedure steps in LKED contain the ASMFCLG parameter, these parameters will still be effective.

The PERFORM Parameter—*keyword, optional*

The PERFORM parameter specifies the performance group definitions to which a job step is associated.

For further information on the performance groups, see "Performance of Jobs and Jobs Steps."

```
PERFORM[.procstepname]=n
```

procstepname
specifies the name of a step within a procedure invoked by this EXEC statement.

n
is a number between 1 and 255, inclusive, identifying a performance group that has been defined by the installation.

Default: The interpreter will obtain a default from the system resources manager and issue a warning message indicating a system default is set.

- For non-TSO jobs, the IBM-supplied default is one (1).
- For TSO jobs, the IBM-supplied default is two (2).
- If an invalid performance group is specified, the interpreter will obtain a default from the system resources manager and issue a warning message indicating nonverification and default substitution.
- Specifying an invalid procstepname also results in a warning message, but no other action.
- If no PERFORM parameter is specified on either the JOB or EXEC statements, the performance group defaults to one.

Rule for Coding

- If PERFORM is specified for a procedure, the specified value is effective for the entire procedure. If PERFORM.procstepname is coded for a procedure, the value is effective only for the procedure step named.
- If PERFORM is specified on the JOB statement, its value will supercede any PERFORM specifications on EXEC statements associated with the job. If no PERFORM parameter appears on the JOB statement and a PERFORM parameter appears on an associated EXEC statement, the parameter value appearing on the EXEC statement will be used during the associated job step.

Example of the PERFORM Parameter

```
//STEPA     EXEC    PGM=ADAM,PERFORM=60
```

This job step will be run in performance group 60. The significance of this performance group is defined by the installation.

The PGM Parameter—*positional, optional*

The PGM parameter specifies a program to be executed. The specified program must be a member of a temporary library, a system library, or a private library.

For further information on identifying programs and on libraries (partitioned data sets), see "Identifying Data Sets to the System."

```
PGM=        {program name                        }
            {*.stepname.ddname                   }
            {*.stepname.procstepname.ddname      }
```

program name
specifies the member name or alias of the program to be executed.

***.stepname.ddname**
specifies a backward reference to a DD statement that defines, as a member of a partitioned data set, the program to be executed. Stepname is the name of the step in which the DD statement appears; ddname is the name that appears on the DD statement.
This form of the parameter is usually used when a previous job step has created a temporary partitioned data set to store a program until the program is required.

***.stepname.procstepname.ddname**
specifies a backward reference to a DD statement within a cataloged procedure step that defines, as a member of a partitioned data set, the program to be executed. Stepname is the name of the step that calls the procedure; procstepname is the name of the procedure step that contains the DD statement .

Rules for Coding

- If you code the PGM parameter, code it as the first parameter on the EXEC statement. The program you specify must be a member of a partitioned data set.
- The program name must consist of up to 8 alphameric or national characters, the first of which must be alphabetic or national.
- For compatability with ASP (running under JES3), if you code PGM=JCLTEST, you can scan the job's JCL without executing the job or setting up devices. This is the same function as coding TYPRUN=SCAN on the JOB statement.

Examples of the PGM Parameter

```
//STEP1      EXEC     PGM=TABULATE
```

Specifies that the program named TABULATE is a member of SYS1.LINKLIB.

```
//JOB8       JOB      MSGLEVEL=(2,0)
//JOBLIB     DD       DSNAME=DEPT12.LIB4,DISP=(OLD,PASS)
//STEP1      EXEC     PGM=USCAN
```

Specifies that the system is to look for the program name USCAN in a private library named DEPT12.LIB4.

```
//CREATE     EXEC     PGM=IEWL
//SYSLMOD    DD       DSNAME=&&PARTDS(PROG),UNIT=2314,DISP=(MOD,PASS),
                      SPACE(1024,(50,20,1))
//EXECUTE    EXEC     PGM=*.CREATE.SYSLMOD
```

Uses a backward reference to a DD statement that defines a temporary library created in the step named CREATE. The program name PROG is stored as a member of the partitioned data set named &&PARTDS and will be executed in the step name EXECUTE. &&PARTDS will be deleted at the end of the job.

```
//STEP2      EXEC     PGM=UPDT
//DDA        DD       DSNAME=SYS1.LINKLIB(P40),DISP=OLD
//STEP3      EXEC     PGM=*.STEP2.DDA
```

Uses a backward reference to a DD statement that defines a system library. The program named P40 is stored as a member of SYS1.LINKLIB and is executed in the step named STEP3.

```
//CHECK      EXEC     PGM=IEFBR14
```

Executes the program named IEFBR14, allowing you to satisfy space allocation and disposition processing requests prior to executing your program. The remaining job control statements in the job are also checked for syntax.

The PROC Parameter—*positional, optional*

The PROC parameter specifies that a cataloged procedure or an in-stream procedure is to be called and executed.

For further information on cataloged and in-stream procedures, see "Using Cataloged and In-Stream Procedures."

```
{PROC=procedure name}
{procedure name     }
```

procedure name
the member name (or alias) of a cataloged procedure or the name of an in-stream procedure to be called and executed.

Rules for Coding

- The procedure name must consist of one through eight alphameric or national characters of which the first must be alphabetic or national.
- The PROC and PGM parameters are mutually exclusive. Therefore, if you code PGM, do not code PROC. If you code the PROC parameter, code it as the first parameter on the EXEC statement, instead of the PGM parameter. You can code only the cataloged or in-stream procedure name, omitting PROC.
- When the EXEC statement specifies a cataloged or in-stream procedure, parameters in the operand field of the EXEC statement will override EXEC parameters in the called procedure.
- Any DD statements that follow the EXEC statement will be treated as overriding DD statements or DD statements that are to be added to the cataloged or in-stream procedure for the duration of the job step.

Examples of the PROC Parameter

```
//SP3      EXEC     PROC=PAYWKRS
```

Specifies that the cataloged or in-stream procedure named PAYWKRS is to be called.

```
//BK       EXEC     OPERATE
```

Specifies that the cataloged or in-stream procedure named OPERATE is to be called. This specification has the same effect as coding PROC=OPERATE.

The RD Parameter—*keyword, optional*

The RD (restart definition) parameter specifies how the step restart facilities are used with the CHKPT macro instruction, and whether automatic restart is permitted or suppressed.

For detailed information on the checkpoint/restart facilities, refer to: **OS/VS Checkpoint/Restart** GC26-3784.

```
                   ⎧R  ⎫
                   ⎪RNC⎪
RD[.procstepname]= ⎨NC ⎬
                   ⎩NR ⎭
```

procstepname
indicates that the RD parameter applies to the step corresponding to the statement referred to by the statement.

R
indicates that automatic step restart is permitted.
If the processing program used by a job step does not include any CHKPT macro instructions, coding RD=R allows execution to be resumed at the beginning of the abnormally terminated step.
If the program does include a CHKPT macro instruction, coding RD=R permits automatic step restart to occur if the step abnormally terminates before execution of the CHKPT macro instruction; thereafter, only checkpoint restart can occur.
If you cancel the effects of the CHKPT macro instruction before a checkpoint restart is performed, the request for automatic step restart is again in effect.

RNC
indicates that automatic step restart is permitted and automatic and deferred checkpoint restart are not permitted.

NC
indicates that automatic step restart and automatic and deferred checkpoint restart are not permitted

NR
indicates that a CHKPT macro instruction can establish a checkpoint, but neither automatic step restart nor automatic checkpoint restart is permitted. Coding RD=NR allows you to resubmit the job at a later time and specify in the RESTART parameter (on the job statement of the resubmitted job) the checkpoint at which execution is to be resumed.

Rules for Coding

- Automatic restart will not be honored if you do not have a job journal (a job journal is an initialization option).
- Even if you do not code the RD parameter, you job is eligible for automatic checkpoint restart if checkpoints have been issued. However, the job is not eligible for automatic step restart.
- Code the RD parameter on EXEC statements instead of the JOB statement when you want to make different restart requests for each job step.
  If you code the RD parameter on the JOB statement, any RD parameters coded on the job's EXEC statements are ignored and the value coded on the JOB statement is effective for all steps.

- The RD parameter can be coded on the EXEC statement of a cataloged procedure. If the job step does call a cataloged procedure:
  To override all RD parameters, code the RD parameter on the EXEC statement that calls the procedure. This establishes one restart for all the steps in the procedure.
  To override only certain RD parameters, code, on the EXEC statement that calls the procedure, RD.procstepname for each procedure step that you want to override. The restart request will then pertain only to the named procedure step.
- The RD parameter applies to the step corresponding to the statement or to all steps of the cataloged procedure referred to by the statement.
- RD.procstepname applies to the specified procedure step and overrides the RD parameter that may be coded on the EXEC statement of the procedure step. It can be coded once for each step of the procedure.
- The RD parameter values NC and RNC can be used to suppress the action of the CHKPT parameter.

Examples of the RD Parameter

```
//STEP1      EXEC     PGM=GIIM,RD=R
```

Permits execution to be automatically restarted with this step if it abnormally terminates.

```
//NEST       EXEC     PGM=T18,RD=RNC
```

Permits execution to be automatically restarted with this step if it abnormally terminates; suppresses the action of CHKPT macro instructions issued in the program this job step uses.

```
//CARD       EXEC     PGM=WTE,RD=NR
```

Neither automatic step restart nor automatic checkpoint restart can occur, but CHKPT macro instructions issued in the program that this job step executes can establish checkpoints.

```
//STP4       EXEC     BILLING,RD.PAID=NC,RD.BILL=NR
```

Specifies that different restart requests pertain to each of the named procedure steps (PAID and BILL).

The REGION Parameter—*keyword, optional*

The REGION parameter specifies the amount of real address space to be allocated to a job.

For further information on the REGION parameter, see "Requesting Storage."

```
REGION=valueK
```

valueK
specifies a number that indicates how many bytes of storage are to be allocated to a job step.

Default: the installation-defined default.

General Rules for Coding

- Code an even number. (If you code an odd number, the system treats it as the next highest even number.)
- When you want to specify a different region size for each job step, code the REGION parameter on the EXEC statements, instead of the JOB statement.
- If the REGION parameter is coded on the JOB statement, REGION parameters coded on the job's EXEC statements are ignored.

Rule for Coding when Using Virtual Storage

- The installation provides a default region size if the REGION parameter is not specified when ADDRSPC=VIRT is coded. If the REGION parameter is coded, the value sets the upper boundary to limit region size for variable-length GETMAINS. If the value is exceeded, the job or job step will abnormally terminate.

Examples of the REGION Parameter

```
//MKBOYLE    EXEC     A,ADDRSPC=REAL,REGION=40K
```

40K of real storage will be assigned to this job step.

```
//STP6       EXEC     PGM=CONT,REGION=120K
```

The REGION parameter will be ignored for a job that can be paged and the entire private address space will be assigned unless you have variable-length GETMAIN requests. In that case, the REGION parameter value (120K) will be used as a maximum value for each variable-length GETMAIN request.

The TIME Parameter—*keyword, optional*

The TIME parameter specifies the maximum amount of time that a job step can use the CPU. The CPU time used is written on the output listing.

```
TIME=  {( [minutes] [,seconds] )}
       {1440                    }
```

minutes
specifies the maximum number of minutes the job step can use the CPU. The number of minutes must be less than 1440 (24 hours).

seconds
specifies the maximum number of seconds beyond the specified number of minutes the job step can use the CPU. The number of seconds must be less than 60.

1440
specifies that the job step is not to be timed.

Default: defined by your installation. The IBM default is 30 minutes.

Rules for Coding

- If you code the CPU time limit in minutes only, you need not code the parentheses.
- Code 1440 if the job step can use the CPU for 24 hours or more or if the job step should be allowed to remain in a wait state for more than the established time limit.
- You can code the TIME parameter on the EXEC statement of a cataloged procedure step. To override all TIME parameters in a cataloged procedure, code the TIME parameter on the EXEC statement that calls the procedure. This establishes a CPU time limit for the entire procedure, and nullifies any TIME parameters that appear on EXEC statements in the procedure.
  To override only certain TIME parameters, code, on the EXEC statement that calls the procedure, TIME.procstepname, for each procedure step that you want to override. The CPU time limit will then pertain only to the named procedure step.
- The remaining job time may affect the amount of time the step can use the CPU. If the remaining CPU time for the job is less than the CPU time limit specified on the EXEC statement, the step can use the CPU only for the job's remaining CPU time.
- A step that exceeds the specified limit causes termination of the job unless you use a user exit routine to extend the time.
- TIME=0 is not supported. When coded on the EXEC statement, the step will fail only after the unexpired time from the previous step is used up.

Examples of the TIME Parameter

```
//STEP1      EXEC     PGM=GRYS,TIME=(12,10)
```

Specifies that the maximum amount of time the step can use the CPU is 12 minutes 10 seconds.

```
//FOUR       EXEC     PGM=JPLUS,TIME=(,30)
```

Specifies that the maximum amount of time the step can use the CPU is 30 seconds.

```
//INT        EXEC     PGM=CALC,TIME=5
```

Specifies that the maximum amount of time the step can use the CPU is 5 minutes.

```
//LONG       EXEC     PGM=INVANL,TIME=1440
```

Specifies that the job step is not to be timed. Therefore, the step can use the CPU and can remain in a wait state for an unspecified period of time.

```
//STP4       EXEC     BILLING,TIME.PAID=(45,30),TIME.BILL=(112,59)
```

Specifies that different time limits pertain to each of the named procedure steps.

The DD Statement

Control Statement

The DD (data definition) statement describes a data set to be used in a job step and specifies the input and output facilities required for the data set.

```
//ddname    DD      operands    comments
```

The DD statement consists of the characters // in columns 1 and 2, and four fields — the name, operation (DD), operand, and comments field.

Rules for Coding

- Code a DD statement for each data set to be used in a step.
- Code a ddname, beginning in column 3, and consisting of 1 through 8 alphameric and national (@,#,$) characters. The first character must be alphabetic or national.
- Code unique ddnames within a job step. If duplicate ddnames exist in a step, allocation of devices and space and disposition processing are done for both DD statements; however, all references are directed to the first such DD statements in the step.
- Apart from the restricted use of certain special ddnames (listed below), there are two instances when you should not code a ddname at all:
  - A DD statement is to define a data set that is concatenated with a data set defined by a preceding DD statement.
  - The DD statement is the second or third consecutive DD statement that defines an indexed sequential data set.
- Special ddnames: Do not use the following seven special ddnames unless you wish to make use of the particular facilities which these names represent to the system; these facilities are explained in detail in the following pages.

  JOBCAT
  JOBLIB
  STEPCAT
  STEPLIB
  SYSABEND
  SYSUDUMP
  SYSCHK

- Although all DD statement parameters are optional, a blank operand field is invalid, except when you are overriding DD statements that define concatenated data sets.
- The maximum number of DD statements allowed per job step is 1635.
- There are two types of parameters that can be coded on a DD statement: keyword and positional. The positional parameters, which must precede any keyword parameters, are:

  *
  DATA
  DUMMY
  DYNAM

  The keyword parameters are:

AMP
CHKPT
COPIES
DCB
DDNAME
DEST
DISP
DLM
DSID
DSNAME
FCB
FREE
HOLD
LABEL
MSVGP
OUTLIM
QNAME
SPACE
SYSOUT
TERM
UCS
UNIT
VOLUME

Rules for Coding DD Statements when Using Cataloged Procedures

- If a job step uses a cataloged procedure, you can make modifications to the DD information within the procedure for the duration of the job step. To do this, code modifications on the DD statements immediately following the EXEC statement that calls the cataloged procedure.
- To override parameters on a DD statement within a cataloged procedure, code the name of the procedure step in which the DD statement appears, followed by a period, followed by the name of the DD statement that you want to override.
- To override two or more DD statements in a procedure step, the sequence of the overriding statements must be the same as the sequence of the procedure statements being overridden.
- To add DD statements to a procedure step, code the name of the procedure step in which the DD statement appears, followed by a period, followed by a ddname of your choosing. Added statements must follow all overriding statements.
- To supply a procedure step with data in the input stream, code the name of the procedure step that is to use the data, followed by a ddname. This ddname may be predefined in the procedure step by means of the DDNAME parameter. In this case, the ddname that follows the procedure step name must be the name code in the DDNAME parameter.
- Do not use a JOBLIB DD statement in a cataloged procedure.

Examples of Valid Ddnames

```
//INPUT      DD      DSN=FGLIB,DISP=(OLD,PASS)
//           DD      DSN=GROUP2,DISP=SHR
```

Because the ddname is missing from the second DD statement, the data sets defined in these statements will be concatenated.

```
//PAYROLL.DAY   DD
```

If the procedure step named PAYROLL includes a DD statement named DAY, this statement will override parameters on the statement named DAY. If the step does not include a DD statement named DAY, this statement will be added to the procedure step for the duration of the job step.

```
//STEPSIX.DD4   DD
//              DD
```

This sequence defines data sets that are to be concatenated and added to the procedure step. On the first DD statement, the procedure step to which statements are to be added is identified and followed by any valid ddname. On the second DD statement, the ddname is omitted.

The JOBCAT Facility

DD statement

The JOBCAT DD statement defines a private user catalog that is searched for data sets before the master catalog or a private catalog associated with the first qualifier of data set names for the duration of a job.

```
//JOBCAT     DD       DISP= {OLD},DSNAME=usercatalogname
                            {SHR}
```

JOI

General Rules for Coding

- JOBCAT applies to each job step in which a STEPCAT has not been specified.
- The location of the user catalog is given in the master catalog, so do not specify any unit or volume information.
- To specify more than one user catalog for a job, include after the JOBCAT statement an unlabeled DD statement that names another user catalog.
- OS CVOLs cannot be specified as JOBCAT. Access to an OS CVOL is only possible with a CVOL pointer in the master catalog.
- The JOBCAT statement must appear after the JOB statement, but before the first EXEC statement.
- A JOBLIB statement must precede the JOBCAT statement, if specified.

Example of the JOBCAT DD Statement

The following example specifies a private user catalog. Place a JOBCAT DD statement before the first EXEC statement after the JOB statement. The JOBCAT DD statement should also appear after any JOBLIB statements.

```
//EXAMPLE   JOB     WILLIAMS,MSGLEVEL=1
//JOBLIB    DD      DSNAME=USER.LIB,DISP=SHR
//JOBCAT    DD      DSNAME=LYLE,DISP=SHR
//          EXEC    PGM=SCAN
```

The JOBLIB Facility

DD statement

The JOBLIB DD statement defines a private library to be made available by the system to each step of a job.

```
//JOBLIB    DD
```

General Rules for Coding

- Code JOBLIB as the ddname on the first DD statement. Never use the ddname JOBLIB except to define a private library for an entire job.
- Omit the ddname from all subsequent DD statements that define data sets that are to be concatenated to the first one. These DD statements must immediately follow the JOBLIB statement, and the JOBLIB statement must immediately follow the JOB statement.
- If you include a JOBLIB DD statement in the JCL for a job, each time the job requests a program, the system first searches the private library; if it does not find the program there, it next searches the system library.
- Use a STEPLIB DD statement, described under the STEPLIB Facility, to define a private library to be made available to one job step in a job. If you include a STEPLIB DD statement for a job step and a JOBLIB DD statement for the entire job, the system first searches the step library and then the system library for the requested program. The job library is ignored for that step.
- To make the private library available throughout the job, code the DISP parameter to specify the library's status and disposition. One of the following combination of DISP parameter values must be coded:

  DISP=(NEW,PASS)
  DISP=(OLD,PASS)
  DISP=(SHR,PASS)
  DISP=(NEW,CATLG)
  DISP=(OLD,CATLG)
  DISP=(SHR,CATLG)

  For further explanation, refer to the DISP parameter in the index of this publication.

- The rules for coding parameters on the JOBLIB DD statement depend on whether or not the private library is cataloged. These rules are discussed below under separate headings.
- Do not use a JOBLIB statement in a cataloged procedure.
- If COND=ONLY is specified on the first job step and a JOBLIB is being used, the unit and volume information are not passed to the succeeding step and the catalog will be searched for the JOBLIB data set.

Rules for Coding When the Library is Cataloged

- Code the DSNAME parameter to specify the name of the private library.
- Code the DISP parameter. The DISP parameter must be other than NEW.
- Do not code VOL=SER to request a cataloged data set.
- Code the DCB parameter if complete data control block information is not contained in the data set label.
- To refer to the private library in a later DD statement, code DSNAME=*.JOBLIB and the DISP parameter.

If a later DD statement defines a data set that is to be placed on the same volume as the private library, code VOLUME=REF=*.JOBLIB to obtain volume and unit information.

Rules for Coding When the Library is Not Cataloged

- Code the DISP parameter. The DISP parameter must be one of the following values:

  DISP=(OLD,PASS)
  DISP=(SHR,PASS)
  DISP=(NEW,PASS)

- Code the UNIT parameter to specify the device to be allocated to the library.
- Code the DSNAME parameter unless the data set has been assigned a disposition of (NEW,PASS).
- Code the VOLUME parameter unless the status of the data set is NEW.
- If the status of the data set is NEW, you must code the SPACE parameter to allocate space for the data set on the designated volume.
- Code the DCB parameter if complete data control block information is not contained in the data set label.
- To refer to the private library in a later DD statement, code DSNAME=*.JOBLIB,VOLUME=REF=*.JOBLIB (or VOLUME=SER=serial number, UNIT=unit information), and the DISP parameter, DISP=(OLD,PASS).

If a later DD statement defines a data set that is to be placed on the same volume as the private library, code VOLUME=REF=*.JOBLIB to obtain volume and unit information.

Examples of the JOBLIB DD Statement

```
//PAYROLL   JOB    JONES,CLASS=C
//JOBLIB    DD     DSNAME=PRIVATE.LIB4,DISP=(OLD,PASS)
//STEP1     EXEC   PGM=SCAN
//STEP2     EXEC   PGM=UPDATE
//DD1       DD     DSNAME=*.JOBLIB,DISP=(OLD,PASS)
```

The private library defined on the JOBLIB DD statement is cataloged. The statement named DD1 refers to the private library defined in the JOBLIB DD statement.

```
//PAYROLL   JOB    FOWLER,CLASS=L
//JOBLIB    DD     DSNAME=PRIV.DEPT58,DISP=(OLD,PASS),
//                 UNIT=2314,VOLUME=SER=D58PVL
//STEP      EXEC   PGM=DAY
//STEP2     EXEC   PGM=BENEFITS
//DD1       DD     DSNAME=*.JOBLIB,VOLUME=REF=*.JOBLIB,
//                 DISP=(OLD,PASS)
```

The private library defined on the JOBLIB DD statement is not cataloged. The statement named DD1 refers to the private library defined in the JOBLIB DD statement.

```
//TYPE      JOB    MSGLEVEL=(1,1)
//JOBLIB    DD     DSNAME=GROUP8.LEVEL5,DISP=(NEW,CATLG),
//                 UNIT=2314,VOLUME=SER=148562,
//                 SPACE=(CYL,(50,3,4))
//STEP1     EXEC   PGM=DISC
//DDA       DD     DSNAME=GROUP8.LEVEL5(RATE),DISP=OLD,
//                 VOL=REF=*.JOBLIB
//STEP2     EXEC   PGM=RATE
```

The private library defined on the JOBLIB DD statement does not exist yet; therefore, all the parameters required to define the private library are included on the JOBLIB DD statement. The library is not created until STEP1 when a new member is defined for the library. The system looks for the program named DISC in SYS1.LINKLIB; the system first looks for the program named RATE in the private library.

```
//PAYROLL   JOB      LIEF,TIME=1440
//JOBLIB    DD       DSNAME=KRG.LIB12,DISP=(OLD,PASS)
//          DD       DSNAME=GROUP31.TEST,DISP=(OLD,PASS)
//          DD       DSNAME=PGMSLIB,UNIT=2314,
//                   DISP=(OLD,PASS),VOLUME=SER=34568
```

Several private libraries are concatenated. The system searches libraries for each program in this order: KRG.LIB12, GROUP31.TEST, and PGMSLIB.

The STEPCAT Facility

DD statement

The STEPCAT DD statement defines a private VSAM user catalog that is searched for data sets before the master catalog or a private catalog associated with the first qualifier of data set names for the duration of a job step.

```
///STEPCAT   DD       DISP= {OLD},DSNAME=usercatalogname
                            {SHR}
```

General Rules for Coding

- A STEPCAT DD statement can appear in any position among the DD statements for a job step.
- The location of the user catalog is given in the master catalog, so do not specify any unit or volume information.
- To specify more than one user catalog for a job step, include after the STEPCAT statement an unlabeled DD statement that names another user catalog.
- If you want to override the JOBCAT with the master catalog for a particular job step, code the following:

```
//STEPCAT        DD       DISP=OLD,DSNAME=master catalog name
```

- OS CVOLs cannot be specified as STEPCAT. Access to an OS CVOL is only possible with a special CVOL pointer in the master catalog.

Example of the STEPCAT DD Statement

The following example specifies a job-step user catalog named BETTGER by placing a DD statement with the ddname STEPCAT after the EXEC statement for the job step:

```
//           EXEC     PROC=SNZ12
//STEPCAT    DD       DSNAME=BETTGER,DISP=SHR
```

The STEPLIB Facility

DD Statement

The STEPLIB DD statement defines a private library to be made available by the system to a job step.

```
//STEPLIB    DD
```

General Rules for Coding

- The ddname on this statement must be STEPLIB. Never use the ddname STEPLIB except to define a private library for a job step.
- A STEPLIB DD statement can appear in any position among the DD statements for a step.
- A private library defined on a STEPLIB DD statement can be referred to by, or passed on to, later job steps in the same job.
- If you include a STEPLIB DD statement in the JCL for a job, when the jobstep for which the library is defined requests the program, the system searches the private library. Use a JOBLIB DD statement, described under the JOBLIB facility, to define a private library to be made available to an entire job. If you include a JOBLIB DD statement for the entire job and a STEPLIB DD statement for an individual job step, the system searches the step library. The job library is ignored for that step.
- A STEPLIB DD statement can appear in a cataloged procedure.
- To concatenate libraries, that is, to arrange a sequence of DD statements that define different data sets:

  Code STEPLIB as the ddname of the first DD statement.

  Omit the ddname from all subsequent DD statements that define private libraries for the particular step.

- If you want the system to ignore the JOBLIB for a particular job step, use the following STEPLIB DD statement:

```
//STEPLIB    DD        DSNAME=SYS1.USERLIB,DISP=SHR
```

  For the particular job step, the system will first search the system library for the required data set.
- The rules for coding parameters on the STEPLIB DD statement depend on whether the library is cataloged, not cataloged, or passed by a previous job step. These rules are discussed below under separate headings.

Rules for Coding When the Library is Cataloged

- Code the DSNAME parameter to specify the name of the private library.
- Code the DISP parameter to specify the library's status and its disposition. Its status must be either OLD or SHR. Its disposition may be any valid disposition.
- Code the DCB parameter if complete data control block information is not contained in the data set label.

Rules for Coding When the Library has been Passed by a Previous Step

- Within a job, a previously defined step library must be made available for use by subsequent job steps by assigning a disposition of PASS.
- To refer to a previously defined step library:
  Code the DSNAME parameter, specifying either the name of the step library or a backward reference of the form *.stepname.ddname. If the step library was defined in a cataloged procedure, the backward reference must include the procedure step name *.stepname.procstepname.ddname.
  Code the DISP parameter, specifying a status of OLD and a disposition, depending on what you want done with the private library after its use in the job step.
  Code the DCB parameter if complete data control block information is not contained in the data set label.

Rules for Coding When the Library is Neither Cataloged Nor Passed

- Code the DSNAME parameter, specifying the name of the private library.
- Code the DISP parameter, specifying the library's status, either OLD or SHR and a disposition, depending on what you want done with the private library after its use in the job step.
- Code the VOLUME parameter, identifying the volume serial number.
- Code the UNIT parameter, specifying the device to be allocated to the library.
- Code the DCB parameter if complete data control block information is not contained in the data set label.

Examples of the STEPLIB DD Statement

```
//PAYROLL   JOB     BROWN,MSGLEVEL=1
//STEP1     EXEC    LAB14
//STEP2     EXEC    PGM=SPKCH
//STEPLIB   DD      DSNAME=PRIV.LIB5,DISP=(OLD,KEEP)
//STEP3     EXEC    PGM=TIL80
//STEPLIB   DD      DSNAME=PRIV.LIB13,DISP=(OLD,KEEP)
```

The private libraries defined in STEP2 and STEP3 are cataloged.

```
//PAYROLL   JOB     BAKER,MSGLEVEL=1
//JOBLIB    DD      DSNAME=LIB5.GROUP4,DISP=(OLD,PASS)
//STEP1     EXEC    PROC=SNZ12
//STEP2     EXEC    PGM=SNAP10
//STEPLIB   DD      DSNAME=LIBRARYP,DISP=(OLD,PASS),
//                  UNIT=2314,VOLUME=SER=55566
//STEP3     EXEC    PGM=A1530
//STEP4     EXEC    PGM=SNAP11
//STEPLIB   DD      DSNAME=*.STEP2.STEPLIB,
//                  DISP=(OLD,KEEP)
```

The private library defined in STEP2 is not cataloged. The STEPLIB DD statement in STEP4 refers to the library defined in STEP2. Since a JOBLIB DD statement is included, STEP1 and STEP3 could execute programs from LIB5.GROUP4 or, if the programs are not found there, from SYS1.LINKLIB. STEP2 and STEP4 could execute programs from LIBRARYP or SYS1.LINKLIB.

```
//PAYROLL    JOB     THORNTON,MSGLEVEL=1
//JOBLIB     DD      DSNAME=LIB5.GROUP4,DISP=(OLD,PASS)
//STEP1      EXEC    PGM=SUM
//STEPLIB    DD      DSNAME=SYS1.LINKLIB,DISP=OLD
//STEP2      EXEC    PGM=VARY
//STEP3      EXEC    PGM=CALC
//STEPLIB    DD      DSNAME=PRIV.WORK,DISP=(OLD,PASS)
//           DD      DSNAME=LIBRARYA,DISP=(OLD,KEEP),
//                   UNIT=2314,VOLUME=SER=44455
//           DD      DSNAME=LIB.DEPT88,DISP=(OLD,KEEP)
//STEP4      EXEC    PGM=SHORE
```

All steps can use programs contain in the private library named LIB5.GROUP4, which is defined in the JOBLIB DD statement. STEP1 can use a program from the system library, since the library defined on the STEPLIB DD statement is the system library. A concatenation of private libraries is defined in STEP3. The system searches for the program named CALC in this order: PRIV.WORK,LIBRARYA,LIB.DEPT88,SYS1.LINKLIB. If a later job step refers to the STEPLIB DD statement in STEP3, the system will search for the program in the private library named PRIV.WORK, and if it is not found there, in SYS1.LINKLIB.

The SYSABEND and SYSUDUMP Facilities

DD Statements

The SYSABEND DD statement defines a data set on which a dump can be written if the step in which the statement appears abnormally terminates. The dump provided by this facility includes the system nucleus, the processing program storage area, and a trace table.

The SYSUDUMP DD statement defines a data set on which a dump can be written if the step in which the statement appears abnormally terminates. The dump provided by this facility includes only the processing program storage area.

For information on how to interpret dumps, see **OS/VS2 System Programming Library: Debugging Handbook**, GC28-0632.

```
//SYSABEND  DD
//SYSUDUMP  DD
```

STEPL
SYSAI
SYSUI

Rules for Coding

To Dump to a Unit Record Device: Code the UNIT parameter, specifying the unit record device to which you want to write the dump, or code the SYSOUT parameter, specifying the output class through which you want the data set routed.

- If you want to store the dump and do not want it written immediately to any output device, code the following parameters:
  - The DSNAME parameter, specifying the name of the data set.
  - The UNIT parameter, specifying the device to be allocated to the data set.
  - The VOLUME parameter, identifying the serial number of the volume to which the dump is to be written.
  - The DISP parameter, specifying the data set's status and disposition. Since you want to store the data set, make the data set's conditional disposition KEEP or CATLG.
  - The SPACE parameter (for direct access devices), specifying the amount of space you want allocated to the data set.

Examples of the SYSABEND and SYSUDUMP DD Statements

```
//STEP2     EXEC    PGM=A
//SYSUDUMP  DD      SYSOUT=A
```

The SYSUDUMP DD statement specifies that you want the dump routed through the standard output class A.

```
//SYSUDUMP  DD      DSNAME=DUMP,DISP=(NEW,KEEP),
//                  UNIT=2400,VOL=SER=147958
```

This step causes the dump to be stored on a standard labeled tape.

```
//STEP1      EXEC   PGM=PROGRAM1
//SYSABEND   DD     DSNAME=DUMP,UNIT=2314,DISP=(,PASS,KEEP),
//                  VOLUME=SER=1234,SPACE=(TRK,(40,20))
//STEP2      EXEC   PGM=PROGRAM2
//SYSABEND   DD     DSNAME=*.STEP1.SYSABEND,DISP=(OLD,DELETE,KEEP)
```

The SYSABEND DD statement specifies that you want the dump stored. The space request in STEP1 is large (40 tracks or 340 maximum tracks) so that the dumping operation will not be inhibited due to insufficient space; if STEP1 does not abnormally terminate but STEP2 does, the dump will be written using the space allocated in STEP1. In both steps, a conditional disposition of KEEP is specified. This will allow storing of the dump if either of the steps abnormally terminates. If both of the steps are successfully executed, the second subparameter of the DISP parameter (DELETE) in STEP2 will delete the data set and free the space acquired for dumping.

```
//STEP1      EXEC   PGM=WWK
//SYSUDUMP   DD     DSNAME=DUMP,UNIT=2314,DISP=(,DELETE,
//                  KEEP),VOLUME=SER=54366,SPACE=(1680,(160,80))
//STEP2      EXEC   PGM=PRINT,COND=ONLY
//IN         DD     DDNAME=*.STEP1.SYSUDUMP,DISP=(OLD,DELETE),
//                  VOLUME=REF=*.STEP1.SYSUDUMP
```

Step 1 specifies that the dump is to be stored if the step abnormally terminates. Because COND=ONLY is specified in STEP2, the step will be executed only if STEP1 abnormally terminates. STEP2 uses a program that prints the dump.

The SYSCHK Facility

DD Statement

The SYSCHK DD statement defines a checkpoint data set written during the original execution of a processing program.

For detailed information about the checkpoint/restart facilities, see **OS/VS Checkpoint/Restart**, GC26-3784.

```
//SYSCHK      DD
```

General Rules for Coding

- The SYSCHK DD statement must immediately precede the first EXEC statement of the resubmitted job when restart is to begin at a checkpoint. (If the first EXEC statement is preceded by a DD statement named SYSCHK and restart is to begin at a step, the SYSCHK DD statement is ignored.)
- The SYSCHK DD statement supports cataloged data sets.
- Include a SYSCHK DD statement among the DD statements for a job whenever a deferred checkpoint restart is to occur, that is whenever a job is resubmitted for restart of execution at a particular checkpoint.
- If you include a JOBLIB DD statement, the SYSCHK DD statement must follow it.
- Code the RESTART parameter on the JOB statement; otherwise the SYSCHK DD statement will be ignored.
- The rules for coding parameters on the SYSCHK DD statement depend on whether or not the checkpoint data set is cataloged. These rules are discussed below under separate headings.

When the Checkpoint Data Set is Cataloged

If the checkpoint data set is cataloged, you must always code the DSNAME and DISP parameters.

- The DSNAME parameter specifies the name of the checkpoint data set.
- The DISP parameter must specify or imply a status OLD and a disposition of KEEP.
- The UNIT parameter specifies the type and the number of devices assigned to the data set.
- The VOLUME parameter specifies the volume(s) on which the data set resides.
- If the checkpoint entry exists on a tape volume other than the first volume of the checkpoint data set, you must indicate this by coding the volume serial number or volume sequence number in the VOLUME parameter. (The serial number of the volume on which a checkpoint entry was written is contained in the console message printed after the checkpoint entry is written.) If you code the volume serial number, you must also code the UNIT parameter, since the system will not look in the catalog for unit information.

When the Checkpoint Data Set is Not Cataloged

If the checkpoint data set is not cataloged, you must always code the DSNAME, DISP, VOLUME, and UNIT parameters.

- The DSNAME parameter specifies the name of the checkpoint data set. If the checkpoint data set is partitioned, do not include a member name in the DSNAME parameter.
- The DISP parameter must specify or imply a status of OLD and disposition of KEEP.
- The VOLUME parameter specifies the volume serial number of the volume on which the checkpoint entry resides. (The serial number of the volume on which a checkpoint entry was written is contained in the console message printed after the checkpoint entry is written.)
- The UNIT parameter specifies the device to be allocated to the data set.

Example of the SYSCHK DD Satement

```
//JOB1       JOB     RESTART=(STEP3,CK3)
//SYSCHK     DD      DSNAME=CHLIB,UNIT=2314,
//                   DISP=OLD,VOLUME=SER=456789
//STEP1      EXEC
```

The checkpoint data set defined on the SYSCHK DD statement is not cataloged.

```
//JOB2       JOB     RESTART=(STEP2,NOTE2)
//JOBLIB     DD      DSNAME=PRIV.LIB3,DISP=(OLD,PASS)
//SYSCHK     DD      DSNAME=CHECKPTS,DISP=(OLD,KEEP),
//                   UNIT=2400,VOLUME=SER=438291
//STEP1      EXEC
```

The checkpoint data set defined on the SYSCHK DD statement is not cataloged. Note that the SYSCHK DD statement follows the JOBLIB DD statement.

The * Parameter—*positional, optional*

The * parameter specifies that data for a processing program follows the DD statement. The * parameter causes the system to check for an input delimiter (/*, //, or when the card reader runs out of cards or whatever you specify on the DLM parameter that overrides /*) on the input reader device.

```
//ddname    DD   *
```

General Rules for Coding

- You can code more than one DD * statement for each job step.
- Code the DATA parameter instead of the * parameter when the data contains statements starting with //.
- When preceding the data with a DD * statement, a delimiter statement (/*) following the data is optional.
- You must code input stream data records in BCD or EBCDIC.
- If the processing program does not read all the data in an input stream, the remaining data is skipped without causing abnormal termination of the job.
- The DLM parameter can be used to define other than the standard delimiter.
- The DSID and the VOL=SER parameters can be used to indicate to a diskette reader that a diskette data set is to be merged into the JCL stream following this DD statement.

Rules for Coding a Catalog Procedure

- A cataloged procedure cannot contain a DD * statement.
- If you call a cataloged procedure with the EXEC statement, you can include the data for each procedure step in the input stream. You can add more than one DD * statement to each procedure step.

Restriction when Coding *

- The keywords allowed on the DD * statement are: DLM, DCB=BLKSIZE, DCB=BUFNO, DCB=LRECL, VOL=SER, and DSID. All other keywords will cause an error.
- The VOL=SER, DCB=BLKSIZE, DCB=BUFNO, DCB=LRECL, and DSID parameters are ignored except when they are detected by a diskette reader as a request for an associated data set as described in **OS/VS2 IBM 3540 Programmer's Reference**, GC24-5111.

Separating Groups of Data

- You can include several distinct groups of data in the input stream for a job step or a procedure step. The system will recognize each group of data if you precede each group with a DD * statement, or if you follow each group with a delimiter statement (/*), or both. (If you leave out the DD * statement for a group of data, the system provides a DD * statement having SYSIN as its ddname.)

*Examples of the * Parameter*

```
//INPUT1            DD      *
                .
                .
              data
                .
                .
/*
//INPUT2            DD      *
                .
                .
              data
                .
                .
/*
```

Defines several groups of data in the input stream.

```
//STEP2             EXEC    PROC=FRESH
//SETUP.WORK        DD      UNIT=2400,LABEL=(,NSL)
//SETUP.INPUT1      DD      *
                .
                .
              data
                .
                .
/*
//PRINT.FRM         DD      UNIT=180
//PRINT.INP         DD      *
                .
                .
              data
                .
                .
/*
```

Defines data in the input stream. The input data defined by the DD statement named SETUP.INPUT1 is for use by the cataloged procedure step named SETUP; the input defined by the DD statement named PRINT.INP is for use by the cataloged procedure step named PRINT.

```
//INPUT2            DD      *
                .
                .
              data
                .
                .
/*
```

Defines data in the input stream.

The AMP Parameter—*keyword, optional*

The AMP parameter completes information in an access method control block (ACB). The ACB is a control block for entry-sequenced data sets or key-sequence data sets.

For further information on AMP and the ACB, see **OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide**, GC26-3838.

```
AMP=      'AMORG'
          [,'BUFND=number']
          [,'BUFNI=number']
          [,'BUFSP=number']
                    ⎧RCK⎫
                    ⎪NCK⎪
          [,'CROPS= ⎨NRE⎬']
                    ⎩NRC⎭
                    ⎧I  ⎫
          [,'OPTCD= ⎨L  ⎬']
                    ⎩IL ⎭
                    ⎧F  ⎫
                    ⎪FB ⎪
          [,'RECFM= ⎨V  ⎬']
                    ⎩VB ⎭
          [,'STRNO=number']
          [,'SYNAD=modulename']
          [,'TRACE']
```

AMORG
indicates that the DD statement defines a VSAM data set. You must specify AMORG only when you include unit and volume information or DUMMY in the DD statement. You never have to specify unit and volume information unless you want to have only some of the volumes mounted on which the data set is stored, or if you want to defer mounting.

BUFND
specifies the number of I/O buffers to be used for transmitting the contents of data control intervals between virtual and auxiliary storage. A minimum of two data buffers is required. If the number of buffers is not specified in the AMP parameter or the ACB or GENCB macro instructions, the default is the number specified for STRNO, plus one additional buffer.

BUFNI
specifies the number of I/O buffers to be used for transmitting the contents of index control intervals between virtual and auxiliary storage. A minimum of one index buffer is required. If the number of index buffers is not specified in the AMP parameter or ACB or GENCB macro instructions, the default is the number specified for STRNO. If the ISAM interface program is being used, a search of the high-level index in virtual storage can be simulated by adding one additional index buffer.

BUFSP
specifies the size of the user area to be allocated for data and index buffers. With entry-sequenced data sets, the minimum number of buffers required is two; with key-sequenced data sets, the minimum number of buffers required is three. If you specify less space than was specified in the BUFFERSPACE parameter of the DEFINE command of Access Method Services when the data set was defined, the BUFFERSPACE amount BUFSP has precedence over BUFND and BUFNI.

CROPS

specifies one of four checkpoint/restart options, described in the **OS/VS Checkpoint/Restart**, GC26-3784.

RCK

specifies that a data-erase test and data set post-checkpoint modification tests are performed. RCK is the default for CROPS.

NCK

specifies that data-set-post-checkpoint modification tests are not performed.

NRE

specifies that a data-erase test is not performed.

NRC

specifies that neither a data-erase test nor data set post-checkpoint modification tests are performed.

If no value for CROPS is specified, RCK is assumed. If you specify an option which is not applicable for a data set, such as the data-erase test for an input data set, the option is ignored.

OPTCD

specifies how records flagged for deletion are to be processed with an ISAM processing program using the ISAM interface.

I

specifies, when coded along with OPTCD=L in the DCB, that records marked for deletion by your processing program are not written into the data set by the ISAM interface. If OPTCD=I is specified in the AMP parameter, but OPTCD=L is not specified in the processing program's DCB, records flagged for deletion are treated like any other records; that is, AMP='OPTCD=I', with L not specified, has no effect.

L

specifies that a record marked for deletion by your processing program is to be kept in the data set. Although this parameter has the same meaning and restrictions for ISAM interface as it has for ISAM, it may have to be specified in the AMP parameter when it wasn't previously needed in the ISAM job control language. It is required when OPTCD=L is not specified in the DCB processing program because OPTCD is not merged into the DSCB when ISAM interface is used.

IL

specifies that if processing programs marks a job for deletion, the ISAM interface does not put the record into the data set.

RECFM

specifies the ISAM record format that the processing program is coded for. Although this parameter has the same meaning and restrictions for the ISAM interface as it has for ISAM, it may have to be specified in the AMP parameter when it wasn't previously required in the ISAM job control language. RECFM is required when it is not specified in the DCB in the processing program because RECFM is not merged into the DSCB when the ISAM interface is used. All VSAM requests are for unblocked records. If your program issues a request for blocked records, the ISAM interface sets the overflow-record indicator for each record to indicate that each is being passed to your program unblocked. If RECFM isn't specified in the AMP parameter or in the processing program's DCB, V is the default.

F

indicates fixed-length records.

FB

indicates blocked fixed-length records.

V

indicates variable-length records.

VB

indicates blocked variable-length records.

STRNO

indicates the number of VSAM requests that require concurrent data set positioning. STRNO is an operand of the ACB or GENCB macro instruction and is fully described in **OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide**, GC26-3838.

SYNAD

is an operand of the EXLST macro instruction. It can be used to override the address of a SYNAD exit routine specified in the EXLST (or GENCB) macro instruction that generates the exit list. The address of the intended exit list is specified in the access method control block that links this DD statement to the processing program. If no SYNAD exit is specified, the AMP SYNAD parameter is ignored.

You can also use this parameter when processing a VSAM data set with an ISAM processing program to provide an ISAM SYNAD routine or to replace one with another.

TRACE

specifies that the generalized trace facility (GTF) executes with your job to gather information about opening and closing of data set, and end-of-volume processing. You can print the trace output with the AMDPRDMP program (see **OS/VS2 System Programming Library: Service Aids**, GC28-0674.

Rules for Coding

- If the number of buffers specified in the BUFND and BUFNI subparameters causes the virtual storage requirements to exceed the BUFSP specification, the number of buffers is reduced to comply with BUFSP. If BUFSP specifies more space than required by BUFNO and BUFNI, the number of buffers is increased.
- For a key-sequenced data set, the total minimum buffer requirement is three; two data buffers and one index buffer. For an entry-sequenced data set, two data buffers are required.
- Apostrophes must enclose each subparameter or group of subparameters if they contain special characters, for example, AMP='BUFSP=value'.
- If the subparameters continue from one line to another, each line of subparameters must begin and end with an apostrophe and the entire group of subparameters must be enclosed in parentheses.

Additional rules for coding and further explanation of the AMP parameter are in the **OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide**, GC26-3838.

Examples of the AMP Parameter

```
//AMPDD     DD     DSN=SYS1.MACLIB,DISP=SHR,AMP=('BUFSP=200,BUFND=2',
//                 'BUFNI=3,STRNO=4,SYSNAD=ERROR')
```

This DD statement defines the size of the user area for data and index buffers; specifies the number of data and index buffers; specifies the number of requests that require concurrent data set positioning and specifies an error analysis routine. ERROR will override the error analysis routine specified in the EXLST macro.

```
//AMPDD     DD     DSN=SYS1.MACLIB,DISP=SHR,AMP=('BUFSP=23456,BUFND=5',
//                 'BUFNI=10,STRNO=6,SYNAD=ERROR2,CROPS=NCK,TRACE')
```

This DD statement defines the values for BUFSP, BUFNI, STRNO, and SYNAD as in the previous example. It also specifies that a data-set-post-checkpoint modification test is not to be performed when restarting at a checkpoint and that OPEN is to provide a module trace.

```
//AMPDD     DD     DSN=SYS1.MACLIB,DISP=SHR,AMP=('BUFSP=23456',
//                 'BUFND=5','BUFNI=10','STRNO=6','SYNAD=ERROR2',
//                 'CROPS=NCK','TRACE')
```

Another way of continuing subparameters from one line to another.

The CHKPT Parameter—*keyword, optional*

The CHKPT parameter is used to invoke the checkpoint at end-of-volume facility. It specifies that checkpoints are to be taken for the data set defined by the DD statement on which it is coded. For more information, see **OS/VS Checkpoint/Restart**, GC26-3784.

```
CHKPT=EOV
```

EOV
specifies that checkpoints are to be taken at end of volume for that data set.

Rules for Coding

- The CHKPT parameter is specified only for multi-volume data sets using QSAM or BSAM. (CHKPT is ignored for non-multivolume QSAM or BSAM data sets or for ISAM, BDAM, BPAM, or VSAM data sets.)
- Checkpoints can be taken on either input or output data sets.
- CHKPT is mutually exclusive with DD *, DD DATA, SYSOUT, DYNAM, and DDNAME parameters. Coding CHKPT with any of these parameters will result in a JCL error.
- For concatenated BSAM or QSAM data sets, CHKPT must be coded on each DD in the concatenation if checkpoint is desired for each DD.
- If this parameter is specified on one or more DD statements in a job step, a SYSCKEOV DD must be provided (as outlined in the discussion on SYSCKEOV in **OS/VS Checkpoint/Restart**, GC26-3784).
- The RD parameter values NC and RNC on the JOB or EXEC statements override the **CHKPT** parameter.
- The CHKPT parameter overrides cataloged procedure values or START console values for checkpoints at end of volume.

Examples of the CHKPT Parameter

```
//DS1     DD      DSNAME=INDS,DISP=OLD,CHKPT=EOV,
//                UNIT=SYSSQ,VOLUME=SER=(TAPE01,TAPE02,TAPE03)
```

INDS is a multivolume QSAM (or BSAM) data set for which a checkpoint is to be taken twice—once after end of volume on TAPE01 and once after end of volume on TAPE02.

```
//DS2     DD      DSNAME=OUTDS,DISP=(NEW,KEEP),
//                CHKPT=EOV,UNIT=SYSDA,VOLUME=(,,,8)
```

OUTDS is a multi-volume data set being created that will require eight volumes. Seven checkpoints will be taken at the end of volumes one through seven.

The COPIES Parameter—*keyword, optional*

The COPIES parameter allows you to request one or more copies of the output data set.

For further information on the use of the COPIES parameter, see "Obtaining Output" for either JES2 or JES3.

```
COPIES=nnn
```

nnn
specifies the number of SYSOUT copies (between 1 and 255) of the SYSOUT data set to be written to the printer, punch, or external writer, subject to an installation limit.

Default: 1

- If COPIES is incorrectly coded, a default of 1 is supplied and a warning message is issued.

Rules for Coding

- The COPIES parameter can be coded only on a DD statement that includes the SYSOUT parameter. Otherwise, the COPIES parameter is ignored.
- If you request copies of the entire job (on the JES2 JOBPARM statement) as well as additional copies of the data set (on the JCL DD COPIES parameter) and if the data set is part of the job related output, you may receive a number of copies equal to the product of the two requests.
- Numbers of copies can also be specified on the OUTPUT control statement.

Example of the COPIES Parameter

```
//RECORD    DD      SYSOUT=W,COPIES=32
```

Request 32 copies of the data set defined by the DD statement named RECORD.

The DATA Parameter—*positional, optional*

The DATA parameter specifies that data for a processing program is to follow the DD statement. This data can contain statements with the characters // in columns 1 and 2.

```
//ddname     DD        DATA
```

General Rules for Coding

- You can code more than one DD DATA statement for each job step.
- Code the * parameter instead of the DATA parameter when the data does not contain statements starting with //.
- You must code input stream data records in BCD or EBCDIC.
- If the processing program does not read all the data in an input stream, the remaining data is skipped without causing abnormal termination of the job.
- You must code a delimiter to end data in the input stream. Define this parameter as either /* or use the DLM parameter.
- The DSID and VOL=SER parameters can be used to indicate to a diskette reader that a diskette data set is to be merged into the JCL stream following this DD statement.

Rules for Coding a Catalog Procedure

- If you had an EXEC statement for the job step that calls a cataloged procedure, you can add more than one DD DATA statement to a procedure step.
- A cataloged procedure cannot contain a DD DATA statement.

Restrictions when Coding DATA

- The keywords allowed on the DD * statement are: DLM, DCB=BLKSIZE, DCB=BUFNO, DCB=LRECL, VOL=SER, and DSID and DCB=MODE=C for JES3 only. All other keywords will cause an error.
- The VOL=SER, DCB=BLKSIZE, DCB=BUFNO, DCB=LRECL, and DSID parameters are ignored except when they are detected by a diskette reader as a request for an associated data set as described in **OS/VS 3540 Programmer's Reference**, GC24-5111.

Separating Groups of Data

- You can include several distinct groups of data in the input stream for a job step or a procedure step. Precede each group of data with a DD DATA statement and follow it with a delimiter statement (/*). The data contained between the DD DATA statement and the delimiter statement and the delimiter must not contain /* in columns 1 and 2. See the DLM parameter.

Examples of the DD DATA Parameter

```
//INPUT             DD      DATA
              .
              .
            data
              .
              .
/*
```

Defines data in the input stream.

```
//STEP2             EXEC    PROC=UPDATE
//PREP.DD4          DD      DSNAME=A.B.C,VOLUME=SER=D88,
//                          UNIT=2314,SPACE=(TRK,(10,5)),
//                          DISP=(,CATLG,DELETE)
//PREP.INPUT        DD      DATA
              .
              .
            data
              .
              .
/*
//ADD.IN            DD      *
              .
              .
            data
              .
              .
/*
```

Defines data in the input stream. The input defined by the DD statement name PREP.INPUT is for use by the cataloged procedure step name PREP. This data contains job control statements. The input defined by the DD statement named ADD.IN is for use by the cataloged procedure step named ADD. Since this data is defined by a DD * statement, it must not contain job control statements.

```
//INPUT             DD      DATA
              .
              .
            data
              .
              .
/*
//INPUT3            DD      DATA
              .
              .
            data
              .
              .
/*
```

Defines several groups of data in the input stream.

The DCB Parameter—*keyword, optional*

The DCB parameter is used to complete information in a data control block (DCB) about a data set at execution time. The data control block is originally constructed in a processing program by a DCB macro instruction.

For further information on the formation of the data control block, see **OS/VS Data Management Services Guide**, GC26-3783.

```
⎧DCB=(list of attributes)                                                      ⎫
⎪DCB=(  ⎧dsname                         ⎫                                      ⎪
⎨       ⎨*.ddname                       ⎬                                      ⎬
⎪       ⎪*.stepname.ddname              ⎪         [,list of attributes])       ⎪
⎩       ⎩*.stepname.procstepname.ddname ⎭                                      ⎭
```

list of attributes
those DCB keyword subparameters that describe the data set and are needed to complete the data control block. The DCB keyword subparameters are listed alphabetically in this section in the pages immediately following.

dsname
the name of a cataloged data set from which the system is to copy DCB information. The information is contained in the data set label of the cataloged data set; the data set must reside on a direct access volume and the volume must be mounted before execution of the job step.

***.ddname**
the name of an earlier DD statement in the same job step from which the system is to copy DCB information.

***.stepname.ddname**
the name of a DD statement (ddname) in a earlier job set (stepname) from which the system is to copy DCB information.

***.stepname.procstepname.ddname**
the name of a DD statement (ddname), which appears in a procedure step (procstepname); the procedure step is part of a cataloged procedure that was called by an earlier job step (stepname).

General Rules for Coding

- Separate DCB keyword subparameters by a comma.
- You need not enclose the DCB parameter value in parentheses if it consists of only one keyword subparameter, a data set name, or a backward reference.
- All DCB subparameters, except BLKSIZE, BUFNO, and DIAGNS are mutually exclusive with the DDNAME parameter; therefore, when the DDNAME parameter is coded, do not code any DCB subparameters except BLKSIZE, BUFNO, and DIAGNS.
- Code the DCB parameter on the DD statement unless the data control block is completed by another source, for example, the DCB macro instruction in the processing program. There are several ways of specifying DCB information on the DD statement. The following methods are explained in detail in the next three groups of syntax rules:
  - Supplying all pertinent DCB keyword subparameters on the DD statement.
  - Copying the DCB information from the data set label of an existing cataloged data set.
  - Copying the DCB information from an earlier DD statement.

Supplying DCB Keyword Subparameters

- You must code the DCB macro instruction in a processing program written in assembler language. However, you can supply some DCB operands as DCB subparameters on a DCB statement.
- List the information required to complete the data control block as keyword subparameters in the DCB parameter.
- If the processing program and the DCB parameter supply the same subparameter, the subparameter on the DD statement is ignored.
- The DCB keyword subparameters are listed alphabetically in this section in the pages immediately following.

Copying DCB Information From a Data Set Label

- You can copy DCB information from the data set label of a cataloged data set on a currently mounted direct access volume. A permanently resident volume is the most likely place from which to copy information because it is always mounted.
- Code in the DCB parameter the data set name of the cataloged data set. The data set name cannot contain special characters, except for periods used in a qualified name.
- The following DCB keyword subparameters can be copied from the data set label:

  DSORG (used in a backward reference)
  RECFM
  OPTCD
  BLKSIZE
  LRECL
  KEYLEN
  RKP

  The volume sequence number, system code, creation date, and expiration data of the cataloged data set will also be copied unless you specify them in the DD statement.

- If you code any DCB keyword subparameters following the name of the cataloged data set, these subparameters override any of the corresponding subparameters that were copied.
- The DCB subparameters are listed alphabetically in this section in the pages immediately following.

Copying DCB Information From an Earlier DD Statement

- The earlier DD statement from which DCB information can be copied can be contained in the same job step, an earlier job step, or a cataloged procedure step. Code in the DCB parameter one of the following types of reference names, depending on the location of the DD statement you want to use:

  *.ddname
  *.stepname.ddname
  *.stepname.procstepname.ddname

- If you code any DCB keyword subparameters following the reference to the DD statement, these subparameters override any of the corresponding subparameters that were copied.
- The system copies only those subparameters from the earlier DD statement that are not again specified on the referencing DD statement.
- The DCB subparameters are listed alphabetically in this section in the pages immediately following.

Examples of the DCB Parameter

```
//DD1     DD       DSNAME=ALP,DISP=( ,KEEP ),VOLUME=SER=44321,
//                 UNIT=2400,DCB=( RECFM=FB,LRECL=240,BLKSIZE=960,
//                 DEN=1,TRTCH=C )
```

This DD statement defines a new data set and contains the information necessary to complete the data control block.

```
//DD2     DD       DSNAME=BAL,DISP=OLD,DCB=( RECFM=F,LRECL=80,
//                 BLKSIZE=80 )
//DD3     DD       DSNAME=CNANN,DISP=( ,CATLG,DELETE ),UNIT=2400,
//                 LABEL=( ,NL ),VOLUME=SER=663488,DCB=*.DD2
```

The statement named DD3 defines a new data set and requests the system to copy the DCB subparameters from the DD statement named DD2, which is in the same job step.

```
//DD4     DD       DSNAME=JST,DISP=( NEW,KEEP ),UNIT=2314,
//                 SPACE=( CYL,( 12,2 ) ),DCB=( A.B.C,KEYLEN=8 )
```

This DD statement defines a new data set and requests the system to copy DCB information from the data set label of the cataloged data set named A.B.C.. If the data set label contains a key length specification, it is overridden since KEYLEN is coded on the DD statement.

```
//DD5     DD       DSNAME=SMAE,DISP=OLD,UNIT=2314,
//                 DCB=( *.STEP1.PROCSTP5.DD8,BUFNO=5 )
```

This DD statement defines an existing data set and requests the system to copy the DCB subparameters from the DD statement named DD8, which is contained in the procedure step named PROCSTP5. The cataloged procedure was called by the job step named STEP1. If any of the DCB subparameters coded on the procedure DD statement have been previously defined for this data set, they are ignored. If the BUFNO subparameter has not been previously specified for the data set, then five buffers are assigned to the data control block.

The following is a brief description of the DCB subparameters. For more detail on each of them, refer to the book describing the access method you are using.

Access Method	**Publication**
BDAM, BISAM, BPAM, *BSAM, QISAM, QSAM*	**OS/VS Data Management Macro Instructions,** *GC26-3793.*
TCAM	**OS/VS2 TCAM Programmer's Guide,** *GC30-2041.*
GAM	**Graphic Programming Services for 2250,** *GC27-6971.* **Graphic Programming Services for 2260,** *GC27-6972.*
EXCP	**OS/VS2 System Programming Library: Data Management,** *GC26-3830.*
BTAM	**OS/VS BTAM,** *GC27-6980.*

Access Method / Sub-parameters	BDAM	BISAM	BPAM	BSAM	BTAM	EXCP	GAM	QISAM	QSAM	TCAM	Description of Subparameters
BFALN	X	X	X	X		X		X	X		BFALN=(F|D) Specifies that each buffer starts either on a word boundary that is not also a doubleword boundary or on a doubleword boundary. If both BFALN and BFTEK are specified, they must be supplied from the same source. Default: D (doubleword)
BFTEK	X			X	X				X		BFTEK=R (for BDAM and BSAM) BFTEK={S|E|A} (for QSAM) R specifies that the data set is being created for or contains variable-length spanned records. S, E, and A specify simple, exchange, or locate mode logical record interface for spanned records. It can only be coded when RECFM=VS. If both BFALN and BFTEK are specified, they must be supplied from the same source.
BLKSIZE	X		X	X		X		X	X	X	BLKSIZE=number of bytes Specifies the maximum length, in bytes, of a block. The minimum length is 18. The largest number allowed is 32,760 except for blocks of ASCII records on magnetic tape. This maximum length is 2048. If you code the BLKSIZE subparameter in the DCB macro instruction or on a DD statement that defines an existing data set with standard labels, the subparameter overrides the block size specified in the label. BLKSIZE may be coded but will have no effect on EXCP processing.
BUFIN										X	BUFIN=number of buffers Specifies the number of buffers to be assigned initially for receiving operations for each line in the line group. The number of buffers specified in the combined BUFIN and BUFOUT operands must be no greater than the number of buffers in the buffer pool for this line group (not including those for disk activity only). Default: 1
BUFL	X	X	X	X		X		X	X	X	BUFL=number of bytes Specifies the length, in bytes, of each buffer in the buffer pool. The maximum length allowed is 32,760.
BUFMAX										X	BUFMAX=number of buffers Specifies the maximum number of buffers to be allocated to a line at one time. The number must be greater than 1 but may not exceed 15. It must be at least equal to the larger of the numbers specified by the BUFIN and BUFOUT subparameters. Default: 2
BUFNO	X	X	X	X	X	X		X	X		BUFNO=number of buffers Specifies how many buffers are to be assigned to the DCB; the maximum normally is 255, but can be less because of the size of the partition or region.
BUFOFF				X					X		BUFOFF=(n|L) Specifies the buffer offset; that is, the length of an optional block prefix that can precede a block of one or more ASCII records on magnetic tape. For input, n can be 0 through 99, unsigned. For output, n can only be 0. L can be specified only when RECFM=D, indicating a four byte field containing block length.
BUFOUT										X	BUFOUT=number of buffers Specifies the number of buffers to be assigned initially for sending operations for each line in the line group. The combined number of BUFIN and BUFOUT values must not be greater than the number of buffer in the buffer pool for this line group (not including those for disk activity only) and cannot exceed 15. Default: 2
BUFSIZE										X	BUFSIZE=number of bytes Specifies the length, in bytes, of each of the buffers to be used for all lines in a particular line group. This length must be at least 31 bytes, but cannot exceed 65,535.

<table>
<tr><th>Access Method / Sub-parameters</th><th>BDAM</th><th>BISAM</th><th>BPAM</th><th>BSAM</th><th>BTAM</th><th>EXCP</th><th>GAM</th><th>QISAM</th><th>QSAM</th><th>TCAM</th><th>Description of Subparameters</th></tr>
<tr><td>CODE</td><td></td><td></td><td></td><td>X</td><td></td><td>X</td><td></td><td></td><td>X</td><td></td><td>CODE={A|B|C|F|I|N|T}
Specifies the paper tape code used for punched data. The subparameters CODE, DEN, KEYLEN, MODE, PRTSP, STACK, and TRTCH are mutually exclusive.
A ASCII (8 track)
B Burroughs (7 track)
C National Cash Register (8 track)
F Friden (8 track)
I IBM BCD perforated tape transmission code (8 track)
N No conversion required
T Teletype[1] (5 track)
Default: I</td></tr>
<tr><td>CPRI</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X</td><td>CPRI={R|E|S}
Specifies the relative transmission priority assigned to the lines in this line group.
R Specifies that CPU receiving has priority over CPU sending.
E Specifies that receiving and sending have equal priority.
S Specifies that CPU sending has priority over CPU receiving.</td></tr>
<tr><td>CYLOFL</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X</td><td></td><td></td><td>CYLOFL=number of tracks
Specifies how many tracks on each cylinder are to hold the records that overflow from other tracks on that cylinder. The maximum is 99. Specify CYLOFL only when OPTCD=Y.</td></tr>
<tr><td>DEN</td><td></td><td></td><td></td><td>X</td><td></td><td>X</td><td></td><td></td><td>X</td><td></td><td>DEN={0|1|2|3|4}
Specifies the magnetic density in number of bits-per-inch used to write a data set.
<table>
<tr><th>DEN</th><th>7-track tape</th><th>9-track tape</th></tr>
<tr><td>0</td><td>200</td><td>–</td></tr>
<tr><td>1</td><td>556</td><td>–</td></tr>
<tr><td>2</td><td>800</td><td>800 (NRZI)</td></tr>
<tr><td>3</td><td>–</td><td>1600 (PE)</td></tr>
<tr><td>4</td><td>–</td><td>6250 (GCR)</td></tr>
</table>
NRZI is for non-return-to-zero inverted recording mode.
PE is for phase encoded recording mode.
GCR is for group coded recording mode.
Default: 800 bpi assumed for 7-track tape and 9-track without dual density.
1600 bpi assumed for 9-track with dual density or phase-encoded drives.
6250 bpi assumed for 9-track with 6250/1600 bpi dual density or group coded recording tape.
The subparameters CODE, DEN, KEYLEN, MODE, PRTSP, STACK, and TRTCH are mutually exclusive.</td></tr>
<tr><td>DIAGNS</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td></td><td>DIAGNS=TRACE
Specifies the OPEN/CLOSE/EOV trace option which gives a module-by-module trace of OPEN/CLOSE/EOV's work area and the DCB. When GTF is not running and tracing user events, DIAGNS is ignored.</td></tr>
</table>

[1] Trademark of Teletype Corporation, Skokie, Ill.

<table>
<tr><th>Access Method
Sub-parameters</th><th>BDAM</th><th>BISAM</th><th>BPAM</th><th>BSAM</th><th>BTAM</th><th>EXCP</th><th>GAM</th><th>QISAM</th><th>QSAM</th><th>TCAM</th><th colspan="2">Description of Subparameters</th></tr>
<tr><td rowspan="13">DSORG</td><td rowspan="13">X</td><td rowspan="13">X</td><td rowspan="13">X</td><td rowspan="13">X</td><td rowspan="13">X</td><td rowspan="13">X</td><td rowspan="13">X</td><td rowspan="13">X</td><td rowspan="13">X</td><td rowspan="13">X</td><td colspan="2">DSORG=data set organization
Specifies the organization of the data set and indicates whether the data set contains any location-dependent information that would make the data set unmovable.</td></tr>
<tr><td>PS physical sequential data set.</td><td>BSAM, EXCP, QSAM, TCAM</td></tr>
<tr><td>PSU physical sequential data set that contains location-dependent information.</td><td>BSAM, QSAM, EXCP</td></tr>
<tr><td>DA direct access data set.</td><td>BDAM</td></tr>
<tr><td>DAU direct access data set that contains location-dependent information.</td><td>BDAM, EXCP</td></tr>
<tr><td>IS indexed sequential data set.</td><td>BISAM, QISAM</td></tr>
<tr><td>ISU indexed sequential data set that contains location-dependent information</td><td>QISAM, EXCP</td></tr>
<tr><td>PO partitioned data set.</td><td>BPAM, EXCP</td></tr>
<tr><td>POU partitioned data set that contains location-dependent information.</td><td>BPAM, EXCP</td></tr>
<tr><td>CX communications line group.</td><td>BTAM</td></tr>
<tr><td>GS graphic data control block.</td><td>GAM</td></tr>
<tr><td>TX TCAM line group data set.</td><td>TCAM</td></tr>
<tr><td>TQ TCAM message queue or checkpoint data set</td><td>TCAM</td></tr>
<tr><td>EROPT</td><td></td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td>X</td><td></td><td colspan="2">EROPT=n
BTAM: Requests the BTAM on-line terminal test option. n=T
QSAM: Specifies the option to be executed if an error occurs in reading or writing a record.
n=ACC system is to accept the block causing the error.
SKP system is to skip the block causing the error.
ABE system is to cause abnormal end of task.
Default: ABE</td></tr>
<tr><td>FRID</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">FRID=identifier
Specifies a 1 to 4 character load module name identifying the first format record of the 3886 data set. FRID is mutually exclusive with the FCB parameter.</td></tr>
<tr><td>FUNC</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td></td><td>X</td><td></td><td colspan="2">FUNC={I|R|P|W|D|X|T}
Specifies the type of data set to be opened for the 3305/3525 card reader/card punch. Unpredictable results will occur if coded with other than the 3505/3525 devices.
I data in a data set is to be punched into and printed on cards.
R data set is for reading cards.
P data set is for punching cards.
W data set is for printing.
D data protection for a punch data set.
X data set is for both punching and printing.
T two-line print option.
Default: output data set is P; input data set is R.</td></tr>
<tr><td>GNCP</td><td></td><td></td><td></td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td colspan="2">GNCP=number of channel programs
Specifies the maximum number of input/output macro instructions that will be issued before a WAIT macro instruction.</td></tr>
<tr><td>INTVL</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X</td><td colspan="2">INTVL={integer|0}
Specifies the number of seconds of delay between passes through an invitation list.
Default: 0</td></tr>
</table>

Sub-parameters \ Access Method	BDAM	BISAM	BPAM	BSAM	BTAM	EXCP	GAM	QISAM	QSAM	TCAM	Description of Subparameters
KEYLEN	X		X	X		X		X		X	KEYLEN=number of bytes Specifies the length, in bytes, of the keys used in a data set. The largest number allowed is 255. The key length information can be supplied from the data set label for an existing data set. If a key length is not specified, no input or output requests that require a key can be used.
LIMCT	X										LIMCT=number of blocks or tracks Specifies how many blocks (if relative block addressing is used) or how many tracks (if relative track addressing is used) are to be searched for a free block or available space. This kind of search occurs only when the extended search option is specified (OPTCD=E); otherwise, LIMCT is ignored. If the number specified in the LIMCT subparameter equals or exceeds the number of blocks or tracks in the data set, the entire data set is searched.
LRECL			X	X		X		X	X	X	LRECL=number of bytes Specifies the length, in bytes, for fixed-length records or it specifies the maximum length, in bytes, for variable-length records. The length cannot exceed the blocksize (BLKSIZE) except for variable-length spanned records. For unblocked records with a relative key position (RKP) of zero, the record length includes only the data portion of the record. The record length can be specified only when the data set is being created. LRECL may be coded but will have no effect on EXCP processing. QSAM: LRECL=x Specifies the logical record length when it exceeds the maximum block size for variable-length spanned records.
MODE				X		X			X		MODE= $\left\{ \{C\}\ \{E\} \begin{bmatrix} O \\ R \end{bmatrix} \right\}$ Specifies the mode of operation to be used with a card reader, a card punch, or a card read-punch. C indicates card image (column binary) mode. E indicates EBCDIC mode. O indicates optical mark read mode. R indicates read column eliminate mode. If R is specified then either C or E must be specified. Do not code the MODE subparameter for data entered through the input stream. The subparameters MODE, CODE, DEN, KEYLEN, PRTSP, STACK,,and TRTCH are mutually exclusive. Default: E
NCP		X	X	X							NCP=number of channel programs Specifies the maximum number of READ or WRITE macro instructions that can be issued before a CHECK macro instruction is issued to test for completion of the I/O operation. The largest number that can be specified is 99, but may be less depending on the size of the region or partition. If chained scheduling is used, NCP must be greater than 1. Default: 1
NTM								X			NTM=number of tracks Specifies the number of tracks to be used for a cylinder index. When the specified number of tracks has been filled, a master index is created. This information is required only when the master index option (OPTCD=M) has been selected. If you omit NTM information and OPTCD=M is specified, the master index option is ignored.

Access Method / Sub-parameters	BDAM	BISAM	BPAM	BSAM	BTAM	EXCP	GAM	QISAM	QSAM	TCAM	Description of Subparameters
OPTCD	X	X	X	X	X	X		X	X	X	Specifies the optional services to be performed by the control program. All optional services must be requested by one method, that is, by the problem program, the DCB macro, or the DD DCB parameter. The characters may be coded in any order and when used in combination, no commas are permitted between characters. BDAM: OPTCD= $\left\{\begin{Bmatrix}A\\R\end{Bmatrix}\ [E]\ [F]\ [W]\right\}$ A indicates that the actual device addresses are to be specified in READ and WRITE macro instructions. R indicates that relative block addresses are to be specified in READ and WRITE macro instructions. E indicates that an extended search (more than one track) is to be performed for a block or available space. (LIMCT must be coded but do not code LIMCT=0 because it will cause an ABEND when a READ or WRITE macro instruction is issued.) F indicates that feedback can be requested in READ and WRITE macro instructions and the device address returned is to be in the same form as that presented to the control program. W requests a validity check for write operations on direct access devices.
											BISAM: OPTCD={[L] [R] [W]} L requests that the control program delete records that have a first byte of all ones. (These records can be deleted when space is required for new records. To use the delete option, RKP must be greater than zero for fixed-length records and greater than four for variable-length records.) R indicates that relative block addresses are to be specified in READ and WRITE macro instructions. W requests a validity check for write operations on direct access devices.
											BPAM: OPTCD={C|W|CW} C requests that chained scheduling be used. W requests a validity check for write operations on direct access devices.

											BSAM and QSAM: OPTCD= {B}
											{T}
											{U [C] }
											{C [T][B] }
											{H [Z][B] }
											{W [C][T][B] }
											{Z [C][T][B] }
											{Q [C][T][B] }
											{Z}
											B requests that end-of-file recognition be disregarded for tapes.
											C requests that chained scheduling be used.
											H requests hopper empty exit for Optical Readers or bypass of DOS checkpoint records.
											Q specifies that translation from ASCII input is required or that translation from EBCDIC to ASCII output is required.
											T requests user totaling facility. (T cannot be specified for a SYSIN or SYSOUT data set.)
											U only for 1403 or 3211 printers with the Universal Character Set feature; unblocks data checks and allows analysis by an appropriate error analysis routine. (If U is omitted, data checks are blocked, that is, not recognized as errors.)
											W requests a validity check for write operations on direct access devices.
											Z for magnetic tape input — requests the control program to shorten its normal error recovery procedure. When specified, a data check is considered permanent after five unsuccessful attempts to read a record for direct access storage device input — specifies search direct (SD) for sequential data sets.

Access Method / Sub-parameters	BDAM	BISAM	BPAM	BSAM	BTAM	EXCP	GAM	QISAM	QSAM	TCAM	Description of Subparameters
OPTCD (continued)											BTAM and EXCP: OPTCD=Z Z for magnetic tape input – requests the control program to shorten its normal error recovery procedure. When specified, a data check is considered permanent after five unsuccessful attempts to read a record. BTAM Only: for direct access storage device input – specifies search direct (SD) for sequential data sets.
											QISAM: OPTCD={[I] [L] [M] [R] [U] [W] [Y]} I requests that the problem program use the independent overflow areas for overflow records. L requests that the problem program delete records that have a first byte of all ones. (These records can be deleted when space is required for new records. To use the delete option, RKP must be greater than zero for fixed-length records and greater than four for variable-length records.) M requests that the system create and maintain a master index(es) according to the number of tracks specified in the NTM subparameter. R requests that the control program place reorganization criteria information in certain fields of the data control block. (The problem program can analyze these statistics to determine when to reorganize the data set. This option is provided whenever the OPTCD subparameter is omitted from all sources.) U requests that the system accumulate track index entries in storage and write them as a group for each track of the track index. This can only be specified for fixed-length records. W requests a validity check for write operations on direct access devices. Y requests that the system use the cylinder overflow areas for overflow records.
											TCAM: OPTCD={C|U|W} C specifies that one byte of the work area be used to indicate if a segment of a message is the first, middle, or last segment. U specifies that the work unit to be handled is a message. If U is omitted, the work unit is assumed to be a record. W specifies that the name of each message source is to be placed in an eight-byte field in the work area.
PCI										X	PCI=$\left\{\begin{bmatrix}N\\R\\A\\X\end{bmatrix}\begin{bmatrix},N\\,R\\,A\\,X\end{bmatrix}\right\}$ Specifies whether or not a program-controlled interruption (PCI) is to be used to control the allocation and freeing of buffers; the PCI subparameter also specifies how these operations are to be performed. The operands shown in the format above apply to receiving and sending operations, respectively. N specifies that no PCIs are taken during filling (on receiving operations) or emptying (on sending operations) of buffers. R specifies that after the first buffer is filled or emptied, a PCI occurs during the filling or emptying of each succeeding buffer. The completed buffer is freed, but no new buffer is allocated to take its place. A specifies that after the first buffer is filled or emptied, a PCI occurs during the filling or emptying of the next buffer. The first buffer is freed and a buffer is allocated to take its place. X specifies that after a buffer is filled or emptied, a PCI occurs during the filling or emptying of the next buffer. The first buffer is not freed, but a new buffer is allocated. Default: (A, A)

Sub-parameters \ Access Method	BDAM	BISAM	BPAM	BSAM	BTAM	EXCP	GAM	QISAM	QSAM	TCAM	Description of Subparameters
PRTSP				X		X			X		PRTSP={0|1|2|3} Specifies the line spacing on a printer as 0, 1, 2, or 3. It is valid only if the control characters A and M are not specified in the RECFM subparameter. The subparameters PRTSP, CODE, DEN, KEYLEN, MODE, STACK, and TRTCH are mutually exclusive. 0 specifies that spacing is suppressed. 1 specifies single spacing. 2 specifies double spacing. 3 specifies triple spacing. Default: 1
RECFM	X		X	X		X		X	X	X	Specifies the format and characteristics of the records in the data set. The format and characteristics must be completely described by one source; that is, the problem program, the DCB macro, or the DD DCB parameter. BDAM: RECFM= $\left\{\begin{array}{l} U \\ V\,[S] \\ \quad [BS] \\ F\,[T] \end{array}\right\}$ U indicates that the records are of undefined length. V indicates that the records are of variable length. VS indicates that the records are of variable length, and spanned. VBS indicates that the records are of variable length, blocked and spanned and the problem program must block and segment the records. F indicates that the records are of fixed length. T indicates that the records may be written using the track-overflow feature. Default: undefined-length, unblocked records.
											BPAM: RECFM= $\left\{\begin{array}{l} U\ [T]\ \begin{bmatrix}A\\M\end{bmatrix} \\ V\ \begin{bmatrix}B\\T\\BT\end{bmatrix}\begin{bmatrix}A\\M\end{bmatrix} \\ F\ \begin{bmatrix}B\\T\\BT\end{bmatrix}\begin{bmatrix}A\\M\end{bmatrix} \end{array}\right\}$ A indicates that the record contains American National Standards Institute control characters. B indicates that the records are blocked. F indicates that the records are of fixed length. M indicates that the records contain machine code control characters. T indicates that the records may be written using the track-overflow feature. Chained scheduling (OPTCD=C) will be ignored. U indicates that the records are of undefined length. V indicates that the records are of variable length. Default: U

Sub-parameters \ Access Method	BDAM	BISAM	BPAM	BSAM	BTAM	EXCP	GAM	QISAM	QSAM	TCAM	Description of Subparameters
RECFM (continued)											BSAM, EXCP, and QSAM: RECFM=$\left\{\begin{array}{l} U\ [T] \begin{bmatrix}A\\M\end{bmatrix} \\ B \begin{bmatrix}B\\S\\T\\BS\\BT\\BST\end{bmatrix}\begin{bmatrix}A\\M\end{bmatrix} \\ B \begin{bmatrix}B\\S\\T\\BS\\BT\\BST\end{bmatrix}\begin{bmatrix}A\\M\end{bmatrix}\end{array}\right\}$ For BSAM, EXCP, and QSAM using ASCII data sets on tape: RECFM= $\left\{\begin{array}{l} D\ [B]\ [A] \\ U\ \ \ \ \ [A] \\ F\ [B]\ [A]\end{array}\right\}$ A or M cannot be specified if the PRTSP subparameter is specified. A indicates that the record contains ANSI device control characters. B indicates that the records are blocked. D indicates that the records are variable-length ASCII tape records. F indicates that the records are of fixed length. M indicates that the records contain machine code control characters. S for fixed-length records, the records are written as standard blocks, that is, no truncated blocks or unfilled tracks within the data set, with the exception of the last block or track. For variable-length records, a record can span more than one block. T indicates that the records can be written using the track-overflow feature if required. Chained scheduling (OPTCD=C) will be ignored. U indicates that the records are of undefined length. V indicates that the records are of variable length. Variable length records cannot be used for an ASCII tape data set or for a card reader data set. RECFM=V cannot be used for a 7-track tape unless the data conversion feature (TRTCH=C) is used. Default: U
											QISAM: RECFM= $\left\{\begin{array}{l} V\ [B] \\ F\ [B]\end{array}\right\}$ B indicates that the records are blocked. F indicates that the records are of fixed length. V indicates that the records are of variable length; variable length records cannot be in ASCII. When indexed sequential data sets are created, you can code the RECFM subparameter; when existing indexed sequential data sets are processed, FECFM must be omitted. Default: V
											TCAM: RECFM=$\left\{\begin{array}{l} U \\ V\ [B] \\ F\end{array}\right\}$ B indicates that the records are blocked. F indicates that the records are of fixed length. U indicates that the records are of undefined length. V indicates that the records are of variable length. Default: U
RESERVE										X	RESERVE=(number1,number2) Specifies the number of bytes (from 0 to 255) to be reserved in a buffer for insertion of data by the DATETIME and SEQUENCE macros. number1 indicates the number of bytes to be reserved in the first buffer that receives an incoming message. number2 indicates the number of bytes to be reserved in all the buffers following the first buffer in a multiple-buffer header situation. Default: 0

Access Method / Sub-parameters	BDAM	BISAM	BPAM	BSAM	BTAM	EXCP	GAM	QISAM	QSAM	TCAM	Description of Subparameters
RKP						X			X		RKP=number Specifies the position of the first byte of the record key within each logical record. The beginning byte of a record is addressed as 0. If RKP=0 is specified for blocked fixed-length records, the key begins in the first byte of each record, and the delete option (OPTCD=L) must not be specified. If RKP=0 is specified for unblocked fixed-length records, the key is not written in the data field; the delete option can be specified. For variable-length records, the relative key position must be 4 or greater, when the delete option (OPTCD=L) is not specffied. The relative key position must be 5 or greater if the delete option is specified. When indexed sequential data sets are created, you can code the RECFM subparameter; when existing indexed sequential data sets are processed RECFM must be omitted. Default: 0 RKP can be coded but will have no effect on EXCP processing.
STACK				X		X			X		STACK={1|2} Specifies which stacker bin is to receive a card. The subparameters STACK, CODE, DEN, KEYLEN, MODE, PRTSP, TRTCH are mutually exclusive. Default: 1
THRESH										X	THRESH=number Specifies the percentage of the non-reusable disk message queue records to be used before a flush closedown occurs. Default: closedown occurs when 95% of the records have been used.
TRTCH				X		X			X		TRTCH={C|E|T|ET} Specifies the recording technique for seven-track tape. The subparameters TRTCH, CODE, KEYLEN, MODE, PRTSP, and STACK are mutually exclusive. C specifies that the data conversion feature is to be used, with odd parity and no translation. E specifies even parity, with no translation and no conversion. T specifies that BCDIC to EBCDIC translation is required with odd parity and no data-conversion feature. ET specifies even parity and no conversion with BCDIC to EBCDIC translation required. Default: C

The DDNAME Parameter—*keyword, optional*

The DDNAME parameter allows the postponing of defining a data set until later in the same job step. In the case of cataloged and in-stream procedures, this parameter allows you to postpone defining a data set in the procedure until the procedure is called by a job step.

```
DDNAME=ddname
```

ddname
the name of the DD statement on which the data set is defined.

General Rules for Coding

- Only the DCB subparameters DIAGNS, BLKSIZE, and BUFNO can be coded with the DDNAME parameter. If this subparameter is coded both on the DD statement that contains the DDNAME parameter and on the DD statement that actually defines the data set, the subparameter coded with the DDNAME parameter is ignored.
- You can code the DDNAME parameter up to five times in a job step or procedure step. However, each time the DDNAME parameter is coded, it must refer to a different ddname.
- If the data set, which will be defined later in the job step, is to be concatenated with other data sets, the DD statements that define these other data sets must immediately follow the DD statement that includes the DDNAME parameter.
- The DDNAME parameter cannot appear on a DD statement named JOBLIB, JOBCAT, or STEPCAT.
- The DDNAME parameter cannot refer to a DD statement that has DYNAM coded on it.
- If you postpone the definition of a data set by coding the DDNAME parameter, and then do not define the data set later in the job step, the job step is abnormally terminated.
- The DDNAME parameter is mutually exclusive with the *, AMP, DATA, DISP, DSNAME, DYNAM, FCB, FREE, LABEL, QNAME, SPACE, SYSOUT, UCS, UNIT, and VOLUME parameters. Therefore, do not code these parameters when you code DDNAME.

Rules for Coding Backward References

- In any backward reference to a data set, you must use the ddname of the DD statement containing the DDNAME parameter, **not** the ddname specified in the DDNAME parameter.
- The DD statement that actually defines the data set cannot contain any backward references to a DD statement that follows the one with the DDNAME parameter.

Example of the DDNAME Parameter

The following procedure step is included in a cataloged procedure named CROWE:

```
//PROCSTEP      EXEC    PGM=FLORA
//DD1           DD      DDNAME=DAVE
//POD           DD      DSNAME=JEREMY,DISP=OLD
```

The DD statement named DD1 is meant to contain weekly records, in the form of data in the input stream, that are processed by this step. Since the * and DATA parameters cannot be included in cataloged procedures, the DDNAME parameter is used to postpone defining the data set until the procedure is called by a job step. When calling thc procedure, you would code:

```
//STEPA       EXEC    CROWE
//DAVE        DD      *
              .
              .
              data
              .
              .
/*
```

DD

The DEST Parameter—*keyword, optional*

JES2 and JES3 allow you to route output to specified destinations. The DEST parameter specifies a remote destination (work station), a TSO user's location as the destination, a destination (central computing center), or a specific local device for an output data set.

For further information on the DEST parameter, see "Obtaining Output" for either JES2 and JES3.

```
          JES2            JES3
        { RMTnnn  }     { ANYLOCAL       }
DEST=   { REMOTEn }     { device-name    }
        { LOCAL   }     { device-address }
                        { group-name     }
```

JES2

RMTnnn

where nnn is a 1-3 alphameric or national character string indicating a destination for the output data set.

REMOTEn

where n is an alphameric or national character indicating a destination for the output data set.

LOCAL

a local device is the destination for the output data set.

JES3

ANYLOCAL

any device (either a printer or punch as defined by the output class on the DD statement) attached to the central CPU to received the output data set.

device-name

1-8 alphameric or national character name of a local printer or punch (as defined by the system programming staff) to receive the output data set.

device-address

three character physical device address of the device to receive the output data set.

group-name

name of a group of local devices, an individual remote station, or a group of remote stations to receive the output data sets. Specify LOCAL to define the default group-name for local devices (that is, those local devices that are in no other group).

Default: name of the source of the job (whoever submitted the request).

- If the destination specified is invalid, the job is failed.

Rules for Coding

- The DEST parameter can only be coded on a DD statement that includes the SYSOUT parameter. Otherwise, DEST is syntax-checked and ignored.
- Output destination can also be coded on the JES2 OUTPUT and ROUTE control statements and the JES3 MAIN ORG and FORMAT PR and PU DEST parameters.

Example of the DEST Parameter

```
//JOB01          JOB      ,'REBECCA BARNHARDT',MSGLEVEL=1
//STEP1          EXEC     PGM=INTEREST
//DEB            DD       SYSOUT=A
//GWB            DD       SYSOUT=A,DEST=RMT1
```

In this example, the workstation from which the job was submitted receives the output described by the DEB DD statement. The user identified by the station-id RMT1 receives the output described by the GWB DD statement.

The DISP Parameter—*keyword, optional*

The DISP parameter describes the status of a data set to the system. It also indicates what is to be done with the data set after termination of the job step or job that processes it. You can indicate in the DISP parameter one disposition to apply if the step terminates normally after execution and another to apply if the step terminates abnormally (conditional disposition). For further information on the DISP parameter, see "Disposition Processing".

```
DISP=      [NEW]  [,DELETE  ]  [,DELETE  ]
           [OLD]  [,KEEP    ]  [,KEEP    ]
           [SHR]  [,PASS    ]  [,CATLG   ]
           [MOD]  [,CATLG   ]  [,UNCATLG ]
           [ ,  ]  [,UNCATLG ]
                  [ ,       ]
```

Status

Note: The disposition of a data set is solely a function of the DISP parameter; however, the disposition of the volumes on which the data set resides is a function of the volume status when the volume is demounted.

NEW
specifies that the data set is to be created in this job step.

OLD
specifies that the data set existed before this job step.

SHR
specifies that the data set existed before this job step and can be used simultaneously (shared) by another job, since it will only be read.

MOD
specifies that the read/write mechanism is to be positioned after the last record in the data set. If the system cannot find the data set on the specified volume, MOD specifies that the data set is to be created.

,
specifies that NEW is assumed and that a normal or conditional disposition follows.

Normal Termination Disposition

,DELETE
specifies that the data set is no longer needed and its space on the volume is to be released at the end of this job step for use by other data sets.

,KEEP
specifies that the data set is to be kept on the volume at the end of this job step.

,PASS
specifies that the data set is to be passed for use by a subsequent job step in the same job.

,CATLG
specifies that the data set is to be kept at the end of this job step and an entry pointing to the data set is to be placed in the system or user catalog. Any missing index levels will be created.

,UNCATLG
specifies that the data set is to be kept at the end of this job step but the entry pointing to the data set in the system or user catalog, and unneeded indexes, with the exception of the highest level, are to be deleted.

,

specifies no explicit disposition for the data set, but indicates that a conditional disposition follows. A new data set is deleted and a data set that existed before execution of the job step is kept at step termination.

Abnormal Termination Disposition

,DELETE

specifies that the data set is no longer needed and its space on the volume is to be released for use by other data sets if this step abnormally terminates.

,KEEP

specifies that the data set is to be kept on the volume if this step abnormally terminates.

,CATLG

specifies that an entry pointing to the data set is to be placed in the system or user catalog if this step abnormally terminates. Any missing index levels will be created.

,UNCATLG

specifies that the entry pointing to the data set in the system or user catalog, and unneeded indexes, with the exception of the highest level, are to be deleted if this step abnormally terminates.

General Rules for Coding

- If you code only the first subparameter, you need not enclose it in parentheses.
- If the data set is new, you can omit the subparameter NEW. However, if you specify a disposition or conditional disposition, you must code a comma to indicate the absence of NEW.
- You can omit the DISP parameter if a data set is created and deleted during a job step.
- If you do not want to change the automatic disposition processing performed by the system, you need not code the second subparameter. (When the second subparameter is not coded, the system automatically deletes data sets that did not exist before the job.) If you omit the second subparameter and code a conditional disposition, you must code a comma to indicate the absence of the second subparameter.
- The DISP, SYSOUT, and DDNAME parameters are mutually exclusive: therefore, when SYSOUT or DDNAME is coded, do not code the DISP parameter.
- You must specify a disposition of PASS or DELETE for a temporary data set or a data set with a system-generated name; that is, when DSNAME=dsname or DSN=dsname is omitted from the DD statement. Any other disposition will be overridden by the system with PASS.
- If a job step abnormally terminates and a conditional disposition is not specified, the normal disposition (second subparameter) is processed.
- If a temporary data set name is specified, any conditional disposition other than DELETE is ignored.
- If the data set name has special characters, you must not assign the CATLG disposition to it.
- A data set can only be passed within a job. VSAM data sets cannot be passed.
- If a job step abnormally terminates, conditional dispositions of CATLG, UNCATLG, or DELETE (of a cataloged data set) for unrecieved data sets will not update a user catalog.

Examples of the DISP Parameter

```
//DD2        DD      DSNAME=FIX,UNIT=2400-1,VOLUME=SER=44889,
//                   DISP=(OLD,,DELETE)
```

This DD statement defines an existing data set and implies that the data set is to be kept if the step terminates normally. (For an existing data set, the system assumes it is to keep the data set if no disposition is specified.) The statement requests that the system delete the data set if the step abnormally terminates.

```
//STEP1      EXEC    PGM=FILL
//DD1        DD      DSNAME=SWITCH.LEVEL18.GROUP12,UNIT=2314,
//                   VOLUME=SER=LOCAT3,SPACE=(TRK,(80,15)),DISP=(,PASS)
//STEP2      EXEC    PGM=CHAR
//DD2        DD      DSNAME=XTRA,DISP=OLD
//DD3        DD      DSNAME=*.STEP1.DD1,DISP=(OLD,PASS,DELETE)
//STEP3      EXEC    PGM=TERM
//DD4        DD      DSNAME=*.STEP2.DD3,DISP=(OLD,CATLG,DELETE)
```

The DD statement named DD1 in STEP1 defines a new data set and requests that the data set be passed. If STEP1 abnormally terminates, the data set will be deleted since it is a new data set and a conditional disposition was not specified. The DD statement named DD3 in STEP2 receives the passed data set and requests that the data set be passed. If STEP2 abnormally terminates, the data set will be deleted because of the conditional disposition of DELETE. The DD statement named DD4 in STEP3 receives the passed data set and requests that the data set be cataloged at the end of the step. If STEP3 abnormally terminates, the data set will be deleted because of the conditional disposition of DELETE.

The DLM Parameter—*keyword, optional*

The DLM parameter allows you to use a delimiter other than /* to terminate data defined in the input stream. By assigning a different delimiter in the DLM parameter, you can include a standard delimiter (/*) as data in the input stream.

```
DLM=delimiter
```

delimiter
specifies two characters that will indicate the end of a group of data in the input stream.

Default: /*

Rules for Coding

- For JES2, if the DLM parameter is specified incorrectly, such as misspelling the keyword, then it is ignored. However, if an incorrect delimiter is coded, such as coding a three character delimiter, then the system creates a probable delimiter and scans for it at the end of your data. For JES3, the job is flushed.
- The delimiter can be any two characters.
- If the delimiter contains special characters, enclose them in apostrophes. If you include an ampersand or an apostrophe in the delimiter, you must code each ampersand or apostrophe as two consecutive ampersands or apostrophes.
- The DLM parameter has meaning only on statements defining data in the input stream (DD * and DD DATA statements).
- If you do code the DLM parameter on a DD DATA statement, the characters you assign as delimiters override any delimiter implied by the DD DATA statement. You must terminate the data with the characters you assigned in the DLM parameter.
- If the system encounters an error on the DD statement before the DLM parameter, it will not recognize the value assigned as a delimiter. When the card reader is empty, the input reader device will also cause the system to end an input data set.
- JES2 statements will not be recognized if they are in an input stream.

Example of the DLM Parameter

```
//DD1         DD        *,DLM=AA
              .
              .
              .
              data
              .
              .
AA
```

The DLM parameter assigns the characters AA as the valid delimiter for the data defined in the input stream by DD1. In this case, the characters // would also serve as valid delimiters since a DD * statement was used.

The DSID Parameter—*keyword, optional*

The DSID parameter specifies the data set identifier of an input or output data set on diskette for the 3540 diskette reader or writer utilities. Output data sets to be written to a 3540 diskette must be assigned to an output class that is processed by the diskette writer (an external writer). For the diskette writer to receive data sets, reserved classes for diskette output must be defined. To write data sets on a diskette, the operator must start the diskette writer to a 3540 device.

For more information about associated data sets, refer to the section, "Associated Data Sets (3540 Diskette)" in this book and to **OS/VS2 IBM 3540 Programmer's Reference**, GC24-5111.

```
DSID=( id, [V] )
```

id
specifies the data set identifier. The identifier can be 1 - 8 characters in length. The characters must be alphameric, national, minus (hyphen), or left bracket (12-0 punch). The first character must be alphabetic or national.

V
specifies that the data set label must have been previously verified on a 3741 data entry terminal. (SYSIN only)

General Rules for Coding

- DSID is mutually exclusive with DDNAME, MSVGP, and DYNAM. DSID can be specified with the DD *, DD DATA, and DD SYSOUT parameters; otherwise, it is ignored.
- If only the id is coded, you can omit the parentheses.
- DSID on the DD * or DD DATA statement is ignored except when the JCL is processed by a diskette reader.
- Along with DSID, you can specify volume serial and logical record length information on the DD * and DD DATA statements.

Example of the DSID Parameter

```
//JOB1        JOB         ,,MSGLEVEL=(1,1)
//STEP        EXEC        PGM=AION
//SYSIN       DD          *,DSID=(ABLE,V),VOL=SER=123456,
//                        DCB=LRECL=80
//SYSPRINT    DD          SYSOUT=E,DCB=LRECL=128,DSID=BAKER
```

In this example the input is found on diskette 123456 in data set ABLE and must have been verified. The output will be created on diskette in data set BAKER.

The DSNAME Parameter—*keyword, optional*

The DSNAME parameter specifies the name of a data set. For new data sets, the name specified is assigned to the data set; for existing data sets, the system uses the name to locate the data set on the volume.

For further information on indexed sequential data sets and generation data groups, see "Special Data Sets.". Partitioned data sets are described in **OS/VS Data Management Services Guide**, GC26-3783.

```
{DSNAME} = { dsname                              }
{DSN   }   { dsname(member name)                 }
           { dsname(generation number)           }
           { dsname(area name)                   }
           { &&dsname                            }
           { &&dsname(member name)               }
           { &&dsname(area name)                 }
           { *.ddname                            }
           { *.stepname.ddname                   }
           { *.stepname.procstepname.ddname      }
```

dsname
specifies a data set name.

dsname(member name)
specifies a nontemporary partitioned data set name and the name of a member within that data set.

dsname(generation number)
specifies the name of a generation data group (GDG) and the generation number (zero or a signed integer) of a generation data set within the GDG.

dsname(area name)
specifies the name of a nontemporary indexed sequential data set and an area of that data set (INDEX, PRIME, or OVFLOW).

&&dsname
specifies the name of a temporary data set.

&&dsname(member name)
specifies the name of a temporary partitioned data set and a member within that data set.

&&dsname(area name)
specifies the name of a temporary indexed sequential data set and an area of that data set (INDEX, PRIME, or OVFLOW).

***.ddname**
specifies that the data set name is to be copied for an earlier DD statement in the job step.

***.stepname.ddname**
specifies that the data set name is to be copied from an earlier DD statement, ddname, which appears in an earlier step, stepname, in the same job.

***.stepname.procstepname.ddname**
specifies that the data set name is to be copied from an earlier DD statement in a cataloged procedure. Stepname is the name of the job step that calls the procedure, procstepname is the name of the procedure step that includes the named DD statement, and ddname is the name of the DD statement that contains the data set name.

General Rules for Coding

- The DSNAME parameter can be abbreviated DSN.
- The DSNAME, DSID, and DDNAME parameters are mutually exclusive; therefore, if you code the DDNAME or DSID parameters, do not code the DSNAME parameter.

- If the data set name begins with a blank character, the system assigns the data set a temporary data set name. Blank characters at the end of a data set name are ignored.

Special Characters

- If a data set name includes special characters as part of the name (the characters do not have special significance to the system), you must enclose the name in apostrophes (5-8 punch). If one of the special characters is an apostrophe, identify it by coding two consecutive apostrophes, for example, DSNAME= ’DAYS”END’
- If the only special character is a period or a hyphen, you need not enclose the data set name in apostrophes.
- The following special characters have significance to the system and must not be enclosed in apostrophes: ampersands coded to identify temporary data sets; parentheses enclosing the member name of a partitioned data set, the area name of an indexed sequential data set, or the generation number of a generation data set; and the asterisk, used in the backward reference.
- If a data set is to be cataloged, the data set name cannot contain special characters.

Nontemporary Data Sets

- You can assign a nontemporary data set either an **unqualified** or **qualified** name. An unqualified name consists of 1 to 8 characters. The first character must be an alphabetic or national (@,#,$) character; the remaining characters can be any alphameric or national characters, a hyphen, or a plus zero (12-0) punch. A qualified name consists of multiple names joined by periods. The rules for coding each name within a qualified name are the same as for coding an unqualified name. A qualified data set name can include as many as 44 characters, including periods, unless the data set is a generation data set. Qualified names of generation data groups cannot exceed 35 characters, including periods.

Temporary Data Sets

- You need not code the DSNAME parameter when defining a data set that is created and deleted within a job (a temporary data set). The system will generate a name for the data set.
- If you do code the DSNAME parameter, the data set name consists of 1 to 8 characters and is preceded by two ampersands (& &). The first character following the ampersands must be an alphabetic or national (@,#,$) character; the remaining characters can be any alphameric or national characters, a hyphen, or a plus-zero (12-0) punch. The system generates a qualified name for the temporary data set that begins with SYS and includes the jobname, the temporary name assigned in the DSNAME parameter, and other identifying characters.
- A single ampersand preceding a data set name in a cataloged or in-stream procedure normally signifies a symbolic parameter. However, if no value is assigned to the name on either the EXEC statement that calls the procedure or on a PROC statement within the procedure, the name is treated as a temporary data set name.

Special Data Sets

- An **indexed sequential data set** can be either temporary or nontemporary. If you use only one DD statement to define an indexed sequential data set, omit the area name or code PRIME for the area name; for example, DSNAME=dsname or DSNAME=dsname(PRIME). To retrieve an indexed sequential data set, code only the data set name and omit the area name.

- If you assign a qualified name to a **generation data group**, the qualified name cannot exceed 35 characters, including periods. To retrieve all generations of a generation data group, omit the relative generation number in the DSNAME parameter.

Examples of the DSNAME Parameter

```
//DD1           DD      DSNAME=ALPHA,DISP=( ,KEEP ),
//                      UNIT=2400,VOLUME=SER=389984
```

This DD statement defines a new data set whose name is ALPHA. Later job steps or jobs may retrieve this data set by supplying the data set name in the DSNAME parameter, unit information in the UNIT parameter, and volume information in the VOLUME parameter.

```
//DD2           DD      DSNAME=PDS( PROG12 ),DISP=( OLD,KEEP ),UNIT=2314,
//                      VOLUME=SER=882234
```

This DD statement retrieves a member of a partitioned data set named PDS.

```
//DD3           DD      DSNAME=&&WORK,UNIT=2400
```

This DD statement defines a temporary data set. Since the data set is to be deleted at the end of the job step, the DSNAME parameter can be omitted. However, it may be included to facilitate a later reference to a passed data set; for example, DSNAME= & & WORK,DISP=OLD, in which case you must add DISP=(,PASS) to DD3.

```
//STEP1     EXEC    PGM=CREATE
//DD4       DD      DSNAME=&&ISDATA( PRIME ),DISP=( ,PASS ),UNIT=( 2311,2 ),
//                  SPACE=( CYL,( 10,,2 ),,CONTIG ),VOLUME=SER=33489,
//                  DCB=DSORG=IS
//STEP2     EXEC    PGM=OPER
//DD5       DD      DSNAME=*.STEP1.DD4,DISP=( OLD,DELETE )
```

The DD statement named DD4 in STEP1 defines a temporary indexed sequential data set whose name is ISDATA. This DD statement is used to define all of the areas of an indexed sequential data set. The DD statement named DD5 in STEP2 retrieves the data set by referring to the earlier DD statement that defines the data set. Since the temporary data set will be passed when it is defined in STEP1, STEP2 can retrieve the data set.

The DUMMY Parameter—*positional, optional*

The DUMMY parameter specifies that:

- No device or external storage space is to be allocated to the data set.
- No disposition processing is to be performed on the data set.
- For BSAM and QSAM, no input or output operations are to be performed on the data set.

  For further information on the DUMMY parameter, see "Defining a Dummy Data Set."

```
//ddname         DD        DUMMY
```

General Rules for Coding

- Code the DUMMY parameter by itself or follow it with all the parameters you would normally code when defining a data set, except the DDNAME parameter. The DDNAME and DUMMY parameters are mutually exclusive.
- Code the DCB parameter if you would code it for normal I/O operations. DCB information can be established in the DUMMY DD statement.
- Code AMP=ORG if you are using VSAM and specify DUMMY for a data set.
- If you used the DUMMY parameter to test a program, when you want input or output operations performed on the data set, replace the DD statement that contains the DUMMY parameter with a DD statement that contains all of the parameters required to define this data set.
- When nullifying a procedure DD statement that contains the DUMMY parameter, code the DSNAME parameter on the overriding DD statement. However, be sure that the data set name is not NULLFILE. Assigning the name NULLFILE in the DSNAME parameter has the same effect as code DUMMY.
- If you code the DUMMY parameter and also request an access method other than the basic sequential access method (BSAM) or queued sequential access method (QSAM) to read or write the data set, or if the DUMMY parameter is coded and the access method of BDAM load mode (BSAM with DCB MACRF=WL) is requested, a programming error will occur.
- Besides bypassing input or output operations on a data set, the DUMMY parameter causes the UNIT, SPACE, and DISP parameters, when coded on the DD DUMMY statement, to be ignored; however, these parameters are checked for syntax.
- Backward references: If you code DUMMY on a DD statement and a later DD statement in the same job refers to this DD statement when requesting unit affinity (UNIT=AFF=ddname) or volume affinity (VOLUME=REF=*.stepname.ddname), the data set defined on the later DD statement will be assigned a dummy status.
- Data sets concatenated to a DUMMY data set will also be treated as a DUMMY data set by the system.
- If you use DD DUMMY and either VOL=REF=dsname or DCB=REF=dsname, then the referenced dsname must be cataloged or passed or the job will fail.

Examples of the DUMMY Parameter

```
//OUTPUT        DD      DUMMY,DSNAME=X.X.Z,UNIT=2314,
//                      SPACE=(TRK,(10,2)),DISP=(,CATLG)
```

This DD statement defines a dummy data set. The parameters coded with the DUMMY parameter will not be used.

```
//IN         DD       DUMMY,DCB=(BLKSIZE=800,LRECL=400,RECFM=FB)
```

This DD statement defines a dummy data set. The DCB parameter will supply information that was not supplied in the DCB macro instruction for the data control block. Otherwise, abnormal termination may occur.

If you are calling a cataloged procedure that contains the following DD statement in STEP4,

```
//IN         DD       DUMMY,DSNAME=ELLN,DISP=OLD,VOL=SER=11257,UNIT=2314
```

you can nullify the effects of the DUMMY parameter by coding:

```
//STEP4.IN      DD      DSNAME=ELLN
```

If you are calling a cataloged procedure that contains the following DD statement in STEP1,

```
//TAB        DD       DSNAME=APP.LEV12,DISP=OLD
```

you can make this DD statement define a dummy data set by coding:

```
//STEP1.TAB     DD      DUMMY
```

If you are calling a cataloged procedure that contains the following DD statement in a procedure step named LOCK,

```
//MSGS       DD       SYSOUT=A
```

you can make this DD statement define a dummy data set by coding:

```
//LOCK.MSGS     DD      DUMMY
```

The DYNAM Parameter—*positional, optional*

The DYNAM parameter specifies that a resource can be held in anticipation of reuse.

For further information, see "Dynamically Allocating and Deallocating Data Sets."

```
//ddname        DD      DYNAM
```

Rules for Coding

- Do not code any other parameters with the DYNAM parameter.
- Do not use the DDNAME parameter to refer to a DD DYNAM statement.
- To nullify the DYNAM parameter in a cataloged procedure, code the SYSOUT or DSNAME parameter in the overriding DD statement, but do not use the DSNAME=NULLFILE.
- Coding DYNAM on DD statements that will require dynamic allocation no longer establishes this DD statement as a DUMMY request. Rather, the number of DYNAM requests are added to the DYNAMNBR value only to acquire a control value necessary to track the resources to be held for reuse.
- Do not use any type of DD parameter referback to a DD DYNAM statement.
- Do not code the DYNAM parameter on the first DD statement of a group of DD statements defining a data set concatenation.
- Do not code the DYNAM parameter on a DD statement having a ddname that is meaningful to the system; for example, JOBLIB, SYSCHK, etc.

Example of the DYNAM Parameter

```
//INPUT      DD       DYNAM
```

This statement specifies that the control value for dynamically allocated resources held for reuse is incremented by one for dynamic allocation.

The FCB Parameter—*keyword, optional*

The FCB parameter specifies the forms control image to be used to print an output data set on a 3211 or 1403 printer, the data protection image to be used for the 3525 card punch or for SYSOUT.

For further information on the forms control buffer, see **OS/VS2 System Programming Library: Data Management**, GC26-3830 and **OS and OS/VS Programming Support for the IBM 3505 Card Reader and IBM 3525 Card Punch**, GC21-5097.

```
FCB=( image-id  [,ALIGN ]  )
                [,VERIFY]
```

image-id
specifies 1-4 alphameric or national characters that identify the image to be loaded into the forms control buffer. The first character must be alphabetic or national.

ALIGN
requests that the operator check the alignment of the printer forms before the data set is printed.

VERIFY
requests that the operator verify that the image displayed on the printer is the desired one. The operator is also given an opportunity to align the printer forms.

Default: For 3211, the image currently in the buffer. If one is not there, the operator will be requested to specify an image. For JES2, the buffer value must have a default flag. For JES3, the FCB parameter defaults to an installation-defined default or by job class.

Rules for Coding

- The ALIGN and VERIFY subparameters are ignored for SYSOUT data sets.
- If you do not code ALIGN or VERIFY, you need not enclose the image-id in parentheses.
- The FCB parameter is ignored for the 3525 for SYSOUT only and is saved by JES2 and JES3 and is used either to request a carriage tape for a non-FCB printer or to load the FCB on a printer having the FCB feature.
- The FCB parameter is mutually exclusive with the DDNAME parameter and the DCB subparameters RKP, CYLOFL, INTVL, and FRID. Therefore, if you code the DDNAME parameter or one of the DCB subparameters (RKP, CYLOFL, INTVL, or FRID), do not code the FCB parameter or the job will abnormally terminate.
- STD1 and STD2 should not be used for SYSOUT unless specified by your installation.

Examples of the FCB Parameter

```
//DD1          DD      UNIT=3211,FCB=(IMG1,VERIFY)
```

This DD statement defines the output data set that is to be written to a 3211 printer. The FCB parameter requests that the data set be written using the control information corresponding to the forms control image with the code IMG1. Since VERIFY is coded, the forms control image will be displayed on the printer before the data set is printed and the operator will be asked to align the printer forms.

```
//DD2             DD      SYSOUT=A,FCB=IMG2
```

If output class A routes output to a printer having the forms control buffer feature, JES2 loads the image identified by IMG2 into the forms control buffer. If the printer does not have the forms control buffer feature, the operator receives a message to mount the specified carriage tape (in this case, IMG2) on the printer.

```
//OUTPUT          DD      UNIT=3211,FCB=(6,ALIGN)
```

This DD statement requests that the operator check the alignment of the printer forms before the data set is printed.

```
//PUNCH           DD      UNIT=3525,FCB=DP2
```

The unit specification is for the 3525 card reader. Therefore, the FCB parameter is defining the data protection image to be used for the 3525.

The FREE Parameter—*keyword, optional*

The FREE parameter causes deallocation when the data set defined by a DD statement is closed.

Code CLOSE whenever you don't want to monopolize resources — for example, devices, volumes, exclusive access rights to a data set—any longer than necessary.

```
FREE=  {END  }
       {CLOSE}
```

END
specifies that the data set is to be deallocated at the end of the step.

CLOSE
specifies that the data set is to deallocated at the time it is closed.

Default: END

- If the value is incorrectly coded, the default value is substituted and a warning message is issued.

Rules for Coding

- Code the FREE=CLOSE parameter on a SYSOUT DD statement to cause JES2 and JES3 to spin off the data set.
- FREE=CLOSE should not be specified for a data set that is opened and closed more than once during a job step. If the data set is reopened, the job step will abnormally terminate unless there is an intervening dynamic allocation.
- FREE and DDNAME are mutually exclusive parameters; therefore, if you code FREE, do not code DDNAME or your job will abnormally terminate.
- FREE=CLOSE is mutually exclusive in a DD statement that also contains DYNAM, DATA, or *. It is ignored for a DD statement that also has a ddname of JOBCAT, JOBLIB, STEPCAT, or STEPLIB, or that is a member of a concatenated group.

Example of the FREE Parameter

```
//EA33       DD       SYSOUT=D,FREE=CLOSE
```

The data set allocated to class D will be deallocated and spun off (available for printing) when the data set is closed rather than at the end of the job.

```
//EA33       DD       DSN=SYBIL,DISP=OLD,FREE=CLOSE
```

The data set is dequeued when deallocated and available for someone else to use.

The HOLD Parameter—*keyword, optional*

The HOLD parameter specifies that an output data set is to be held on a queue until released by a central or remote operator at the target destination, or by the time-sharing user who is eligible to free the data set. If you are receiving the output at the destination (work station) you should inform either the central operator or the work station to which the output will be sent to release the data set for processing.

For further information on the HOLD parameter, see "Obtaining Output" for either JES2 or JES3.

```
HOLD= {YES}
      {NO }
```

YES
specifies that processing of the output data set is to be deferred until the data set is released.

NO
specifies that processing of the output data set is to proceed normally.

Default: NO

- If an incorrect value is coded, the default is assumed and a warning message is issued. The job continues.

Rule for Coding

- The HOLD parameter can be coded only on a DD statement that includes the SYSOUT parameter. Otherwise, it is ignored.

Example of the HOLD Parameter

```
//JOB01     JOB     ,'HAROLD DUQUETTE',MSGLEVEL=1
//STEP1     EXEC    PGM=MJCOSCO
//DD1       DD      SYSOUT=B,DEST=RMT6,HOLD=YES
```

The output from JOB01 will be held on a queue until the user identified by RMT6 or the central or remote operator requests that the data set be released.

The LABEL Parameter—*keyword, optional*

The LABEL parameter indicates the type and contents of the label or labels associated with a data set.

For detailed information on tape label definitions and processing, see **OS/VS Tape Labels**, GC26-3795; labels on direct access devices are described in **OS/VS Data Management Services Guide**, GC26-3783. A detailed description of protecting a data set by assigning a password is included in **OS/VS2 System Programming Library: Data Management**, GC26-3830.

```
LABEL=([data set sequence number] [,SL  ] [,PASSWORD] [,IN ] [,RETPD] )
                                  [,SUL ] [,NOPWREAD] [,OUT] [,EXPDT]
                                  [,AL  ] [,        ] [,   ]
                                  [,AUL ]
                                  [,NSL ]
                                  [,NL  ]
                                  [,BLP ]
                                  [,LTM ]
                                  [,    ]
```

data set sequence number
specifies the relative position of a data set on a tape volume.

SL
specifies that a data set has IBM standard labels.

SUL
specifies that a data set has both IBM standard and user labels.

AL
specifies that a tape data set has American National standard labels.

AUL
specifies that a tape data set has American National standard and user labels.

NSL
specifies that a tape data set has nonstandard labels.

NL
specifies that a tape data set has no labels.

BLP
specifies that the system is to bypass label processing for a tape data set.

LTM
specifies that the data set can have a leading tapemark.

,
specifies that a data set has only IBM standard labels and another subparameter follows.

PASSWORD
specifies that a data set cannot be read, changed, deleted, or written to unless the operator or time-sharing user supplies the correct password.

NOPWREAD
specifies that a data set cannot be changed, deleted, or written to unless the operator or time-sharing user supplies the correct password. No password is necessary for reading the data set.

,
specifies that another subparameter follows and, for a new data set, the data set is not to be password-protected.

IN

specifies that a BSAM data set is to be processed for input only. This subparameter overrides the INOUT option in the OPEN macro instruction.

OUT

specifies that a BSAM data set is to be processed for output only. This subparameter overrides the OUTIN option in the OPEN macro instruction.

,

specifies that either the RETPD or EXPDT subparameter follows and one or more subparameters precede it.

EXPDT=yyddd

specifies the date that the data set can be deleted or written over by another data set. Assign a 2-digit year number and a 3-digit day number. For example, February 2, 1973 would be specified as 73033.

RETPD=nnnn

specifies the number of days that the data set must be kept before it can be deleted or written over by another data set.

General Rules for Coding

- All the subparameters except the last subparameter in the LABEL parameter are positional. Therefore, if you code one subparameter and omit a previous subparameter, indicate its absence with a comma.
- If you only want to specify the data set sequence number, RETPD, or EXPDT, you can omit the parentheses and code LABEL=data set sequence number, LABEL=RETPD=nnnn, or LABEL=EXPDT=yyddd.
- The LABEL, DDNAME, and SYSOUT parameters are mutually exclusive. If DDNAME or SYSOUT is coded, do not specify LABEL.
- Do not specify both the DCB FUNC subparameter and the LABEL parameter; unpredictable results will occur.

Data Set Sequence Number Subparameter

- Default: If you omit this subparameter or code 0, the system assumes that this is the first data set on the tape volume, unless the data set is passed or cataloged. If a data set is cataloged, the system obtains the data set sequence number from the catalog. The data set sequence number for a passed data set is obtained from the passing step.
- The data set sequence number is a 1- to 4-digit number.

Label Type Subparameter

- Default: If you omit this subparameter, the system assumes that the data set has only IBM standard labels (SL).
- Data sets on direct access devices always have standard labels; they can optionally have user labels also. Therefore, only SL or SUL can be coded for data sets on direct access devices. SUL cannot be coded for partitioned or indexed sequential data sets.
- Label type information is not retained for cataloged or passed data sets. You must code the LABEL parameter and specify label type if you refer to a cataloged or passed data set that does not have IBM standard labels only.
- If the system does not have the bypass-label-processing (BLP) feature, specifying BLP has the same effect as specifying NL.
- If you specify BLP and the tape volume has labels, a tapemark delimits the data set. For a tape with labels to be positioned properly, the data set sequence number subparameter must be coded and must reflect all labels and data sets that precede the desired data set.
- If you are processing ASCII data on unlabeled tapes (NL), you must code OPTCD=Q in the DCB macro instruction or in the DCB parameter on the DD statement.

- Direct access devices used when referring the system to an earlier volume request, obtain label type information from the LABEL parameter specified in the DD statement and not from the source you refer it to.

PASSWORD and NOPWREAD (no-password-read) Subparameters

- Only data sets with IBM or American National standard labels can be password-protected.
- When adding or increasing password protection for an existing data set by coding PASSWORD or NOPWREAD, you must open the data set for output processing the first time it is used during the job step.
- When specifying PASSWORD or NOPWREAD for a data set, a password must be assigned to that data set in the PASSWORD data set. If a password is not assigned, attempts to open that data set for output (if NOPWREAD is coded) or for input or output (if PASSWORD is coded) result in abnormal termination.

IN and OUT Subparameters

- When the IN subparameter is coded, any attempt by the processing program to process the data set for output results in abnormal termination. If OUT is coded and the processing program attempts to process the data set for input, the step is abnormally terminated.

RETPD and EXPDT Subparameters

- To delete a data set before the expiration date or retention period has passed, use the DELETE command, as described in **OS/VS Access Method Services**, or the IEHPROGM program, as described in **OS/VS2 System Programming Library: Service Aids.**
- Do not specify or imply RETPD or EXPDT for a temporary data set.

Examples of the LABEL Parameter

```
//DD1          DD       DSNAME=HERBI,DISP=(NEW,KEEP),UNIT=TAPE,
//                      VOLUME=SER=T2,LABEL=(3,NSL,RETPD=188)
```

This DD statement defines a new data set. The LABEL parameter tells the system: (1) this data set is to be the third data set on the tape volume; (2) this tape volume has nonstandard labels; (3) this data set is to be kept for 188 days.

```
//DD2          DD       DSNAME=A.B.C,DISP=(,CATLG,DELETE),UNIT=2400=2,
//                      LABEL=(,NL)
```

This DD statement defines a new data set and requests that the system catalog it. The catalog entry for this data set will not indicate that the data set has no labels. Therefore, each time this data set is referred to by a DD statement, the statement must include LABEL=(,NL).

```
//DD3          DD       DSNAME=SPECS,UNIT=2400,VOLUME=SER=10222,
//                      DISP=OLD,LABEL=4
```

This DD statement defines an existing data set. The LABEL parameter indicates that the data set is the fourth data set on the tape volume.

```
//STEP1        EXEC     PGM=FIV
//DDX          DD       DSNAME=CLEAR,DISP=(OLD,PASS),UNIT=2400-4,
//                      VOLUME=SER=1257,LABEL=(,NSL)
//STEP2        EXEC     PGM=BOS
//DDY          DD       DSNAME=*.STEP1.DDX,DISP=OLD,LABEL=(,NSL)
```

The DD statement named DDX in STEP1 defines an existing data set that has nonstandard labels and requests that the system pass the data set. The DD statement named DDY in STEP2 receives the passed data set. Unit and volume information is not specified since this information is available to the system; the label type is not available to the system and must be coded.

The MSVGP Parameter—*keyword, optional*

The MSVGP parameter specifies the identification of a group of mass storage volumes that reside on a mass storage system (MSS) device.

```
MSVGP=id
```

id

indicates a 1-8 alphameric or national character identifier (in any order) that defines the mass storage volume group.

General Rules for Coding

- MSVGP is ignored for specific volume requests. The following rules apply only to nonspecific volume requests.
- MSVGP is mutually exclusive with the SYSOUT, COPIES, QNAME, DDNAME, DSID, DYNAM, *, and DATA parameters and the SPACE ABSTR and VOL=SER subparameters.
- Positional parameters related to the VOLUME parameter can be specified with MSVGP.
- The SPACE parameter is not required when MSVGP is used on nonspecific requests except for BPAM and ISAM data organization.
- The unit count in the UNIT parameter must be less than the volume count in the VOLUME paramter to guarantee allocation of a non-sharable unit.
- MSVGP results in a private volume for nonspecific volumes; therefore, coding VOL=PRIVATE is redundant.
- For a new, nonspecific, permanent data set request where MSVGP is not specified, a mounted 3330V storage volume is used, if one exists. If one does not exist, a volume is selected from SYSGROUP. If a volume is selected from SYSGROUP, the SPACE parameter must be coded or the job is failed.
- For a new, nonspecific, temporary data set request where MSVGP is not specified, a mounted 3330V public or storage volume is used, if one exists. If one does not exist or there is not enough space, a volume is selected from SYSGROUP.
- To guarantee allocation to SYSGROUP for nonspecific requests, specify MSVGP=SYSGROUP.

Example of the MSVGP Parameter

```
//DD1    DD  DSN=ACCOUNT,DISP=(NEW,CATLG),UNIT=3330V,
//           MSVGP=AB$1234@,VOLUME=(,,3)
```

A new, cataloged data set is to be created on one, two, or three mass storage volumes in the group called AB$1234@. (The installation has previously defined such a group using a mass storage system service and has assigned at least three volumes to this group.) Assume that this utility also provides a space default of SPACE=(CYL,(200,100)).

The system will first mount any other specific mass storage volumes required for this step. This assumes a reference to all old data sets in the catalog and a request for parallel mounting if they are multivolume. This ensures that remaining unmounted volumes in the group AB$1234@ do not contain other data sets required by this step.

The system now selects an unused 3330V device to allocate to this job step. The unit will be marked private because MSVGP was specified. It will also be marked non-sharable because the volume count exceeds the unit count. The system then selects a volume from the remaining volumes in the group that contains at least 200 cylinders of contiguous space and causes it to be mounted on the allocated unit.

During step execution, if more than 200 cylinders are required, end of volume is entered. If 100 more cylinders are not available on the mounted volume, it is dismounted. The system again selects a volume from group AB$1234@ that has at least 100 contiguous cylinders and causes this volume to be mounted. A volume count of three will allow the data set to extend over up to three volumes. If more are required, the step abnormally terminates.

The OUTLIM Parameter—*keyword, optional*

The OUTLIM parameter specifies a limit for the number of logical records you want included in the output data set being routed through the SYSOUT data set, When the limit is reached, an exit may be taken to a user-supplied routine that determines whether to cancel the job or increase the limit. If the exit routine is not supplied, the job is terminated. For more information, see **OS/VS System Management Facilities (SMF)**, GC35-0004.

```
OUTLIM=number
```

number
specifies any number between 1 and 16777215, indicating the maximum number of logical records to be included in the output data set being routed through the output stream.

Default: For JES2 no output limiting; for JES3, it is an installation default.

Rules for Coding

- The OUTLIM parameter is ignored unless SYSOUT is coded in the operand field of the same DD statement.
- The OUTLIM and DDNAME parameters are mutually exclusive. Do not code them together on one DD statement or your job will abnormally terminate.

Example of the OUTLIM Parameter

```
//OUTPUT    DD      SYSOUT=F,OUTLIM=1000
```

The limit for the number of logical records is 1000.

The QNAME Parameter—*keyword, optional*

The QNAME parameter allows you access to messages received through TCAM for processing by an application program.

```
QNAME=process name
```

process name
specifies as eight alphameric or national characters the name of a TPROCESS macro instruction that defines a destination queue for messages that are to be processed by an application program. (The first character must be alphabetic or national).

Rules for Coding

- The process name must be identical to the symbolic name on the TPROCESS macro.
- The DCB parameter is the only parameter that can be coded on a DD statement with the QNAME parameter. BLKSIZE, BUFL, LRECL, OPTCD, and RECFM are the only operands that can be specified as subparameters.

Example of the QNAME Parameter

```
//DYD         DD        QNAME=FIRST,DCB=(RECFM=F,LRECL=80,BLKSIZE=320)
```

This DD statement is used in an application program to define data that will be used by TCAM. "FIRST" is the name of the TPROCESS macro that specifies the destination queue through which messages that must be processed by the application program will be routed. The DCB parameter will supply information that was not supplied in the DCB macro instruction for the data control block.

The SPACE Parameter—*keyword, optional*

The SPACE parameter indicates how much space should be allocated on a direct access volume for a new data set.

```
{SPACE=({TRK        } ,(primary quantity [,secondary quantity] [,directory]) [,RLSE] [,CONTIG] [,ROUND]))}
{       {CYL        }                    [,                  ] [,index    ]  [,    ] [,MXIG  ]           }
{       {blocklength}                                                                [,ALX   ]           }
{                                                                                    [,      ]           }
{SPACE=(ABSTR,(primary quantity,address [,directory] ))                                                  }
{                                       [,index    ]                                                     }
```

TRK
  specifies that space is to be allocated by track.

CYL
  specifies that space is to be allocated by cylinder.

block length
  specifies the average block length of the data. The system computes how many tracks to allocate.

primary quantity
  specifies how many tracks or cylinders are to be allocated, or how many blocks of data are to be contained in the data set.

secondary quantity
  specifies how many more tracks or cylinders are to be allocated if additional space is required. This allocation can be done up to 16 times for each volume, less the number of extents for primary quantity and user-label space (BDAM data sets cannot be extended.)

,
  specifies that the system is not to allocate additional space if it is required, and that either a directory space requirement or index space requirement follows.

directory
  specifies the number of 256-byte records that are to be contained in the directory of a partitioned data set.

index
  specifies how many cylinders are required for the index of an indexed sequential data set. The number of tracks must equal one or more cylinders.

RLSE
  specifies that space allocated to an output data set that is not used when the data set is closed, is to be released.

,
  specifies that unused allocated space that is not used, is not to be released and that another subparameter follows.

CONTIG
  specifies that space allocated to the data set must be contiguous. This subparameter applies only to the primary space allocation.

MXIG
  specifies that the space allocated to the data set must be the largest area of contiguous space on the volume, and the space must be equal to or greater than the space requested. This subparameter applies only to the primary space allocation.

ALX
specifies that up to five different contiguous areas of space are to be allocated to the data set and each area must be equal to or greater than the space requested. This subparameter applies only to the primary space allocation.

,
specifies that CONTIG, MXIG, or ALX is not specified and that the ROUND subparameter follows.

ROUND
specifies that space is requested by specifying the average block length of the data and that the space allocated to the data set must be equal to an integral number of cylinders.

ABSTR
specifies that the data set is to be placed at a specific location on the volume.

primary quantity
specifies the number of tracks to be allocated to the data set.

address
specifies the track number of the first track to be allocated.

directory
specifies the number of 256-byte records in the directory of a partitioned data set.

index
specifies the number of tracks that are required for the index of an indexed sequential data set. The number of tracks must be equal to one or more cylinders.

General Rules for Coding

- The SPACE and DDNAME parameters are mutually exclusive.
- The SPACE parameter has no meaning for tape volumes; however, if you assign a data set to a device class that contains both direct access devices and tape devices, (for example, UNIT=SYSSQ) you should code the SPACE parameter.
- If you do not code secondary, directory, or index quantities, you need not enclose the primary quantity in parentheses.
- Code the second format of the SPACE parameter when you want a data set placed in a specific position on a direct access volume.

Rules for coding when using mass storage volumes (new data sets only)

- The SPACE parameter must be coded when VOL=SER is coded. It is optional when MSVGP is coded. If you do not code VOL=SER or MSVGP, SPACE must be coded whether or not you code VOL=PRIVATE.
- Contiguous space is the MSVGP default. If you want non-contiguous primary space allocation, you must specify the SPACE parameter.

Blocklength

- When you request space in units of blocks, the average blocklength cannot exceed 65,535.
- If the blocks have keys, code the DCB subparameter KEYLEN on the DD statement and specify the key length.

Primary Quantity

- There must be enough available space on one volume to satisfy the primary quantity. If you request a particular volume and there is not enough space available on the volume to satisfy your request, the job step is terminated. You must consider track overflow when computing track requirements.
- When specifying tracks and cylinders, the primary quantity includes the number of tracks and cylinders assigned to the directory.

Secondary Quantity

- The system computes the number of tracks required for the secondary quantity based on what is specified in the DCB subparameter BLKSIZE, the DCB macro, or the SPACE parameter (average blocksize).
- If you do specify a secondary quantity and the data set requires additional space, the system allocates this space based on the quantity you specified. The system attempts to allocate the secondary quantity in contiguous tracks or cylinders. If contiguous space is not available, the system attempts to allocate the secondary quantity in up to five noncontiguous blocks (extents) of space.
- Each time the data set requires more space, the system allocates the secondary quantity. This space is allocated on the same volume on which the primary quantity was allocated until: (1) there is not enough space available on the volume to allocate the secondary quantity, or (2) a total of 16 extents have been allocated to the data set. If either of these conditions is satisfied, the system must allocate the secondary quantity on another volume. You can specify this for a volume request by coding more than one volume in the VOLUME parameter.
- If there is no more space available on those volumes that you requested, if at least one volume is demountable, the system will request that scratch (non-specific) volumes be mounted until the secondary allocation is complete. If there is no demountable volume, the job step will abnormally terminate.

Directory

- When creating a partitioned data set, you must request space for a directory.

RLSE

- If you specify RLSE and an abnormal termination occurs, unused space is not released.
- The RLSE subparameter is ignored when the TYPE=T option is coded in the CLOSE macro instruction.

MXIG, ALX, and CONTIG

- Do not code either the MXIG or ALX subparameters for an indexed sequential data set.
- If CONTIG is specified and contiguous space is not available, the job is terminated.
- If you code a secondary quantity and request contiguous space, the primary request will be satisfied with contiguous space, but the secondary quantity will not necessarily be contiguous.

Examples of the SPACE Parameter

```
//DD1          DD       DSNAME=&&TEMP,UNIT=MIXED,SPACE=(CYL,10)
```

This DD statement defines a temporary data set and requests that the system assign any available tape or direct access volume. (UNIT=MIXED specifies a user-assigned group name of units that consists of tape and direct access devices). If a tape volume is assigned, the SPACE parameter will be ignored; if a direct access volume is assigned, the SPACE parameter will be used to allocate space to the data set. The SPACE parameter includes only the required subparameters (that is, the type of units and a primary quantity), and requests that the system allocate 10 cylinders.

```
//DD2          DD       DSNAME=PDS12,DISP=(,KEEP),UNIT=2314,
//                      VOL=SER=25143,SPACE=(CYL,(10,,10),,CONTIG)
```

This DD statement defines a new partitioned data set. The system will allocate 10 cylinders to the data set and ten 256-byte records for a directory. Since the CONTIG subparameter is coded, the system will allocate 10 contiguous cylinders on the volume.

```
//REQUEST      DD       DSNAME=PET,DISP=NEW,UNIT=3330,VOL=SER=606674,
//                      SPACE=(1024,(75)),DCB=KEYLEN=8
```

The average blocklength of the data is 1024 bytes and 75 blocks of data are expected as output. Each block is preceded by a key eight bytes long. The system computes how many tracks are needed, depending on what device is requested in the UNIT parameter.

The SYSOUT Parameter—*keyword, optional*

The SYSOUT parameter assigns an output class to an output data set.

For further information on the SYSOUT parameter, see "Obtaining Output" for either JES2 or JES3.

```
SYSOUT=(class name ┌,program name┐ ┌,form name┐ )
                   └,            ┘ └,code name┘
```

class name
specifies as an alphameric character (A-Z, 0-9) or * the class associated with the output device to which you want your output data set written.

program name
specifies the member name of an installation-written program in the system library that is to write the output data set, instead of JES2 or JES3. If a user-written writer is specified, it is executed under the control of an external writer rather than by JES2 or JES3. Notify the operator that such a data set exists so he will start an external writer. Two names, INTRDR and STDWTR are reserved for JES2 and JES3. (For their use and definition, see **OS/VS2 System Programming Library: Job Management**, GC28-0627.)

form name
is a 1-4 alphameric or national character string that specifies that the output data set should be printed or punched on a special output form.

code name
(JES2 only) is a 1-4 alphameric or national character string that points to the OUTPUT statement from which output characteristics will be obtained.

General Rules for Coding

- If you omit program name and form name, you need not enclose the class name in parentheses.
- The OUTLIM, UCS, FCB, HOLD, FREE, COPIES, DSID, and DCB parameters can be coded with the SYSOUT parameter. Besides the mutually exclusive parameters listed next, other parameters coded with the SYSOUT parameter are ignored.
- The DISP, DDNAME, VOLUME, LABEL parameters and the SYSOUT parameter are mutually exclusive.
- To print the output data set and the messages from your job on the same output listing, specify the same output class in the SYSOUT parameter as you specified for messages in the MSGCLASS parameter. Or, specify SYSOUT=* for all data sets you want to default to the MSGCLASS output class.
- INTRDR causes the data set to be treated as a job stream.

Examples of the SYSOUT Parameter

```
//DD1        DD       SYSOUT=P
```

This statement specifies that the data set is to be written to the device corresponding to class P.

```
//JOB50      JOB      ,'C. BROWN',MSGCLASS=C
//STEP1      EXEC     PGM=SET
//DDX        DD       SYSOUT=C
```

The DD statement named DDX specifies that the data set is to be written to the device corresponding to class C. Since the classnames in the SYSOUT parameter and the MSGCLASS parameter on the JOB statement are the same, the system messages resulting from this job and the output data set can be written to the same unit record device.

```
//DD5        DD       SYSOUT=(F,,2PRT)
```

This DD statement specifies that the data set is to be written to the device corresponding to class F and the output data set is to be printed on a special form. The form name is 2PRT.

S

The TERM Parameter—*keyword, optional*

The TERM parameter notifies the operating system that a data set is coming from or going to a time-sharing terminal.

```
TERM=TS
```

TS
indicates to the system that the input or output data being defined is coming from or going to a time sharing terminal.

Rules for Coding

- Concatenate a DD statement with a DD statement that contains TERMS=TS only if it is the last DD statement in a job step.
- Code only the DCB parameter with the TERM parameter. Any other parameters coded on a DD statement with TERM are ignored.
- If you code TERM on a SYSOUT DD statement and if the job is from a foreground terminal, the output goes to the terminal; if the job is submitted in batch, the output goes to whatever has been designated as the output device according to the definition given to SYSOUT.

Examples of the TERM Parameter

```
//DD1        DD       TERM=TS
```

This data set (DD1) is either coming from or going to a time-sharing terminal.

```
//DD3        DD       UNIT=2400,DISP=(MOD,PASS),TERM=TS,LABEL=(,NL),
//                    DCB=(LRECL=80,BLKSIZE=80)
```

All of the parameters in this example except TERM and DCB are ignored.

The UCS Parameter—*keyword, optional*

The UCS parameter describes the character set to be used for printing an output data set on a 1403 or 3211 printer or for SYSOUT.

For further information on the UCS parameter, see "Obtaining Output" for either JES2 or JES3 and **OS/VS2 System Programming Library: Data Management**, GC26-3830.

```
UCS=(character set code[,FOLD][,VERIFY])
                       [,    ]
```

character set code
specifies up to four alphameric characters that identify the special character set you want for printing the data set.

,FOLD
specifies that you want the chain or train corresponding to the desired character set loaded in the fold mode. The fold mode is described in the publication **IBM 2821 Control Unit**. The fold mode is most often requested when uppercase and lowercase data is to be printed only in uppercase.

,VERIFY
specifies that the operator is to visually verify that the character set image corresponds to the graphics of the correct chain or train which is mounted before the data set is printed. The character set image is displayed on the printer before the data set is printed.

Default: For the 3211, the image currently in the buffer. For JES2, the buffer value must have a default flag. For JES3, by installation default or by job class.

- If the chain or train mounted on the printer does not correspond to a valid character set, the operator is requested to identify the character set to be used, and mount the corresponding chain or train.
- If you code the UCS parameter and the data set is not written to a printer with the universal character set (UCS) feature, the UCS parameter will be ignored.

Rules for Coding

- If you omit the FOLD and VERIFY subparameters, you need not enclose the character set code in parentheses.
- The FOLD and VERIFY subparameters are ignored for SYSOUT data sets.

General Rules and Restrictions

- For both the 3211 and 1403 printers, you can code the UCS parameter with the UNIT parameter.
- The UCS parameter is mutually exclusive with the DDNAME parameter and the DCB subparameters RKP and CYLOFL. Therefore, if you code the DDNAME parameter or one of the DCB subparameters (RKP and CYLOFL), do not code the UCS parameter, or the job will abnormally terminate.
- In order to use a particular special character set, an image of the character set must be contained in SYS1.IMAGELIB and the chain or train corresponding to the character set must be available for use. IBM provides standard special character sets and the installation may provide user-designed special character sets.

Examples of the UCS Parameter

```
//DD1    DD   UNIT=1403,UCS=(YN,,VERIFY)
```

The DD statement defines an output data set that is to be written to a 1403 printer. The UCS parameter requests that the data set be written using the chain or train corresponding to the special character set with the code YN. Since VERIFY is coded, the character set image will be displayed on the printer before the data set is printed.

```
//DD2         DD        SYSOUT=G,UCS=PN
```

This DD statement defines an output data set that is to be written to the unit record device that corresponds to class G. If the device is a printer with the universal character set, the request in the UCS parameter for the special character set with the code PN will be recognized. Otherwise, the UCS parameter will be ignored.

The UNIT Parameter—*keyword, optional*

The UNIT parameter specifies the types and number of devices you want assigned to a data set.

For further information on the use of the UNIT parameter, see "Requesting Units and Volumes".

```
 ⎧        ⎡unit address            ⎤⎡,unit count⎤           ⎫
 ⎪ UNIT=( ⎢device type             ⎥⎢,P         ⎥[,DEFER])  ⎪
 ⎨        ⎣user-assigned group name⎦⎣,          ⎦           ⎬
 ⎪ UNIT=AFF=ddname                                          ⎪
 ⎩                                                          ⎭
```

unit address
specifies 3 numeric characters that identify a particular unit by its address, which consists of the channel, control unit, and unit numbers.

device type (generic name)
is an IBM-supplied name (for example, 2314) that identifies a particular device by its device number. A list of IBM device types is included in **OS/VS2 System Programming Library: System Generation Reference**, GC26-3792.

user-assigned group name (esoteric name)
is a 1 to 8 alphameric character name that identifies a particular group of devices. The user-assigned name and the devices that make up a group are specified during system generation.

,unit count
is a value from 1 to 59 that indicates the number of devices you want assigned to the data set.

,P
specifies the number of units to be allocated (equal to the number of volumes).

,
specifies that only one device is required and that another subparameter follows.

DEFER
specifies that the system should assign a device(s) to the data set but the volume(s) on which the data set resides should not be mounted until the data set is opened.

AFF
indicates that within a job step, different data sets residing on different volumes can be allocated to the same unit provided that the volumes are removable (unit affinity).

ddname
is the name of an earlier DD statement in the job step that defines a data set with which you want unit affinity.

General Rules for Coding

- If you receive a passed data set or refer to a cataloged data set or earlier DD statement for volume and unit information (VOL=REF=reference), the system will assign one device, even if more devices were requested in an earlier DD statement. Therefore, you must code unit count for more than one device.
- If the only subparameter you code in the UNIT parameter is the first subparameter, you do not have to code the parentheses.
- The UNIT and DDNAME parameters are mutually exclusive.

- Do not identify a device by its address unless it is absolutely necessary. Specifying a unit address limits unit assignment and can result in a delay of the job if the unit is being used by another job.
- For installations where 3340 drives with and without the fixed head feature exist, the device type should not be used for the UNIT parameter. Instead, use the unit address or a user-assigned group name.
- If you code SYSOUT and UNIT on the same statement, the SYSOUT specification overrides the UNIT specification.
- You can receive more units than you specified if you have specified volume affinity and/or a permanently resident or reserved volume.

Using the 3330 mod 11

- If you request a 3330 mod 11, code UNIT=3330-1.

Using Mass Storage Volumes (MSS)

- If you are using mass storage volumes, code UNIT=3330V.
- To extend multivolume data sets to a non-mounted volume, the unit count must be less than the volume count.
- If an old, multivolume data set resides on volumes within a group, specify parallel mount or specify unit count equal to the number of volumes containing the data set.
- Deferred mounting should not be specified for volumes belonging to a MSVGP if there are new data set requests in that job step using MSVGP from the same group. The delay in selection can result in volume conflicts within the job or between jobs causing performance slowdown.

User-assigned Group Names

- A user-assigned group name can identify a device or a group of devices. The group can consist of devices of the same type or class, direct access and tape device classes, or different types of devices.
- When you code a user-assigned group name, you allow the system to assign any available device from the group. If a group consists of only one device, the system will assign that device.
- If a group consists of more than one device type, the units requested are allocated from the same device type. For example, if SYSDA contains 3330 and 2314 device types, a request for two units would be allocated to two 3330s or to two 2314s.
- If a data set that was created using the user-assigned name subparameter is to be extended, additional units allocated to it will be of the same type as specified in the original group name. However, the units allocated to the data set may not necessarily be of that same name.

The unit count, volume count, and volume serial number may be used to determine the number of units and volumes required. The greatest of the three numbers is used.

Deferred Mounting

- If you request deferred mounting of a volume and the data set on that volume is never opened by the processing program, the volume will not be mounted during the execution of the job step.
- DEFER will be ignored if a new, direct access data set is specified.

Unit Override

Volume serial information is obtained from a volume reference to a data set name, a volume reference to an earlier DD statement (VOL=REF), a passed data set or a cataloged data set. The unit description is also available from these same sources. However, you can override the retrieved unit information if the unit you specify is a subset of the retrieved unit. For example, if the retrieved unit grouping is 2314, and the specified unit description is 2314A (a subset of 2314) or 237 device address (a subset of 2314), then the only units considered for allocation are those contained within 2314A or at the device address of 237.

The AFF Subparameter

- You can conserve the number of devices used in a job step by requesting that an existing data set be assigned the same device(s) as assigned to a data set defined earlier in the job step.
- If a request specifying unit affinity is for a new data set and the referenced request is for a direct access device, the job terminates. If the referenced request is eligible for both tape and direct access devices, the job is not terminated, but both requests will only be allocated to tape devices.

Examples of the UNIT Parameter

```
//STEP2    EXEC   PGM=POINT
//DDX      DD     DSNAME=EST,DISP=MOD,VOLUME=SER=(42569,42570),
//                UNIT=(2314,2)
//DDY      DD     DSNAME=ERAS,DISP=OLD,UNIT=2400-2
//DDZ      DD     DSNAME=RECK,DISP=OLD,
//                VOLUME=SER=(40653,13262),UNIT=AFF=DDX
```

The DD statement named DDZ requests that the system assign the same unit to this data set that it assigns to the data set defined on the statement named DDX. Since DDX requests two devices, these two devices are assigned to the data set defined on DDZ.

```
//DD1      DD     DSNAME=AAG3,DISP=(,KEEP),
//                VOLUME=SER=13230,UNIT=2400
```

This DD statement **defines a new data set** and requests that the system assign any 2400 9-track (that can read/write 800 bpi) tape drive to the data set.

```
//DD2      DD     DSNAME=X.Y.Z,DISP=OLD,UNIT=(,2)
```

This DD statement **defines a cataloged data set** and requests that the system assign two devices to the data set. The device type will be obtained from the catalog.

```
//DD3      DD     DSNAME=COLLECT,DISP=OLD,
//                VOLUME=SER=1095,UNIT=(3330,,DEFER)
```

This DD statement defines an existing data set that resides on a direct access volume and requests that the system assign a 3330. Since DEFER is coded, the volume will not be mounted until the data set is opened.

```
//STEPA    DD     DSN=FALL,DISP=OLD,UNIT=237
```

The volume and unit device type will be retrieved from the catalog. You can override the unit by specifying UNIT=237 if that unit is a subset of the device type specified in the catalog.

The VOLUME Parameter—*keyword, optional*

The VOLUME parameter identifies the volume(s) on which a data set resides or will reside.

For further information on the use of the VOLUME parameter, see “Requesting Units and Volumes.”

```
{VOLUME}=([PRIVATE] [,] [,volume sequence number][,volume count] [,] [SER=(serial number,...)              ]
{VOL   }                [,                     ][,            ]     [REF=dsname                           ]
                                                                     [REF=*.ddname                         ]
                                                                     [REF=*.stepname.ddname                ]
                                                                     [REF=*.stepname.procstepname.ddname   ]
```

PRIVATE
specifies a request for exclusive use of a volume.

,
for compatability with former systems, a comma must be coded if either the volume sequence number or volume count are coded.

volume sequence number
specifies which volume of an existing multivolume data set you want used to begin processing.

volume count
specifies the maximum number of volumes an output data set requires.

,
specifies that the volume count is omitted and either the SER or REF subparameter follows.

SER=
indicates that serial numbers of the volumes on which the data set resides or is to reside, are specified.

(serial number,...)
specifies the serial numbers of the volumes on which the data set resides or will reside.

REF=
indicates that the serial numbers of the volumes on which the data set resides or is to reside are identified on an earlier DD statement in the job or in the catalog or an earlier passed data set.

dsname
specifies the name of a cataloged or passed data set. The system locates the information about the data set and assigns your data set to the same volumes as are assigned to the cataloged or passed data set.

***.ddname**
specifies that the system must obtain the volume serial numbers from an earlier DD statement named “ddname” in the same job step.

***.stepname.ddname**
specifies that the system must obtain the volume serial numbers from a DD statement named “ddname”, which was defined in an earlier job step name “stepname.”

***.stepname.procstepname.ddname**
specifies that the system must obtain the volume serial numbers from a DD statement named “ddname”, which was defined in an earlier procedure step named “procstepname”; the procedure step is part of a procedure that was called by an earlier job step named “stepname.”

General Rule for Coding

- The VOLUME, DDNAME, and SYSOUT parameters are mutually exclusive.

Rules for Coding when using Mass Storage Volumes (new data sets only)

- VOL=SER is mutually exclusive with the MSVGP parameter.
- If VOL=SER is coded, the SPACE parameter is required.
- To guarantee allocation to SYSGROUP for a nonspecific request, specify VOL=PRIVATE or MSVGP=SYSGROUP.

The PRIVATE Subparameter

- If you code only PRIVATE, you need not enclose it in parentheses.
- When you do not code PRIVATE, and you code the volume sequence number or volume count subparameter, you must code a comma to indicate the absence of PRIVATE.

The Volume Sequence Number

- The volume sequence number must be less than or equal to the number of volumes on which the data set exists; it can be up to 255. If a unit count greater than the remaining specific volumes is specified, nonspecific volumes are assigned to the remaining units.
- Normally, you code a volume sequence number when you have not specified volume serial numbers on the DD statement (that is, you are retrieving a cataloged data set or you have coded a reference to an earlier DD statement or data set). If you code both a volume sequence number and a volume serial number in the VOLUME parameter, the system will begin processing with the volume that corresponds to the volume sequence number.
- The volume sequence number must correspond to a specific volume serial number or the job will fail.
- The volume sequence number is ignored for NEW data sets.

The Volume Count

- The volume count value can range from 1 to 255.
- If the volume count is greater than the number of specific volume serial numbers, non-specific volumes are added to make up the total. If the number of specific volume serial numbers is greater than the volume count, the volume count is ignored.
- If the request is for a nonspecific direct access device, volume count is ignored. (The number of volumes equals the number of units.)
- When you make a specific volume request and the data set may require more volumes than there are serial numbers, specify in the volume count subparameter the total number of volumes that may be used. By requesting multiple volumes in the volume count subparameter, you can ensure that the data set can be written on more than one volume if it exceeds one volume.

The Volume Serial Number

- You can specify a maximum of 255 volume serial numbers for each DD statement.
- Volume serial information is obtained from a volume reference to a data set name, a volume reference to an earlier DD statement (VOL=REF), a passed data set, or a cataloged data set.
- A volume serial number must be 1 to 6 characters in length. If the number is less than 6 characters, it will be padded with trailing blanks. It can contain any alphameric and national characters, and the hyphen. You must enclose any volume serial number than includes special characters other than the hyphen in apostrophes whenever you code that number in the volume parameter.

- When using some typewriter heads or printer chains, difficulties in volume serial recognition may arise if you use other than alphameric characters.
- The SER subparameter appears as the last subparameter in the VOLUME parameter. Follow SER= with the volume serial numbers. The serial numbers must be enclosed in parentheses unless there is only one serial number. If SER is the only subparameter you are coding, you can code VOLUME=SER=(serial number,...) or VOLUME=SER= serial number.
- Do not use SCRTCH, PRIVAT, or Lnnnnn (L with five numerics) as a volume serial number because they are used as special messages to notify the operator to mount a volume. For optical readers, if no volume serial number is specified, VOLUME=SER=OCRINP is assumed.
- Each volume must have different volume serial numbers regardless of the volume type (for example, tape and disk).

Backward References

- To refer the system to a cataloged data set or to a data set passed earlier in the job that has not been assigned a temporary data set name, code REF as the last subparameter in the VOLUME parameter. Follow REF with the data set name of the cataloged or passed data set. The data set name cannot contain special characters except for periods used in a qualified name. References to SYSIN (DD * or DD DATA) or SYSOUT DD statements are ignored.
- To refer the system to a data set defined earlier in the job that was not passed or was passed but assigned a temporary name, code REF= with a backward reference to the DD statement that contains the volume serial numbers.
- If the ddname refers to a DD statement that defines a dummy data set, it also is assigned a dummy status.
- When refering the system to a data set that resides on more than one tape volume, the system begins with the last volume. When you refer the system to a data set that resides on more than one direct access volume, the system assigns all of the volumes. In either case, you can code the volume count subparameter if additional volumes may be required.
- When coding a volume reference to a previous DD statement that uses user-assigned names, the system will allocate from the same device type name you made reference to rather than from user-assigned group names.
- When refering to a multi-volume VSAM data set, you will receive only the first device type.
- If the reference is to a DD statement, the label type is also copied from this referenced DD.

Checkpoint/Restart

- When a checkpoint data set is not cataloged, code the VOLUME parameter and specify the volume serial number of the volume on which the checkpoint entry is written.
- If a checkpoint data set is cataloged, you do not need to code the VOLUME parameter unless the checkpoint entry exists on a tape volume other than the first volume of the data set; then, code either a volume sequence number or the volume serial number. If you code the volume serial number, you must code the UNIT parameter.

Examples of the VOLUME Parameter

```
//DD1       DD      DSNAME=STEP,UNIT=2314,DISP=OLD,
//                  VOLUME=(PRIVATE,SER=548863)
```

This DD statement defines an existing data set and informs the system that the data set resides on the volume whose serial number is 548863. Since PRIVATE is coded in the VOLUME parameter, the system will not assign the volume to any data set for which a nonspecific volume request is made and will cause the volume to be demounted at the end of the job.

```
//DD2        DD        DSNAME=QUET,DISP=(MOD,KEEP),UNIT=(2400,2),
//                     VOLUME=(,,,4,SER=(96341,96342))
```

This DD statement defines an existing data set that resides on the volumes whose serial numbers are 96341 and 96342, and requests that a total of 4 volumes be used to process the data set if required.

```
//DD3        DD        DSNAME=QOUT,DISP=NEW,UNIT=2400
```

This DD statement defines a temporary data set and, by omission of the VOLUME parameter, requests that the system assign a suitable volume to the data set.

The COMMAND Statement

Control Statement

The COMMAND statement specifies an operator command to be executed.

For further information on commands and for descriptions of their operands, see **Operator's Library: OS/VS2 Reference (JES2)**, GC38-0210 or the operator's reference for JES3.

```
// command operand comments
```

The command statement consists of the characters // in columns 1 and 2, and three fields—the operation (command), operand, and comments fields.

The following JCL commands can be entered through the input stream.

```
CANCEL
CHNGDUMP
DISPLAY
HOLD
LOG
MODIFY
MONITOR
MOUNT
RELEASE
REPLY
RESET
SEND
SET
START
STOP
STOPMN
UNLOAD
VARY
WRITELOG
```

Rules for Coding

- Follow the // in columns 1 and 2, with one or more blanks.
- Follow the command with one or more blanks.
- Code any required operands. Separate each operand with a comma.
- Follow the operands with one or more blanks.
- Code any comments.
- The command statement cannot be continued.
- A command statement can appear immediately before a JOB statement, an EXEC statement, a null statement, or another command statement, but not before the first job in the input stream in JES2. All OS command statements are ignored in JES3.
- If a command statement appears in the input stream between the boundaries of two jobs and it contains errors, the command will not be executed. Furthermore, you will receive no indication that the command was not executed.
- If you includes a command statement as part of your job control statements, the command will usually be executed as soon as it is read. Because of this, it is not likely that the command will be synchronized with the execution of the job step to which it pertains. Therefore, you should preferably tell the operator which commands you want issued and when they should be issued, and let him issue them.
- Disposition is determined by JES2 according to installation options specified for each job class. Disposition is determined by JES3 according to the input source and according to installation options specified for each job class.

Example of the Command Statement

```
//          DISPLAY TS,LIST
```

This command will display the number and user-id of all active time-sharing users of the system.

The Comment Statement

Control Statement

The comment statement specifies a comment to be included in the output listing.

```
//*comments
```

The comment statement consists of characters //* in columns 1, 2, and 3, and the comments field.

Rules for Coding

- Code the comments in columns 4 through 80.
- You cannot continue comment statements using continuation conventions. If you cannot include all of the comments on one comment statement, code another comment statement.
- The comment statement can appear anywhere after the JOB statement, including between continuations of statements.
- With the MSGLEVEL parameter, you can request an output listing of all the control statements processed in your job. You will be able to identify comment statements by the appearance of //* in columns 1, 2, and 3.

Example of the Comment Statement

```
//*THE COMMENT STATEMENT CANNOT BE CONTINUED,
//*BUT IF YOU HAVE A LOT TO SAY, YOU CAN FOLLOW A
//*COMMENT STATEMENT WITH MORE COMMENT
//*STATEMENTS.
```

Control Statement

The delimiter statement indicates the end of data submitted through an input stream for a step.

```
/*  comments
```

The delimiter statement consists of the characters /* in columns 1 and 2 and the comments field. You must have at least one blank before the comments field.

Rules for Coding

- The system will recognize a delimiter other than /* if the DLM parameter is coded on the DD statement defining the data.
- Code /* (or the value assigned in the DLM parameter) in columns 1 and 2, followed by any comments you have. The comments cannot be continued.
- The beginning of data to be submitted through an input stream is indicated by a DD * or DD DATA statement.
- If the data is preceded by a DD * statement and you do not code the DLM parameter, you need not code a delimiter statement.

Example of the Delimiter Statement

```
//JOB54     JOB ,'C BROWN',MSGLEVEL=(2,0)
//STEPA     EXEC PGM=SERS
//DD1       DD *
            .
            .
            .
            data
            .
            .
            .
/* END OF DATA FOR THIS STEP
```

The Null Statement

Control Statement

The null statement indicates the end of JCL statements for a job.

```
//
```

The null statement consists only of the characters // in columns 1 and 2. The remainder of the statement must be blank.

Rules for Coding

- The null statement is ignored by JES2.
- Place a null statement at the end of a job's control statements or at the end of all the statements in an input stream.
- If you do not follow the job's control statements and data with a null statement, the system will place the job on the queue when it encounters another JOB statement in the input stream.
- If the job is the last job in the input stream and it is not followed by a null statement, the system will recognize it as the last job in the input stream and place it on the queue.
- The system will flush statements between a null statement and the next valid JOB statement.
- If a null statement follows a control statement that is being continued, the system treats the null statement as a blank comment field and assumes that the control statement contains no other operands.

Example of the Null Statement

```
//MYJB      JOB      ,'C BROWN'
//STEP1     EXEC     PROC=FIELD
//STEP2     EXEC     PGM=XTRA
//DD1       DD       UNIT=2400
//DD2       DD       *
             .
             .
             .
            data
             .
             .
             .
/*
//
```

The PEND Statement

Control Statement

The PEND statement marks the end of an in-stream procedure.

```
//name  PEND    comments
```

The PEND statement consists of the characters // in columns 1 and 2 and three fields — the name field, the operation (PEND) field, and the comments field.

Rules for Coding

- Code // in columns 1 and 2 then code a name (1 to 8 characters) or one or more blanks.
- If you code a name, follow it with one or more blanks.
- Code PEND, and follow it with one or more blanks.
- Code any desired comments.
- Do not continue a PEND statement. The PEND statement terminates an in-stream procedure at that point, whether or not the statement is continued. The PEND statement must not be included in cataloged procedures.

Examples of the PEND Statement

```
//PROCEND1 PEND THIS STATEMENT IS REQUIRED FOR INSTREAM PROCEDURES
```

This PEND statement contains a comment.

```
// PEND
```

A PEND statement can contain only the coded operation field preceded by // and one or more blanks and followed by blanks.

The PROC Statement

Control Statement

The PROC statement is the first control statement in an in-stream procedure; the PROC statement can also be the first control statement in a cataloged procedure. In either an in-stream procedure or a cataloged procedure, a PROC statement can be used to assign default values to symbolic parameters in the procedure.

```
//name        PROC    operands      comments
```

The PROC statement consists of the characters // in columns 1 and 2 and four fields — the name field, the operation (PROC) field, the operand field, and the comments field.

General Rules for Coding

- A PROC statement is required for an in-stream procedure; it must appear as the first control statement of the in-stream procedure.
- A PROC statement is optional for a cataloged procedure; if a PROC statement is included in a cataloged procedure, it must appear as the first control statement.
- Code // in columns 1 and 2; then code a 1 to 8 character name or one or more blanks. A name is required for in-stream procedures.
- Cataloged procedures with no symbolic parameters can be created and executed.
- If you code a name, follow it with one or more blanks. Then code PROC, followed by one or more blanks.
- In the operand field, you can assign default values to symbolic parameters in a procedure. Code a comma after a symbolic parameter and its default value, if you are coding more than one. Do not code a comma after the last symbolic parameter and its default value.
- The operand field is required in an in-stream procedure only if symbolic parameters are defined as in the example at the end of this section.
- Follow the operands with one or more blanks and any desired comments.
- You can continue the PROC statement onto another statement. Code // in columns 1 and 2 of the continuation statement.
- To assign a value to a symbolic parameter, code:
  symbolic parameter=value
  Omit the ampersand that precedes the symbolic parameter in the procedure.
- The value assigned to a symbolic parameter can be any length, but it cannot be continued onto another statement.
- If the symbolic parameter value contains special characters, enclose the value in apostrophes (the enclosing apostrophes will not be considered part of the value).
  If the special characters include apostrophes, you must code each apostrophe as two consecutive apostrophes.
- If you assign more than one value to a symbolic parameter with some other information, (for example, &JOBNO.321), the information and value cannot exceed a total of 120 characters.
- You can override a default value appearing on a PROC statement by assigning a value to the same symbolic parameter on the EXEC statement that calls the procedure.

Examples of the PROC Statement

```
//DEF        PROC     STATUS=OLD,LIBRARY=SYSLIB,NUMBER=777777
//NOTIFY     EXEC     PGM=ACCUM
//DD1        DD       DSNAME=MGMT,DISP=(&STATUS,KEEP),UNIT=2400,
//                    VOLUME=SER=888888
//DD2        DD       DSNAME=&LIBRARY,DISP=(OLD,KEEP),UNIT=2314,
//                    VOLUME=SER=&NUMBER
```

Three symbolic parameters are defined in this cataloged procedure: &STATUS, &LIBRARY, and &NUMBER. Values are assigned to the symbolic parameters on the PROC statement. These values will be used when the procedure is called and values have not been assigned to the symbolic parameters by the programmer.

```
//CARDS      PROC
```

This PROC statement can be used to mark the beginning of an in-stream procedure named CARDS.

Coding JES2 Control Statements

The JES2 control statements are coded with JCL statements to control the input and output processing of jobs. Rules for coding JCL, including syntax, in the section, "Coding JCL Statements," apply to the JES2 control statements. However, there are additional rules for coding JES2 statements. They are:

- Columns 1 and 2 always contain the characters /*.
- JES2 statements cannot be continued. You can use multiple control statements if more than one statement is needed.
- Do not place JES2 control statements in a cataloged procedure; they are ignored.
- If you code more than one statement with the same parameters, the last statement coded will override any other statements.
- If you code more than one of the same parameters on the same statement, the last parameter coded will override any other parameters.
- You can code the JES2 control statements in any order. However, the COMMAND and the PRIORITY statements must be placed in front of the JOB statement and all other JES2 statements should follow the JOB statement.
- The JOBPARM statement overrides the installation default but can itself be overridden by a specific output statement.

The Command Statement

Control Statement

The command statement specifies JES2 operator commands that can be entered through the card reader or the system console. Examples in this book illustrate the format for commands entered through the card reader. Commands entered through the system console should omit the /* from the message.

For a detailed description of the command statement and the names of the correct JES2 verbs and operands, see **Operator's Library: OS/VS2 Reference (JES2)**, GC38-0210. The command statement consists of the characters /* in columns 1 and 2. Column 3 contains a character either established at JES2 generation by the installation or defaults to '$'. There are two fields — a JES2 command verb starting in column 4 followed by one or more operands. An "N" may be coded in column 72. Columns 73-80 are ignored.

```
/*$command verb  operand [,operand...][N]
```

command verb
an operand indicating which JES2 operator command is to be performed.

operand
one or more variable length operands.

The following JES2 commands can be entered through the input stream.

```
$A    $E    $L    $R    $Z
$B    $F    $N    $S
$C    $H    $O    $T
$D    $I    $P    $VS
```

N
indicates that the command will not be repeated on the operator's console.

Rules for Coding

- Code as many command statements as are needed, but do not continue them from one statement to the next.
- Command statements must be placed before jobs being entered through the input stream. Any command statements within a job will be ignored.
- Commands that are entered on the command statement are executed immediately. They cannot be linked with any execution process of a job.
- JES2 commands entered through the input stream are of the form /*$command. The $ is a JES2GEN option.

Example of the Command Statement

```
/*$SI3-5
```

This command will start initiators three through five. The command is $S and the operand is I3-5.

The JOBPARM Statement

Control Statement

The JOBPARM statement specifies job related parameters for JES2.

The JOBPARM statement consists of the characters /* in columns 1 and 2, the word JOBPARM in columns 3-9, a blank in column 10, and parameters in columns 11-71. Columns 72-80 are ignored.

For further information, see "Obtaining Output (JES2 only)."

```
/*JOBPARM parameters
```

Code one or more of the following parameters in the longer form (full word) or the shorter form (one letter abreviation).

$$\begin{Bmatrix}\text{CARDS=nnn}\\ \text{C=nnn}\end{Bmatrix} \begin{Bmatrix}\text{,COPIES=nnn}\\ \text{,N=nnn}\end{Bmatrix} \begin{Bmatrix}\text{,FORMS=xxx}\\ \text{,F=xxx}\end{Bmatrix}$$

$$\begin{Bmatrix}\text{,LINECT=nnn}\\ \text{,K=nnn}\end{Bmatrix} \begin{Bmatrix}\text{,LINES=nnn}\\ \text{,L=nnn}\end{Bmatrix} \begin{Bmatrix}\text{,NOLOG}\\ \text{,J}\end{Bmatrix}$$

$$\begin{Bmatrix}\text{,ROOM=xxx}\\ \text{,R=xxx}\end{Bmatrix} \begin{Bmatrix}\text{,SYSAFF=cccc}\\ \text{,S=cccc}\end{Bmatrix} \begin{Bmatrix}\text{,TIME=nnn}\\ \text{,T=nnn}\end{Bmatrix} \begin{Bmatrix}\text{,PROCLIB=xxx}\\ \text{,P=xxx}\end{Bmatrix}$$

CARDS=nnn
a value estimating the number of output cards from this job (from 0 to 9999999 cards)

COPIES=nnn
a value indicating the number of printed output copies of a job related output that is to be produced (from 1 to 255 copies)

FORMS=xxx
an alphameric value indicating the print and punch forms for this job's output that are not further defined in this job (from 1 to 4 characters)

J

comı
JOBI

LINECT=nnn
a value showing the number of lines to put on each output page for JES2 page overflow processing (from 0 to 255 lines)

LINES=nnn
a value estimating the number of output lines from this job — in thousands of lines (from 0 to 9,999)

NOLOG
a parameter meaning that you do not want the JES2 job log as output. (The job log contains a list of job related console messages and operator replies produced during processing of the job.)

ROOM=nnn
an alphameric value indicating a programmer's room number to be placed on job's separator page for routing back to programmer. (from 1 to 4 characters)

SYSAFF=cccc
1 to 7 system affinities can be specified indicating systems to be eligible to process this job. In order to specify more than one system, code: SYSAFF=(cccc,cccc,...). cccc is an alphameric value indicating one or more of the following:

- * indicates the system into which the job was read.
- ANY indicates any system in the JES2 multi-access spool complex.

- cccc indicates a specific system. "cccc" must be the four alphameric character system-id of one of the systems in the JES2 multi-access spool complex.
- IND when added to any of the above specifications, indicates systems scheduling in independent mode.

TIME=nnn
a value estimating the job execution time in minutes of real time (from 0 to 279,620 minutes)

PROCLIB=xxx
an alphameric value indicating the DDNAME of the cataloged procedure library that is to be used to convert the JCL for this job. (This name refers to a DD statement in the JES2 cataloged procedure.)

Rules for Coding

- Any JOBPARM statement parameter value will supersede the equivalent parameter value from the accounting field (in HASP format) of the JOB statement or from any preceding JOBPARM statement in this job's JCL. All of these statements override the default established by the installation.
- Any number of the above parameters may be placed on a single JOBPARM statement and as many JOBPARM statements as desired may be placed together with a given input stream. JOBPARM statement cannot be continued.
- Place the JOBPARM statement after the JOB statement.
- If you code the PROCLIB parameter on the JOBPARM statement, the name of the DD statement should be in the JES2 cataloged procedure. If it is not, the JES2 default procedure is used.
- If you code LINECT=0, JES2 will not eject to a new page when the number of lines has exceeded the page limit that was established at JES2 generation.

Example of the JOBPARM Statement

```
/*JOBPARM   L=60,R=4222,T=50
```

The three specifications mean the following:

L=60	The job's estimated printed output will be 60,000 lines.
R=4222	The programmer's room is 4222. This information will be placed in the separators for both printed and punched data sets.
T=50	The job's estimated execution time is 50 minutes.

The MESSAGE Statement

Control Statement

The MESSAGE statement permits you to send messages to the operator (via the operator console) at JES2 job input time.

The MESSAGE statement consists of the characters /* in columns 1 and 2, the word MESSAGE in columns 3-9, a blank in columns 10 and 11, and the message in columns 12-71. Columns 72-80 are ignored.

```
/*MESSAGE   message to be written
```

Rules for Placement

- Place the MESSAGE statement after the JOB statement. This allows the job number to be appended to the beginning of the message.
- If the MESSAGE statement is not included within the boundaries of a job, the input device name is appended to the beginning of the message.

Example of the MESSAGE Statement

```
/*MESSAGE CALL DEPT58 WHEN PAYROLL JOB IS FINISHED--EX.1946
```

This message requests that department 58 be called when the payroll job is complete.

The OUTPUT Statement

Control Statement

The OUTPUT statement specifies characteristics and/or options of a specific SYSOUT data set or groups of SYSOUT data sets.

For further information on the OUTPUT statement, see "Obtaining Output (JES2 only)".

The OUTPUT statement consists of characters /* in columns 1 and 2, the word OUTPUT in columns 3-8, and a code beginning in column 10 followed by the keyword parameters. Columns 72-80 are ignored.

```
/*OUTPUT    code    parameters
```

Code one or more of the following parameters in the longer form (full word) or the shorter form (one letter abreviation).

```
{COPIES=nnn}  {,DEST=nnn}  {,FCB=xxx}
{N=nnn     }  {,D=nnn   }  {,C=xxx  }
{,FORMS=xxx}  {,INDEX=nnn}  {,LINDEX=nnn}  {,UCS=xxx}
{,F=xxx    }  {,I=nnn    }  {,L=nnn     }  {,T=xxx  }
```

code

alphameric characters referencing all SYSOUT data sets within your job whose code in the form number subparameter of the SYSOUT parameter matches the "code" specified on the OUTPUT statement (from 1 to 4 characters)

COPIES=nnn

a value indicating the number of copies of printed job related output that is to be produced (from 1 to 255 copies)

DEST=nnn

1 to 4 different destinations can be specified for each output data set. In order to specify more than one destination, code: DEST=(nnn,nnn,nnn,nnn). DEST is an alphameric value indicating one of the following devices:

- LOCAL—any local device.
- RMTn—remote terminal, "N" indicating a 1 to 3 digit numeric value which is left justified with no leading zero. (For HASP compatibility, REMOTEn (n is one character) is also an acceptable way of defining a valid device specification.)
- PRINTERn—printer, "N" indicating a 1-digit numeric value, defining to which printer the output is to be sent.
- PRINTRnn—printer, "N" indicating a 2-digit numeric value, defining to which printer the output is to be sent.
- PUNCHn—card punch, "N" indicating a 1- or 2-digit numeric value, left justified with no leading zero, defining to which card punch the output is to be sent.

FCB=xxx

an alphameric value indicating the data set forms control or carriage specifications (from 1 to 4 characters).

FORMS=xxx

an alphameric value indicating the print and punch forms (from 1 to 4 characters).

INDEX=nnn

a value indicating the data set indexing print position offset (to the right) for the 3211 printer (from 1 to 31).

LINDEX=nnn
a value indicating the data set indexing print position offset (to the left) for the 3211 printer (from 1 to 31).

UCS=xxx
an alphameric value indicating the universal character set specification (from 1 to 4 characters).

Rules for Coding

- PRINTERn, PRINTRnn, and PUNCHn are the same as LOCAL unless the specified printer or punch is subject to local print/punch routing.
- Parameters specified on the OUTPUT statement will replace any equivalent parameters specified on the referenced DD statement.
- Code as many OUTPUT statements as you need. If more than one OUTPUT statement has the same "code" starting in column 10, the first OUTPUT statement parameters will be used. If there are duplicate parameters on the same OUTPUT statement, the last parameter will override any preceding duplicate parameter.
- Place the OUTPUT statement after the JOB statement.

Coding the DEST Parameter

If more than one destination is coded, the destinations must be in parentheses. If only one destination is coded, the parentheses are optional.

Coding the FCB Parameter

- If the printer on which the data set is to be printed does not have the forms control buffer feature, the operator is sent a message to mount the proper carriage control tape.
- Do not specify STD1 or STD2 unless the installation indicates that you should.

Coding the INDEX and LINDEX Parameters

- If th 3211 printer has the INDEX feature, it will offset the first physical print position to the right by the number of print positions specified to cause the total print line width to be reduced by the number of print positions specified. (That is, a specification of 30 will mean that the maximum line width is now 30 positions less than the original value.) These parameters are ignored on other than 3211 printers.

Example of the OUTPUT Statement

```
/*OUTPUT    ABCD    COPIES=4,DEST=RMT23
```

This statement refers to all SYSOUT data sets within the job whose DD statement specified SYSOUT=(c,,ABCD).

The PRIORITY Statement

Control Statement

The PRIORITY statement assigns a job selection priority to a job.

For further information on the use of PRIORITY, see "Routing a Job Through the System (JES2 only)".

The PRIORITY statement consists of the characters /* in columns 1 and 2, the word PRIORITY in columns 3-10, and the code "p" in columns 16-17. Columns 18-80 are ignored.

```
/*PRIORITY  p
```

p
either a number between 0 and 15 or the character "*" indicating the priority of the job.

Default: If PRIORITY is not present, priority will be derived using information from (1) the JOBPARM statement, (2) the accounting information (in HASP format) on the JOB statement, or (3) an installation-defined default.

Rules for Coding

- If "p" is a number, the value of "p" will be assigned as the priority of your job.
- If "p" is the character "*", the installation-defined default will be used.
- The PRIORITY statement must immediately precede the JOB statement. If it does not, the PRIORITY statement will be ignored and the input stream will be flushed until a JOB statement or another PRIORITY statement is found.

Example of the PRIORITY Statement

```
/*PRIORITY  7
```

The job will have a selection priority of 7. This value only has meaning in relation to other jobs in the system.

The ROUTE Statement

Control Statement

The ROUTE statement specifies the destination of the output which is not specifically routed using the DEST parameter.

The ROUTE statement consists of the characters /* in columns 1 and 2, PRINT or PUNCH in columns 10-14, and one of the device specifications in columns 16-23. Columns 24-80 are ignored.

For further information, see "Obtaining Output (JES2 only)."

```
/*ROUTE     {PRINT} {LOCAL    }
            {PUNCH} {RMTn     }
                    {PRINTERn }
                    {PRINTRnn }
                    {PUNCHn   }
```

PRINT
specifies that the job's printed output is to be routed.

PUNCH
specifies that the job's punched output is to be routed.

LOCAL
any local device.

RMTn
remote terminal, "n" indicating a 1 to 3-digit numeric value, left-justified with no leading zero, defining which remote terminal the output is to be sent. (For purposes of HASP compatibility, REMOTEn is also an acceptable way of defining a valid device specification.)

PRINTERn
printer, "n" indicating a 1-digit numeric value, defining to which printer the output is to be sent.

PRINTRnn
printer, "nn" indicating a 2-digit numeric value, defining to which printer the output is to be send.

PUNCHn
card punch, "n" indicating a 1- or 2-digit numeric value, left justified with no leading zero, defining to which card punch the output is to be sent.

Rules for Coding

- A ROUTE statement can be used to direct either print or punch routing of output, but not both. If both print and punch are to be routed, two cards must be used.
- Place the ROUTE statement after the JOB statement.
- PRINTERn, PRINTRnn, and PUNCHn are the same as LOCAL, unless the specified printer or punch is subject to local print/punch routing.

Examples of the ROUTE Statement

```
/*ROUTE      PRINT   RMT6
```

This statement will route printed output to remote terminal 6.

```
/*ROUTE      PUNCH   PUNCH2
```

This statement will route punched output to card punch 2.

The SETUP Statement

Control Statement

SETUP is a control statement which is used to indicate volumes needed for executing a phase of the job.

For further information on the use of the SETUP statement, see "Routing a Job Through the System (JES2 only)".

The SETUP statement consists of the characters /* in columns 1 and 2, the word SETUP in columns 3-7, and volume serial numbers that begin in column 16. Columns 72-80 are ignored.

```
/*SETUP      volume serial number[,volume serial number...]
```

volume serial number
identifies the volume or volumes required for execution of the job.

Rules for Coding

- All SETUP statements should be placed after the JOB statement.
- As many SETUP statements as necessary can be used.

Example of the SETUP Statement

```
/*SETUP       666321,149658
```

The two volumes requested will be listed on the console when the job enters the system. The job is then placed in the hold status awaiting release by the operator when the required volumes are available. The message informs the operator that the volumes should be mounted before the job is run.

Coding JES3 Control Statements

The JES3 statements are coded with JCL statements to control the input and output processing of jobs. Rules for coding JCL, including syntax, in the section "Coding JCL Statements," apply to the JES3 statements. However, there are additional rules for coding JES3 statements. They are:

- Columns 1 through 3 always contain the characters //*. (Column 4 must be a non-blank). For compatability, ASP version 2 control statements supported by JES3 can be coded with a /* in columns 1 and 2. (Note: SETUP statements from ASP version 2 will be ignored.)
- JES3 statements can be continued by punching a comma as the last character of the first card, punching //* in columns 1 through 3 of the continuation card, and resuming the text in column 4 of the continuation card.
- JES3 control statements, except command, must appear after the JOB statement, including all JOB continuation cards. JES3 statements that appear before or in the middle of the JOB statement are ignored.
- Do not place JES3 control statements in a cataloged procedure; they are ignored.
- A / means not or all but those listed. For example, /ddname means consider all ddnames except this one named.

The Command Statement

Control Statement

The command statement specifies JES3 operator commands, except *DUMP and *RETURN, that are entered through the card reader or the system console. Examples in this book illustrate the format for commands entered through the card reader. Commands entered through the system console should omit the //* from the command.

For a detailed description of the command statement and the names of the correct JES3 verbs and operands, see the operator's reference for JES3. There are two fields—a JES3 command verb starting in column 4 followed by one or more operands. An "N" can be coded in column 72. Columns 73-80 are ignored.

```
//**command verb    [operand ,operand. . .] [N]
```

***command verb**
an operand indicating which JES3 command the operator is to perform.

operand
one or more operands.

CALL	X	INQUIRY	I
CANCEL	C	MESSAGE	Z
DELAY	D	MODIFY	F
DISABLE	H	RESTART	R
ENABLE	N	SEND	T
ERASE	E	START	S
FAIL		SWITCH	
FREE		VARY	V

N
indicates that the command will not be printed on the operator's console.

Rules for Coding

- Begin the command in column 5; code it in the same format as if it were being entered from a console.
- All command statements must precede the first JOB statement in the input stream if jobs are also being submitted. If any command statements follow the JOB statement, they are considered comments statements.
- Multiple command statements can be entered at one time.
- These statements can be placed as the first cards in an active card reader that is being restarted.
- Command statements cannot be continued from one statement to another.
- Commands that are entered on the command statement are executed immediately. They cannot be linked with any execution process of a job.

Examples of the Command Statement

```
//**VARY,280,OFFLINE
//**V,281,OFFLINE
//**VARY,282,OFF
        -or-
//**V,280-282,OFF
```

Several devices are varied offline by coding either three separate commands or one command for all devices to be varied offline. If these cards are placed in card reader 01C, for example, and it is currently not in use, the operator would then enter:

```
*X CR,IN=01C
```

```
//**MESSAGE,CN1,OUTPUT FROM JOB X REQUIRES SPECIAL CONTROLS
```

This example gives a special instruction to the operation staff from a remote location. This card is placed in front of the first job.

The DATASET Statement

Control Statement

The DATASET statement defines the beginning of an additional input stream data set that can contain JCL and/or data. Terminate a data set by coding an ENDDATASET statement. This statement is used as input to an ASP main processor only.

```
//*DATASET  DDNAME=ddname[,MODE=  {E}] [,J={NO }]
                                  {C}      {YES}
```

Defaults: J=NO and MODE=E

DDNAME=ddname
defines the ddname used to reference the spooled data set.

MODE
Defines the card reading mode.

- **E**
specifies that the cards are read as EBCDIC with validity checking.
- **C**
specifies that the cards are read in card image form (column binary or data mode 2).

J
Determines how the data set is terminated.

- **NO**
indicates that a JOB statement will terminate the data set.
- **YES**
indicates that JOB statements can be included in the data set and an ENDDATASET statement will terminate the data set.

Rules for Coding when MODE=C

- The J parameter is ignored when MODE=C is specified. The data set must be terminated with an ENDDATASET statement.
- You must ensure that the operator includes MODE=C for the reader that reads this job.

General Rules for Coding

- MODE=C is invalid for jobs read from disk or tape, and for jobs submitted from remote work stations.

Example of the DATASET Statement

```
//*DATASET  DDNAME=MYPRINT
            data cards
//*ENDDATASET
//*PROCESS OUTSERV
//*FORMAT   PR,DDNAME=MYPRINT,COPIES=5
```

This example will create a data set, DDNAME=MYPRINT, and print five copies.

The ENDDATASET Statement

Control Statement

The ENDDATASET statement terminates the creation of an ASP input stream data set that was defined by the DATASET statement.

```
//*ENDDATASET
```

Rule for Coding

- The ENDDATASET statement must appear immediately after the last card for that data set.

Examples of the ENDDATASET Statement

```
//*DATASET  DDNAME=MYPRINT
            data cards
//*ENDDATASET
//*PROCESS OUTSERV
//*FORMAT   PR,DDNAME=MYPRINT,COPIES=5
```

This example will create a data set, DDNAME=MYPRINT, and print five copies.

DATASE
ENDDA

The FORMAT Statement

Control Statement

The FORMAT statement communicates special destination and format related instructions to the system for processing the print and punch data sets.

```
             ⎧AC ⎫
             ⎪NJP⎪
//*FORMAT    ⎨PR ⎬
             ⎩PU ⎭
```

AC
indicates data sets that are destined for TSO terminal users connected on ASP main processors.

NJP
indicates this card is associated with network job processing.

PR
indicates this card is associated with a print data set.

PU
indicates this card is associated with a punch data set.

General Rules for Coding

- There must be at least one blank between FORMAT and PR, PU, and AC.
- The text depends on the type of data set and is explained on the following pages.
- Multiple FORMAT statements can be used for any data set to specify special requirements for each copy of the data set.
- Classes are established at initialization that group characteristics for job output. See the system programmer to determine if you should use one of the defaults or should code the FORMAT statement.
- FORMAT statements are required for special data set processing such as multiple destinations, multiple copies of output having different attributes, forced single or double space control, and printer overflow checking. For information on special (nonstandard) jobs, see **OS/VS2 System Programming Library: Job Management**, GC28-0627.

The AC Parameter

JES3 created data sets are routed to TSO users running on ASP main processors. ASP main processor TSO users should use the installation-defined ASP TSO output class to retrieve their output. This will reduce the need for FORMAT AC control statements. (Jobs of TSO users running on ASP main processors are physically connected to an ASP system regardless of where the job is run.) For further information, see "Obtaining Output (JES3 only)."

```
//*FORMAT   AC,DDNAME= (ddname )
                       )SYSMSG (
                       )JESJCL (
                       (JESMSG )
           [,DEST=printer-name]
           [,USER=userid]
           [,PRINT=    {YES} ]
                       {NO }
           [,HOLD=     {YES} ]
                       {NO }
           [,MAIN=main-name]
```

Defaults: PRINT=NO
HOLD=NO

DDNAME
specifies the ddname of the DD statement that defines the output class that the user desires to access.

SYSMSG
system messages.

JESJCL
jclfile including statement messages.

JESMSG
JES3 and system operator messages (job log).

DEST
specifies the device name of a printer used to print the output in the event this output is not sent to the user.

USER
specifies a user-id other than your own. The user-id informs the TSO user when his output can be accessed.

PRINT
specifies whether or not the output is to be printed. If PRINT=YES, the data set will be printed. If PRINT=NO, the data set will not be printed.

HOLD
HOLD indicates that the data set is eligible for printing and placed in a special data set for retrieval at a TSO terminal.

HOLD=YES
means the data set is available when the operator releases it.

HOLD=NO
means the data set is eligible for immediate printing. HOLD is meaningful only if PRINT=YES. If PRINT=NO, the data set cannot be printed by JES3 but is placed in a terminal data set.

FO

MAIN
specifies an ASP main processor that has TSO resident. MAIN is not required to return control to TSO submitter.

Rules for Coding DDNAME

The referenced DD statement must be in the form:

```
//name      DD      SYSOUT=class
```

Rule for Coding DEST

The printer-name must be a valid JES3 printer name, group name, or remote destination; that is, one defined by the installation.

Rule for Coding MAIN

The MAIN parameter specifies on what processor the TSO user will be connected for receiving output when the input comes from another destination. This parameter is not required when submitting and receiving from the same TSO destination.

Example of the AC Parameter

```
//*FORMAT   AC,DDNAME=SYSMSG,DEST=PR2,USER=TSOA,PRINT=YES
```

In this example, the data set, SYSMSG, will be printed on PR2 and TSO user, TSOA, will be notified.

The NJP Parameter

The network job processing (NJP) parameter defines the remote station from which and to which the job will be transmitted.

```
//*FORMAT    NJP,FROM=system-name,DEST=system-name
```

FROM
specifies the name of the JES3 system name from which the job will be transmitted.

DEST
specifies the name of the JES3 system name to which the job will be transmitted.

Rules for Coding

- The system-name is determined at initialization time. For information on these cards, see the system programming staff.
- The keywords, FORM and DEST can be coded in any order.

Example of the NJP Parameter

```
//*FORMAT    NJP,FROM=NYC,DEST=LA
```

The job will be transmitted from NYC to LA for processing.

The Print Parameter

The PR parameter specifies print characteristics of a JES3 output data set.

For further information, see "Obtaining Output (JES3) only."

```
//*FORMAT        PR,DDNAME= ┌ddname ┐
                            │SYSMSG │
                            │JESJCL │
                            └JESMSG ┘
                        ┌ANYLOCAL                  ┐
                 [,DEST=│device-name               │ ]
                        │device-address            │
                        └( type[,group-name] )     ┘
                            ┌PROGRAM┐
                 [,CONTROL= │SINGLE │]
                            └DOUBLE ┘
                            ┌1 ┐
                 [,COPIES=  └nn┘ ]
                            ┌STANDARD '┐
                 [,FORMS=   └form-name ┘  ]
                            ┌6LPI      ┐
                 [,FCB=     └image-name┘  ]
                            ┌6LPI                ┐
                 [,CARRIAGE=└carriage-tape-name  ┘ ]
                 [,TRAIN=   ┌STANDARD  ┐       ]
                            └train-name┘
                       ┌OFF┐
                 [,OVFL=└ON ┘ ]
```

Defaults: CONTROL=PROGRAM
COPIES=1
FORMS=STANDARD
FCB=6LPI
CARRIAGE=6LPI
TRAIN=STANDARD
OVFL=ON

DDNAME

specifies the ddname of the data set to which this card applies. This ddname should be qualified to the level required (stepname.procstepname.ddname).

SYSMSG

system messages

JESJCL

jclfile including statement messages

JESMSG

JES3 and system operator messages (job log)

DEST

specifies the printer used for output.

ANYLOCAL

any device (either a printer or punch as defined by the output class on the DD statement) attached to the central CPU to receive the output data set.

device-name

1-8 alphameric or national character name of a local printer or punch (as defined by the system programming staff) to receive the output data set.

device-address

three character physical device address of the device to receive the output data set.

type

in the format gggssss where ggg is the general device classification (for example, PRT) and ssss is the specific device classification (for example, 3211) as defined by the system programming staff.

group-name

name of a group of local devices, an individual remote station, or a group of remote stations to receive the output data set. Specify DEST=(,LOCAL) to define the default group-name for local devices (that is, those local devices that are in no other group).

CONTROL

specifies the type of forms control used.

- PROGRAM indicates that the carriage control character is the first character of each logical record in the data set.
- SINGLE indicates forced single spacing.
- DOUBLE indicates forced double spacing.

COPIES

specifies the number of original copies printed for this data set.

FORMS

specifies the printer forms used.

- STANDARD indicates that standard installation forms are used.
- form-name indicates the form name or form number of special forms to be mounted.

FCB

specifies the name of the forms control buffer used (for 3211's only).

CARRIAGE

specifies the carriage tape for either 3211 or 1403 to print onto this SYSOUT class.

TRAIN

specifies the printer train used. The IBM-supplied train names are in the chapter "Obtain Output (JES3 only)". Check with the system programming group for installation-supplied and supported names.

OVFL

specifies whether or not the printer program should test for forms overflow.

- ON specifies that the printer program should eject whenever the end-of-forms indicator (channel 12) is sensed.
- OFF specifies that forms overflow control is not used.

Rules for Coding DDNAME

- The ddname should be qualified to the level required.
- When DDNAME= is given and no ddname follows, the parameters specified on this statement become the defaults for the job and apply to all print data sets that have no FORMAT statements.

Rules for Coding DEST

- If the parameter is omitted, the first available printer in the origin group (the group of printers defined for the local or remote submitting locations) that fulfill all processing requirements is assigned. If the job originated at a remote RJP terminal, the output is returned to the originating terminal group.
- The MAIN ORG parameter overrides the PR DEST parameter.

Rule for Coding CONTROL

When coding CONTROL=PROGRAM, the character specified can be either the extended UASSI code or the actual channel command code for the System/360 and System/370 channel.

Rules for Coding COPIES

- Maximum copies is 255.
- If zero is specified, printing for this data set is bypassed.

Rule for Coding FORMS

The form-name can be from 1-8 characters in length.

Rules for Coding FCB

- FCB and CARRIAGE are mutually exclusive on the FORMAT statement.
- FCB should only be used when requesting a 3211 printer; otherwise it is ignored.
- Image-name is a 1-4 character description of the last characters of the FCB2xxxx module used to define the print image.

Rules for Coding CARRIAGE

- CARRIAGE and FCB are mutually exclusive on the FORMAT statement.
- If 6LPI is coded or if the parameter is omitted, the installation standard carriage tape is used.
- This field has a maximum of eight characters.
- For 3211 printers, a module must be included in SYS1.IMAGELIB for each carriage tape name.

Rules for Coding TRAIN

- If STANDARD is coded or if the parameter is omitted, the installation defined default (specified at initialization) is used. Since these are not standard machine features, verify that the installation has the required printer train before specifying one of the parameter values.
- The TRAIN parameter should not be used for output destined for a remote RJP terminal.
- The IBM-supplied train names are the chapter "Obtaining Output (JES3 only)". Check with the system programming group for installation-supplied and supported names.

Rule for Coding OVFL

For remote job processing, the overflow test is a responsibility of the terminal package for the remote RJP terminal. OVFL is ignored for remote job processing.

Examples of the Print Parameter

```
//*FORMAT    PR,DDNAME=REPORT,COPIES=2
```

This statement specifies that two original copies of the REPORT data set are requested. Any printer with standard forms, train, and carriage tape mounted can be used.

```
//*FORMAT    PR,DDNAME=,DEST=ANYLOCAL
```

This statement specifies that all data sets without FORMAT statements are printed on any local printed.

The Punch Parameter

The PU parameter specifies punch characteristics of a JES3 output data set.

For further information, see "Obtaining Output (JES3 only)."

```
//*FORMAT   PU,DDNAME=ddname
                   (ANYLOCAL             )
            [,DEST=)device-name          (]
                   )device-address       (
                   ((type[,group-name]) )
                     {1 }
            [,COPIES= {nn} ]
                     {STANDARD }
            [,FORMS=  {form-name}   ]
                   {YES}
            [,INT= {NO }]
```

Defaults: COPIES=1'
FORMS=STANDARD
INT=NO

DDNAME
specifies the qualified ddname of the data set to which this statement applies.

DEST
specifies the punch unit used for output.

ANYLOCAL
any device (either a printer or punch as defined by the output class on the DD statement) attached to the central CPU to receive the output data set.

device-name
1-8 alphameric or national character name of a local printer or punch (as defined by the system programming staff) to receive the output data set.

device-address
three character physical device address of the device to receive the output data set.

type
in the format gggssss where ggg is the general device classification (for example, PRT) and ssss is the specific device classification (for example, 3211) as defined by the system programming staff.

group-name
name of a group of local devices, an individual remote station, or a group of remote stations to receive the output data set. Specify DEST=(,LOCAL) to define the default group-name for local devices (that is, those local devices that are in no other group).

COPIES
specifies the number of copies of the data set that are punched.

FORMS
specifies the card forms used.

INT
specifies whether or not the output is interpreted.

- YES will cause an attempt to obtain a device type PUN3525I (a card punch with the interpret feature). If DEST does not include a 3525I, INT=NO is substituted.
- NO will cause no interpreting of these cards.

Rule for Coding DDNAME

When DDNAME=, is coded, the parameters specified on that statement apply to all punch data sets without FORMAT statements.

Rules for Coding DEST

- If the parameter is omitted, the first available punch unit in the job origin group (the group of printers defined for the local or remote submitting locations) that fulfill all processing requirements are assigned. If the job originated from a remote RJP terminal, the output is returned to the originating terminal group.
- The MAIN ORG parameter overrides the PU DEST parameter.

Rules for Coding COPIES

- Maximum copies is 255.
- If zero is specified, punching for this data set is bypassed.

Rules for Coding FORMS

- This field has a maximum length of eight characters.
- If the STANDARD initialization parameter is coded or if the FORMS parameter is omitted, the installation forms defaults are used.

Example of the Punch Parameter

```
//*FORMAT    PU,DDNAME=PUNCHOUT,DEST=PU1,FORMS=RED-STRP
```

One copy of the data set named PUNCHOUT is punched on unit PU1. Before processing, the operator is requested to insert "RED-STRP" cards into the designated punch.

The MAIN Statement

Control Statement

The MAIN statement defines the processor requirements for the current job. Many of the parameters are used to override parameters of the STANDARDS initialization control card.

```
                   ANY
                   JGLOBAL
                   JLOCAL
                   ASP
//*MAIN [SYSTEM=   main-name                                ]
                   (main-name,main-name,...)
                   /main-name
                   /(main-name,main-name,...)

         [,LINES=(nnn   ,WARNING  )]
                        ,W
                        ,CANCEL
                        ,C
                        ,DUMP
                        ,D

         [,CARDS=nnn    ,WARNING  )]
                        ,W
                        ,CANCEL
                        ,C
                        ,DUMP
                        ,D

         [,HOLD=  NO  ]
                  YES

         [,SETUP=  JOB                          ]
                   HWS
                   THWS
                   DHWS
                   ddname
                   (ddname,ddname,...)
                   /ddname
                   /(ddname,ddname,...)

         [,CLASS=class-name]

         [,FAILURE=  RESTART  ]
                     CANCEL
                     HOLD
                     PRINT
```

```
[,JOBSTEP=  NOCHKPNT  ]
            CHKPNT

[,TYPE=  ANY    ]
         MVT
         VS2/1
         VS2

[,NJPCLASS=class-name]

[,HOTJOB=  NO  ]
           YES

[,IORATE=  MED  ]
           HIGH
           LO

[,ORG=group-name]

[,DEADLINE=(time,type,[,  date        ])]
                          rel,cycle

[,FETCH=  ALL                    ]
          NONE
          SETUP
          ddname
          (ddname,ddname,...)
          /ddname
          /(ddname,ddname,...)

[,JPRTY=  JES3  ]
          JOB

[,LREGION=nnnnK]

[,PROC=  ST  ]
         xx

[,UPDATE=ST]

[,RINGCHK=  YES  ]
            NO
```

F(

M

Defaults:

- SYSTEM=ANY
- TYPE=ANY
- HOTJOB=NO
- JPRTY=HES3
- RINGCHK=YES
- PROC=ST
- If SETUP is not specified, the device requirements for mountable tape and disk volumes is based on an initialization parameter.
- If LINES, CARDS, FETCH, or IORATE are not specified, the installation default for this job class will be used.
- If CLASS or LREGION are not specified, JES3 will determine the value of LREGION based on initialization parameters.

SYSTEM
specifies the processor by name or class of system used for this job.

- ANY defaults to any system (global, local, or ASP) that will satisfy the job's requirements.
- JGLOBAL specifies that the job is to run on the global processor only.
- JLOCAL specifies that the job is to run on a local processor only.
- ASP specifies that the job is to run on any ASP main processor that will satisfy the job requirements. The definition implies TYPE=MVT or TYPE=VS2/1.
- main-name specifies the specific processors considered for this job.
- /main-name specifies the specific processors excluded from consideration for this job.

TYPE
specifies the control program used.

LINES
specifies the estimated number of lines of data, in thousands, printed for this job. The second group of subparameters (WARNING, CANCEL, DUMP) specifies the action taken when the line estimates are exceeded.

CARDS
specifies the estimated number of cards, in hundreds, punched for this job. The second group of subparameters (WARNING, CANCEL, DUMP) specifies the action taken when the line estimates are exceeded.

HOLD
specifies that the job will enter into the system in operator hold status and will be withheld from processing until the operator requests its release. This parameter is the same function as TYPRUN=HOLD on the JOB statement.

SETUP
modifies the standard setup algorithm used in assigning devices to a job prior to its execution.

- JOB indicates that device requirements for mountable units are calculated by the system for the entire job.
- HWS requests allocation of the minimal number of devices required to run the job (high watermark setup).
- THWS requests high watermark setup for tapes and job setup for disks. Job setup requests units for every unique volume in the job.
- DHWS requests high watermark setup for disks and job setup for tape.
- ddname specifies the DD statements (fully qualified) that are set up before a job enters execution (explicit setup).
- /ddname removes the specified DD names from consideration for setup (explicit setup).

CLASS
specifies the job class for this job.

FAILURE

specifies the job recovery option used in case of system failure. This does not apply to continuously active jobs (for ASP main processors only).

- CANCEL cancels the job for printing.
- HOLD holds the job for restart.
- PRINT prints the job and then puts the job in hold for restart.
- RESTART restarts the job when the failing processor is restarted.

JOBSTEP

specifies the job step checkpoint option for jobs on ASP main processors only.

- CHKPNT causes a checkpoint to be taken at the end of each job step on the ASP main processor.
- NOCHKPNT stops the checkpoint option.

NJPCLASS

specifies that this job is to be placed into an identifiable group of jobs that can be transmitted by network job processing.

HOTJOB

specifies a non-ending task scheduled by JES3 on an ASP main processor.

IORATE

specifies the I/O to CPU ratio for a job. This is used in an attempt to balance the mixture of jobs selected for execution on the processor.

ORG

specifies an override origin group name of the device used to enter the job on the JES3 system. This parameter will cause any output to be directed to the specified origin group. Normally, output from a job is directed to the same group of devices from which it originated.

DEADLINE

specifies the time that the job is due to be scheduled.

- time can be specified in minutes, hours, or 24-hour clock time. For example 1M is one minute, 1H is one hour, and 0800 is eight a.m.
- type is a single character identifier from A to Z or 0 to 9 and must match one of the installation deadline types. If the type is not defined, the job is flushed.
- date specifies the date when the time parameter will expire.
- rel specifies the day within the cycle when the deadline falls.
- cycle specifies weekly, monthly, or yearly periods for meeting the deadline.

FETCH

specifies an override of the installation defined FETCH parameter and determines which fetch messages will be issued to the operator for disk and tape volumes for this job.

- ALL specifies that all volumes in DD statements using JES3 setup devices, except permanently resident volumes, should be fetched.
- NONE specifies no fetch messages.
- SETUP specifies that volumes in DD statements specified in the MAIN SETUP parameter should be fetched. If no SETUP parameter is specified, the FETCH default is ALL.
- ddname specifies that only the volumes in DD statements specified will be fetched.
- /ddname specifies that all volumes specified should be not fetched.

JPRTY

specifies the execution priority used for a job (for ASP only).

- JES3 specifies that the job will execute using the DPRTY value from the SELECT initialization card.
- JOB specifies that the job will use the PRTY parameter from the JOB statement or the default for the job.

LREGION
specifies the approximate size of the largest step's working set in real storage during execution. LREGION (logical region) is used by JES3 to improve scheduling on a VS2/1 ASP main processor.

PROC
defines the private library searched for the catalog procedure to run the job.
ST specifies that the standard default procedure library is searched.
xx specifies that a particular procedure is searched.

UPDATE
indicates that this job updates the specified procedure library. This parameter causes all jobs using this library to be held until the update is complete.

RINGCHK
indicates whether a validation is to be made to determine the correct status of the tape reel ring for tape devices set up by JES3. RINGCHK=NO indicates that ring checking is to be by passed for this job.

Rules for Coding TYPE and SYSTEM

- If the TYPE control program requested is not active on the system, the job will wait indefinitely until the control program is active.
- If the control program is inconsistent with the SYSTEM parameter, the job will flushed. For example SYSTEM=REAL,TYPE=VS2 will not run. It must also be consistant with PROCESS statements as discussed in **OS/VS2 System Programming Library: Job Management,** GC28-0627.
- You do not always need to code either the TYPE or SYSTEM parameters becuase the installation often establishes defaults according to job class. Check this with the system programmer.

Rules for Coding LINES

- Definitions of the subparameters:
  WARNING - issue operator warning and continue processing.
  CANCEL - cancel the job.
  DUMP - cancel the job with a storage dump.
- LINES=0 only applies to jobs in the execution phase. After the first line is sent out for writing, the job will issue a warning, a cancel, or a dump, depending on what is requested. When printing the output, however, LINES=0 is ignored.

Rules for Coding CARDS

- Definitions of the subparameters:
  WARNING - issue operator warning and continue processing.
  CANCEL - cancel the job.
  DUMP - cancel the job with a storage dump.
- CARDS=0 only applies to jobs in the execution phase. After the first line is sent for punching, the job will issue a warning, a cancel, or a dump, depending on what is requested. When punching the output, however, CARDS=0 is ignored.

Rule for Coding SETUP

When specifying ddname, enough devices must be specified to allow JES3 allocation for the maximum number of devices required at any one time. If specified devices are insufficient, the job is canceled.

Rules for Coding CLASS

- The class-name can be 1-8 characters.
- If a single character class-name is used, it may be specified on the JOB statement.
- A valid CLASS parameter on the MAIN statement overrides a valid class parameter on the JOB statement.

Rule for Coding FAILURE

FAILURE is ignored if HOTJOBS is coded.

Rules for Coding NJPCLASS

- The class-name can be alphameric and consist of 1-8 characters. It can be specified as an actual terminal name if desired.
- The operator can initiate transmission of the entire group of jobs with one operator command rather than entering a separate command for each individual job.

Rules for Coding HOTJOB (for ASP main processors only)

- If a JES3 system failure occurs while a continuously active job is executing, JES3 can be restarted without interrupting its execution.
- If the continuously active jobs are using JES3 setup, the allocated devices will be reserved over a JES3 restart. As a result, there are no rescheduling requirements for these jobs after a JES3 restart.
- Continuously active jobs cannot use SYSIN or SYSOUT (if JES3 or ASP processes them), or run on global or local processors. The HOTJOB parameter is ignored for jobs scheduled on MVS processors.

Rules for Coding ORG

- The FORMAT statement will override the ORG parameter if specified for the particular data set.
- The MAIN ORG statement should precede all FORMAT statements that do not contain the DEST parameter. If it does not, the default for these data sets is where the job entered the system.

Rules for Coding DEADLINE

- Specify time in minutes, hours or 24-hour clock time.
- Specify type as a single character that is defined by the installation.
- Specify the date in the format MMDDYY. If the date is omitted, the current date is assumed provided that the current time is less than the deadline time. If the current time is greater, the next day's date is assumed.
- Specify cycle as WEEKLY, MONTHLY, or YEARLY for those production runs made periodically.
- Speicfy rel as a decimal digit from 1-366. Specifying rel modifies the cycle to indicate what day within the cycle the deadline falls. To specify Sunday of every week, code (1,WEEKLY) and to specify SATURDAY, code (7,WEEKLY). Weekly values default to 7 if specified greater than 7. Monthly values are 1-31; 29, 30, and 31 are treated as the last day of the month even for months with less days. Monthly values default to 31. Yearly values are 1-365; 365 is treated as the last day (the default) of the year for all non-leap years. Leap year defaults to 366.

- If the current date is specified and the job is submitted after the deadline time, all of the priority changes are applied to make the job the same priority level it would have been if it had been submitted prior to the deadline and not completed.

Rules for Coding JPRTY

- If the parameter is omitted or if JES3 is specified, the execution priority is assigned from the DPRTY value on the SELECT statement.
- Job priority is changed after job selection but before job execution. Therefore the original priority is used for job selection and for any post-execution processing.
- PRTY does not apply to job execution. JPRTY overrides the PRTY field and establishes job execution priority if JPRTY=JES3.

Rule for Coding LREGION

Consult the system programming staff for guidance in using the LREGION parameter. If the values selected for LREGION are too small, the job may run slower.

Rules for Coding PROC

- If a procedure is specified for which there is not corresponding PROCLIB entry, the job is flushed.
- ST is the default private procedure library.

Rules for Coding UPDATE

- If a procedure is specified for which there is no corresponding PROCLIB entry, the job is flushed.

Examples of Coding the MAIN Statement

```
//*MAIN SYSTEM=SY1,LINES=(5,C),SETUP=HWS,
//*FAILURE=RESTART,DEADLINE=(0800,A,3,WEEKLY)
```

The job will execute on system SY1. It is estimated to produce 5000 lines of printed output and if the output exceeds 5000 lines, the job will be canceled. HWS specifies that a minimum number of devices required for this job will be allocated. In the event of a system failure, the job will be restarted on the ASP main processor. JES3 will attempt to complete this job by 8 a.m. every Tuesday (Tuesday is day number 3) by adjusting the job's scheduling priority using the installation-defined A type deadline scheduling parameters.

```
//*MAIN TYPE=VS2/1,HOLD=YES,CLASS=TEST1,FAILURE=CANCEL
```

The job will execute on an ASP main processor that is using OS/VS2 Release 1 as its control program. The job will initially be placed in hold status until the operator requests its release. The job is assigned to a class called TEST1. TEST1 must be installation-defined. Job selection will be based on the priority of class TEST1. In the event of system failure, the job will be canceled.

The NET Statement

Control Statement

The NET statement defines the dependencies between jobs in a dependent job net.

For more information, see “Dependent Job Control” earlier in this book.

```
//*NET {NETID}
       {ID   }  =name
       {NHOLD}
    [, {HC   }  =n]
       {RELEASE}
    [, {RL     }=(jobname1,jobname2,...jobnamen)]
       {NORMAL}   {D}
    [, {NC    } = {F}  ]
                  {R}
       {ABNORMAL}  {D}
    [, {AB      }= {F}  ]
                   {R}
       {OPHOLD}   {NO }
    [, {OH    } = {YES}]
       {RELSCHCT}
    [, {RS      }   =n]
       {NETREL}
    [, {NR    }     =(netid,jobname)]
                {ANY}
    [,DEVPOOL=( {NET},device-name,number[,device-name,number,...]))]
                {YES}
    [,DEVRELSE= {NO } ]
```

Defaults: NORMAL=D
ABNORMAL=R
OPHOLD=NO
DEVPOOL=ANY
DEVRELSE=NO

NETID
specifies the name of the job-net containing this job.

NHOLD
specifies the number of immediate predecessor job completions required before this job can be released for scheduling.

RELEASE
specifies the jobnames of successor jobs for this particular job.

NORMAL and ABNORMAL
specifies the action taken for this job when any predecessor normally or abnormally completes execution.

- D means decrement the NHOLD count (the number of predecessors) of this job. If the NHOLD count goes to zero, this job becomes eligible for scheduling.
- F means flush the job and its successors from the system. The job is canceled, any output printed, and all successors canceled regardless of their normal or abnormal specifications.
- R means retain this job in the system and do not decrement the NHOLD count. This suspends the job and its successors from scheduling until either the precedessor job is resubmitted or the operator decreases the NHOLD count.

OPHOLD

specifies that the job is placed in DJC - operator hold. This prevents scheduling of this job until it is explicitly released from DJC operator hold by the operator.

RELSCHCT

specifies set up of a dependent job's resources and holding of jobs before all of its predecessors have completed execution.

NETREL

specifies that a job in one job net can be a predecessor to a job in another job net.

DEVPOOL

specifies devices to be dedicated to this dependent job control net.

- ANY indicates that jobs in the net can use any dedicated or non-dedicated device, but will attempt allocation from this dedicated pool first.
- NET indicates that jobs can use only devices dedicated to the net.
- device-name and number indicates the name and number of dedicated devices.

DEVRELSE

specifies that all devices dedicated to dependent job control net should be released.

General Rules for Coding

- Only one NET statement can be defined for each job of a job net.
- The parameters on the NET statement can be coded in any order.
- The RELEASE parameter is the only parameter on the NET statement that can be split and continued on a NET statement.

Rules for Coding NETID

- The NETID name can be 1-8 characters in length, the first character must be alphabetic.
- All jobs put into the system with the same net-id form a dependent job control (DJC) net.
- NETIDs must be unique within the JES3 system. Duplicate job nets cannot exist since a job has the same NETID as an existing job net is added as a member of that job net.

Rules for Coding NHOLD

- N has a range of 1 to 32,767 to designate predecessor jobs.
- If N is zero or is not specified, then this job has no predecessors and is immediately eligible for scheduling.
- If an incorrect NHOLD count is specified, two situations can occur:
  1. If N is greater than the actual number of predecessor jobs, then this job is not released from DJC hold when all of its predecessors complete execution.
  2. If N is less than the actual number of predecessor jobs, this job is prematurely released from DJC hold.

Rules for Coding RELEASE

- From 1 to 50 successor jobnames can be specified.
- Jobnames can be from 1-8 characters, the first character must be alphabetic.
- RELEASE values can be split on a NET continuation statement.

Rules for Coding RELSCHCT

- N has a range of 1 to 32,767
- If N is zero or is not specified, there is no early set up of dependent jobs.
- This parameter must not be specified for a job that may have catalog dependencies in dependent job control.
- Do not specify RELSCHCT for nonstandard DJC jobs. Nonstandard DJC jobs are explained in **OS/VS2 System Programming Library: Job Management**, GC26-0627.

Rules for Coding NETREL

- To identify the successors to this job that are in another net, the successor's jobname and the NETID must be defined as parameters of the NETREL keyword.
- The NETREL parameter can be specified once for each job of a given job-net. NETREL values identify all networks and jobs released.

Rules for Coding DEVPOOL

- This parameter is only recognized when found in the first job entered into the system specifying this job net-id.
- The first subparameter indicates what devices are eligible for volume mounting by jobs in the net.
- The device-name can be any name specified in the UNIT subparameter except unit address or an installation-defined name (that is, names defined to JES3 by the installation).
- The device-name and number can be repeated for additional devices eligible for volume mounting up to a maximum that will fit on one card.

Rules for Coding DEVRELSE

- This parameter can be specified on one or more jobs in the net but cannot be specified on the first job.
- The first completing job that has specified DEVRELSE=YES causes the devices dedicated to the net to be released. If DEVRELSE is not specified, all dedicated devices are released when the last job in the net ends.

Example of Coding the NET Statement

```
//*NET   ID=NET01,NHOLD=0,AB=F,DEVPOOL=3330,2
```

In this example, the job defines a job net named NET01. There are no predecessor jobs. In the event the job fails, all successor jobs in NET01 are flushed. The DEVPOOL parameter (which must be coded with the first job in the net) requests a device pool of two 3330s to be established for the job net.

The OPERATOR Statement

Control Statement

The OPERATOR statement transmits any desired message to the operator. Columns 1 through 80 are sent to the LOG console when the job enters the JES3 queue.

```
//*OPERATOR text
```

Example of the OPERATOR Statement

```
//*OPERATOR CALL EXT.   641 WHEN THIS JOB STARTS
```

The PAUSE Statement

Control Statement

An input reader can be halted temporarily by punching the psuedo command, PAUSE, starting in column 5. The PAUSE statement can be entered through any reader. The reader then issues a message and waits for operator reply. The use of the PAUSE statement is intended primarily for system checkout and test. It is recognized only if submitted before the JOB statement in the input stream. It is recommended for remote users only.

```
//**PAUSE
```

Rules for Coding

- At least two blanks must follow the word PAUSE before comments are added.
- The PAUSE statement can be entered through any reader.

Example of the PAUSE Statement

```
//**PAUSE
```

OPEF
PAUS

Reference Tables

The first section of this appendix summarizes the DD statement parameters required to perform the following functions:

- Create a data set on an unit record device (card punch or printer)
- Create a data set on a system output device
- Create a data set on magnetic tape
- Create a data set on a direct access device
- Retrieve a data set fron an unit record device (card reader or paper tape reader)
- Retrieve a data set from the input stream
- Retrieve a passed data set (magnetic tape or direct access)
- Retrieve a cataloged data set (magnetic tape on direct access)
- Retrieve a kept data set (magnetic tape or direct access)
- Extend a passed data set (magnetic tape or direct access)
- Extend a cataloged data set (magnetic tape or direct access)
- Extend a kept data set (magnetic tape or direct access)

Also included are tables for:

- retrieving or extending an Indexed Sequential Data Set
- area arrangement of Indexed Sequential Data Sets
- mutually-exclusive DD parameters
- disposition processing
- direct access capacities
- track capacities
- the JOB statement
- the EXEC statement
- the DD statement

Device	Parameter Type	Parameter	Comments
Unit Record Devices	Location of the Data Set	UNIT	Required
	Data Attributes	DCB	Optional
	Special Processing Options	UCS	Optional (for a printer with the universal character set feature)
		FCB	Optional (for a 3211 printer if forms control information is to be specified)
		FREE	Optional
		DUMMY	Optional
System Output Devices	Location of the Data Set	SYSOUT	Required. Specifies the output class
	Data Attributes	DCB	Optional
	Special Processing Option	OUTLIM	Optional
		FREE	Optional
		DEST	Optional
		DSID	Required for output to a 3540 diskette
		HOLD	Optional
		COPIES	Optional
Magnetic Tape	Data Information	DSNAME (or DSN)	Required if the data set is to be cataloged or used by a later job
		DISP	Required if the data set is to be cataloged, used by a later step in this job, or used by another job
	Location of the Data Set	UNIT	Required unless you request (with the VOLUME parameter) the same volume used for an earlier data set in your job
		VOLUME (or VOL)	Required if you want a specific volume. If you do not use this parameter you will get a scratch tape
		LABEL	Required if you do not want to use IBM standard labels for the data set
	Data Attributes	DCB	Optional
	Special Processing Options	DUMMY	Optional
		CHKPT	Optional
		FREE	Optional
Direct Access Devices	Data Set Information	DSNAME (or DSN)	Required if the data set is to be cataloged or used by a later job
		DISP	Required if the data set is to be cataloged, used by a later step in this job, or used by another job
	Location of the Data Set	UNIT	Required unless you request (with the VOLUME parameter) the same volume used for an earlier data set in your job
		VOLUME (or VOL)	Required if you want a specific volume or multiple volumes. If you do not use this parameter your data set will be allocated on any suitable volume
		LABEL	Required if you want the data set to have both IBM standard and user labels
	Size of the Data Set	SPACE	SPACE must be used for ISAM data sets
	Data Attributes	DUMMY	Optional
		DYNAM	Optional
		FREE	Optional

Figure 19. DD Parameters for Creating a Data Set (Part 1 of 2)

Device	Parameter Type	Parameter	Comments
Mass Storage System (MSS)	Data Set Information	DSNAME (or DSN)	Required if the data set is to be cataloged or used by another job
		DISP	Required if the data set is to be cataloged, used by a later step in the job, or used by another job
	Location of Data Set	UNIT	Required unless you request (with the VOLUME parameter) the same volume used for an earlier data set in your job
		VOLUME (or VOL)	Required for specific volume requests. Use MSVGP instead of VOL=SER if a nonspecific volume in a specific MSS volume group is desired. If neither is coded, the system will select an already mounted 3330V volume (storage or public) unless PRIVATE is coded
		LABEL	Required if you want the data set to have both IBM standard and user labels
		MSVGP	Required if a nonspecific volume in a specific MSS volume group is required
	Size of Data Set	SPACE	Required unless MSVGP is coded
	Data Attributes	DUMMY	Optional
		DYNAM	Optional
		FREE	Optional

Figure 19. DD Parameters for Creating a Data Set (Part 2 of 2)

Data Set	Parameter Type	Parameter	Comments
Unit Record Devices	Location of the Data Set	UNIT	Required
	Data Attributes	DCB	Optional
	Special Processing Option	DUMMY	Optional
		FREE	Optional
Input Stream	Location of the Data Set	*	You must specify one of these parameters
		DATA	
	Special Processing Option	DLM	Optional
		FREE	Optional
Associated Data Set	Location of Data Set	*	You must specify one of these parameters
		DATA	
	Data Set Information	DSID	Required for 3540 associated data sets
		VOL=SER	Optional for 3540 associated data sets
Passed Data Set	Data Set Information	DSNAME	Required
		DISP	Required
	Location of the Data Set	UNIT	Required only if you want more units
		LABEL	Required only if the data set does not have IBM standard labels
	Data Attributes	DCB	Optional
	Special Processing Option	FREE	Optional
		CHKPT	Optional
		DUMMY	Optional
Cataloged Data Set	Data Set Information	DSNAME	Required
		DISP	Required
	Location of the Data Set	UNIT	Optional
		VOLUME	May be required if you want to begin processing with a volume after the first
		LABEL	Required only if the data set does not have IBM standard labels
	Special Processing Options	DUMMY	Optional
		DYNAM	Optional
		FREE	Optional
		CHKPT	Optional
Kept Data Set	Data Set Information	DSNAME	Required
		DISP	Required
	Location of the Data Set	UNIT	Required
		VOLUME	Required
		LABEL	Required only if the data set does not have IBM standard labels
	Data Attributes	DCB	Optional
	Special Processing Options	DUMMY	Optional
		DYNAM	Optional
		FREE	Optional
		CHKPT	Optional

Figure 20. DD Parameters for Retrieving a Data Set

Data Set	Parameter Type	Parameter	Comments
Passed Data Set	Data Set Information	DSNAME	Required
		DISP	Required
	Location of the Data Set	UNIT	Required only if you want more units
		VOLUME	Required only if you need more volumes
		LABEL	Required only if the data set does not have IBM standard labels
	Size of the Data Set	SPACE	Required only if you want to override the secondary quantity
	Data Attributes	DCB	May be required if data set does not have IBM standard labels
	Special Processing Option	FREE	Optional
		CHKPT	Optional
		DUMMY	Optional
Cataloged Data Set	Data Set Information	DSNAME	Required
		DISP	Required
	Location of the Data Set	UNIT	Optional
		VOLUME	Required only if you need more volumes
		LABEL	Required only if the data set does not have IBM standard labels
	Size of the Data Set	SPACE	Required only if you want to override the secondary quantity
	Data Attributes	DCB	Required only if the data set does not have IBM standard labels
	Special Processing Options	DUMMY	Optional
		FREE	Optional
		CHKPT	Optional
Kept Data Set	Data Set Information	DSNAME	Required
		DISP	Required
	Location of the Data Set	UNIT	Required
		VOLUME	Required
		LABEL	Required only if data set does not have IBM standard labels
	Size of the Data Set	SPACE	Required only if you want to override the secondary quantity
	Data Attributes	DCB	Required only if the data set does not have IBM standard labels
	Special Processing Options	DUMMY	Optional
		DYNAM	Optional
		FREE	Optional
		CHKPT	Optional

Figure 21. DD Parameters for Extending a Data Set

Area	Parameter Type	Parameter	Comments
Index (used only if index area not on same device type as prime area) (First DD statement)	Data Set Information	DSNAME	Required. You must code the same value as in second DD statement.
		DISP	Required. You must code the same value as in second DD statement.
	Location of the data set	UNIT	Required
		VOLUME	Required
	Data Attributes	DCB	Required
Prime and Overflow; or Index, Prime, and Overflow; or Index and Prime (required) (Second DD statement)	Data Set Information	DSNAME	Required
		DISP	Required. Specifies whether you are retrieving the data set.
	Location of the data set	UNIT	Required unless it is a passed data set with all three areas on one volume.
		VOLUME	Same requirement as UNIT. If used, code volumes in order they were defined.
	Data Attributes	DCB	Required
Overflow (used only if overflow area not on same device type as prime area) (Third DD Statement)	Data Set Information	DSNAME	Required. You must code the same value as in second DD statement.
		DISP	Required. You must code the same value as in the second DD statement.
	Location of the data set	UNIT	Required
		VOLUME	Required
	Data Attributes	DCB	Required

Figure 22. DD Parameters for Retrieving or Extending an Indexed Sequential Data Set

CRITERIA			RESTRICTIONS ON DEVICE TYPES AND NUMBER OF DEVICES REQUESTED	RESULTING ARRANGEMENT OF AREAS
1. Number of DD statements	2. Area defined on a DD statement	3. Index size coded ?		
3	INDEX PRIME OVFLOW	-	None	Separate index, prime, and overflow areas.
2	INDEX PRIME	-	None	Separate index and prime areas.[1]
2	PRIME OVFLOW	No	None	Separate prime and overflow areas. An index area is at the end of the overflow area.
2	PRIME OVFLOW	Yes	The statement defining the prime area cannot request more than one device.	Separate prime and overflow areas. An index area is embedded in the prime area.
1	PRIME	No	None	Prime area with index area at its end.[2]
1	PRIME	Yes	Cannot request more than one device.	Prime area with embedded index area.

[1] If both areas are on volumes that correspond to the same device type, an overflow area is established if one of the cylinders allocated for the index area is only partially used. The overflow area is established in the unused portion of that cylinder.

[2] If the unused portion of the index area is less than one cylinder, it is used as an overflow area.

Figure 23. Area Arrangement of Indexed Sequential Data Sets

	*	AMP	CHKPT	COPIES	DATA	DCB	DDNAME	DEST	DISP	DLM	DSID	DSNAME	DUMMY	DYNAM	FCB	FREE	HOLD	LABEL	MSVGP	OUTLIM	QNAME	SPACE	SYSOUT	TERM	UCS	UNIT	VOLUME
*	▨																										
AMP	▨	▨																									
CHKPT	▨	□	▨																								
COPIES	▨	□	□	▨																							
DATA	▨	□	▨	▨	▨																						
DCB	□	▨	□	□	□	▨																					
DDNAME	▨	▨	▨	□	▨	□	▨																				
DEST	▨	□	□	□	▨	□	▨	▨																			
DISP	▨	□	□	□	▨	□	▨	□	▨																		
DLM	□	□	□	□	□	□	▨	□	□	▨																	
DSID	□	□	□	□	□	□	▨	□	□	□	▨																
DSNAME	▨	□	□	▨	▨	□	▨	□	□	□	□	▨															
DUMMY	▨	□	□	□	▨	□	▨	□	□	□	□	□	▨														
DYNAM	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨													
FCB	▨	▨	□	□	▨	□	▨	□	□	□	□	□	□	▨	▨												
FREE	▨	□	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	▨											
HOLD	▨	□	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	□	▨										
LABEL	▨	□	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	□	□	▨									
MSVGP	▨	□	□	▨	▨	□	▨	□	□	□	▨	□	□	▨	□	□	□	□	▨								
OUTLIM	▨	□	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	□	□	□	□	▨							
QNAME	▨	▨	□	□	▨	□	▨	□	□	□	□	▨	□	▨	□	□	□	□	▨	□	▨						
SPACE	▨	▨	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	□	□	□	□	□	□	▨					
SYSOUT	▨	▨	▨	□	▨	□	▨	□	▨	□	□	□	□	▨	□	□	□	▨	▨	□	▨	□	▨				
TERM	▨	▨	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	□	□	□	□	□	□	□	□	▨			
UCS	▨	□	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	□	□	□	□	□	□	□	□	□	▨		
UNIT	▨	□	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	□	□	□	□	□	□	□	□	□	□	▨	
VOLUME	▨	□	□	□	▨	□	▨	□	□	□	□	□	□	▨	□	□	□	□	□	□	□	□	▨	□	□	□	▨

Legend: This table shows which DD parameters cannot be coded together. At the intersection of the horizontal and vertical columns, the square will be black if the parameters are mutually exclusive and white if they can be coded together on the same DD statement.

For example, to see if DISP and SYSOUT are mutually exclusive, look down the column marked DISP and across the column marked SYSOUT. In this case, they are mutually exclusive.

As indicated by the table, each DD parameter is mutually exclusive with itself; that is, it cannot appear twice on the same DD statement.

Figure 24. Table of Mutually Exclusive DD Parameters

Status	Requested Disposition	Conditional Disposition	Action Taken at Normal End of Step[1]	Action Taken at Abnormal End of Step[1], when Step Fails Due to:		Action Taken at End of Job
				Program canceled or abnormally terminated	Subsequent data set allocation for same step failed	
NEW or MOD[2]	none	none	deleted	deleted	deleted	
	KEEP	none	kept	kept	deleted	
	DELETE	none	deleted	deleted	deleted	
	CATLG	none	cataloged	cataloged	deleted	
	PASS	none	passed	passed	passed	deleted
	PASS	any	passed	passed	passed	deleted[5]
	any except PASS	KEEP	requested disposition	kept	deleted	
	any except PASS	DELETE	requested disposition	deleted	deleted	
	any except PASS	CATLG	requested disposition	cataloged	deleted	
OLD or MOD or SHR	none	none	kept	kept	kept	
	KEEP	none	kept	kept	kept	
	DELETE	none	deleted	deleted	kept	
	CATLG	none	cataloged[3]	cataloged[3]	kept	
	UNCATLG	none	uncataloged	uncataloged	kept	
	PASS	none	passed	passed	passed	kept
	PASS	any	passed	passed	passed	kept[6]
	any except PASS	KEEP	requested disposition	kept	kept[4]	
	any except PASS	DELETE	requested disposition	deleted	kept[4]	
	any except PASS	CATLG	requested disposition	cataloged[3]	kept[4]	
	any except PASS	UNCATLG	requested disposition	uncataloged	kept[4]	

Footnotes:

[1] See list of exceptions in right-hand column.

[2] If volume information is not available to the system, a MOD data set is considered to be a new data set.

[3] If volumes were added to a data set for which unit and volume information was retrieved from the catalog, the data set is actually recataloged.

[4] If the step was attempting to receive a passed data set which was new when initially passed, the data set is deleted.

[5] If any job steps reached abnormal termination, the conditional disposition will be processed. Otherwise, the data set is deleted.

[6] If any job steps reached abnormal termination, the conditional disposition will be processed. Otherwise, the data set is kept if it was old when initially passed in the job, or deleted if it was new when originally passed in the job.

List of Exceptions:

- When a nontemporary data set is passed and the receiving step does not assign it a disposition, the system will, upon termination of this step, do one of two things. If the data set was new when it was initially passed, it will be deleted. If the data set was old when initially passed, it will be kept. Temporary data sets are deleted.
- If automatic step restart is to occur, all data sets in the restart step with a status of OLD are kept. All data sets in the restart step with a status of NEW are deleted.
- If automatic checkpoint restart is to occur, all data sets currently in use by the job are kept.
- If a data set is assigned a temporary name or no name, a conditional disposition other than DELETE is invalid. The system assumes DELETE.
- If a tape data set is unopened, it receives no disposition processing.
- If the data set is not allocated, then no action is taken.

Figure 25. Disposition Processing Chart

Device	2314 (each volume)	2305	3330	3330 Mod II	3340
Storage Medium	Disk	Disk	Disk	Disk	Disk
Cylinders	200	Model 1: 48 Model 2: 96	404	808	696 (70-megabytes) 348 (35-megabytes)
Tracks Per Cylinder	20	8	19	19	12
Bytes Per Track	7,294	Model 1: 14,136 Model 2: 14,660	13,030	13,030	8368
Bytes Per Cylinder	145,880	Model 1: 113,088 Model 2: 117,280	247,570	247,570	100,416
Bytes Per Device (in millions)	29.17	Model 1: 5.4 Model 2: 11.3	101.6	201.7	69.8 (70-megabytes) 34.9 (35-megabytes)

Figure 26. Direct Access Capacities

Maximum Bytes per Record Formatted without Keys					Records per Track	Maximum Bytes per Record Formatted with Keys				
2314	2305-1	2305-2	3330 and 3330 Mod II	3340		2314	2305-1	2305-2	3330 and 3330 Mod II	3340
7294	14136	14660	13030	8368	1	7249	13934	14569	12974	8293
3520	6852	7231	6447	4100	2	3476	6650	7140	6391	4025
2298	4424	4754	4253	2678	3	2254	4222	4663	4197	2603
1693	3210	3516	3156	1966	4	1649	3008	3425	3100	1891
1332	2480	2773	2498	1540	5	1288	2278	2682	2442	1465
1092	1996	2278	2059	1255	6	1049	1794	2187	2003	1180
921	1648	1924	1745	1052	7	877	1446	1833	1689	977
793	1388	1659	1510	899	8	750	1186	1568	1454	824
694	1186	1452	1327	781	9	650	984	1361	1271	706
615	1024	1287	1181	686	10	571	822	1196	1125	611
550	892	1152	1061	608	11	506	690	1061	1005	533
496	782	1040	962	544	12	452	580	949	906	469
450	688	944	877	489	13	407	486	853	821	414
411	608	863	805	442	14	368	406	772	749	367
377	538	792	742	402	15	333	336	701	686	327
347	478	730	687	366	16	304	276	639	631	291
321	424	676	639	335	17	277	222	585	583	260
298	376	627	596	307	18	254	174	536	540	232
276	334	584	557	282	19	233	132	493	501	202
258	296	544	523	259	20	215	94	453	467	184
241	260	509	491	239	21	198	58	418	435	164
226	230	477	463	220	22	183		386	407	145
211	200	448	437	204	23	168		357	381	129
199	174	421	413	188	24	156		330	357	113
187	150	396	391	174	25	144		305	335	99
176	128	373	371	161	26	133		282	315	86
166	106	352	352	149	27	123		261	296	74
157	88	332	335	137	28	114		241	279	62
148	70	314	318	127	29	105		223	262	52
139	52	297	303	117	30	96		206	247	42

Figure 27. Track Capacities

The JOB Statement

//Name	Operation	Operand	P/K	Comments
//jobname	JOB	([account number] [,additional accounting information,...])	P	Identifies accounting information. Can be made mandatory.
		$\left[\text{ADDRSPC} = \begin{Bmatrix}\text{VIRT}\\ \text{REAL}\end{Bmatrix}\right]$	K	Requests storage type.
		[CLASS=jobclass]	K	Assigns a job class to each job.
		[COND=((code,operator),...)]	K	Specifies test for a return code.
		[MSGCLASS=output class]	K	Assigns an output class for the job.
		$\left[\text{MSGLEVEL=(}\begin{bmatrix}0\\1\\2\end{bmatrix}\begin{bmatrix},0\\,1\end{bmatrix}\text{)}\right]$	K	Specifies what job output is to be written.
		[NOTIFY=user identification]	K	Requests a message be sent to a time-sharing terminal.
		[PERFORM=n]	K	Specifies the performance group a job belongs to.
		[programmer's name]	P	Identifies programmer. Can be made mandatory.
		[PRTY=priority]	K	In JES3, specifies a job's initiation priority within its job class.
		$\left[\text{RD=}\begin{Bmatrix}\text{R}\\ \text{RNC}\\ \text{NC}\\ \text{NR}\end{Bmatrix}\right]$	K	Specifies restart facilities to be used.
		[REGION=valueK]	K	Specifies amount of storage space.
		$\left[\text{RESTART=(}\begin{Bmatrix}*\\ \text{stepname}\\ \text{stepname.procstepname}\end{Bmatrix}\text{[,checkid])}\right]$	K	Specifies restart facilities for deferred restart.
		$\left[\text{TIME=}\begin{Bmatrix}\text{([minutes] [,seconds])}\\ \text{1440}\end{Bmatrix}\right]$	K	Assigns a job a CPU time limit.
		$\left[\text{TYPRUN=}\begin{Bmatrix}\text{HOLD}\\ \text{SCAN}\\ \text{COPY}\end{Bmatrix}\right]$	K	Holds a job in job queue, scans JCL for syntax errors, or copies the input deck to SYSOUT.

Legend:

P	Positional parameter.
K	Keyword parameter
{ }	Choose one.
[ ]	Optional; if more than one line is enclosed, choose one or none.

Figure 28. The JOB Statement

The EXEC Statement

//Name	Operation	Operand	P/K	Comments
// [stepname]	EXEC	[ACCT [.procstepname] = (accounting information,...)]	K	Accounting information for step.
		[ADDRSPC={VIRT REAL}]	K	Requests storage type.
		[COND [.procstepname] = ({ (code,operator) (code,operator,stepname) (code,operator,stepname.procstepname) } ,... [,] [EVEN ONLY])]	K	Specifies a test for a return code.
		[DPRTY [.procstepname]=([value1] [,value2])]	K	Specifies dispatching priority for a job step.
		[DYNAMNBR [.procstepname] =n]	K	Specifies dynamic allocation.
		[PARM [.procstepname] =value]	K	Passes variable information to a program at execution time.
		[PERFORM [.procstepname] =n]	K	Specifies a performance group for a job.
		[PGM= {program name *.stepname.ddname *.stepname.procstepname.ddname}]	P	Identifies program.
		[[PROC=] procedure name]	P	Identifies a cataloged or instream procedure.
		[RD [.procstepname] = {R RNC NC NR}]	K	Specifies restart facilities to be used.
		[REGION=valueK]	K	Specifies amount of storage space.
		[TIME [.procstepname] = { ([minutes] [,seconds]) 1440 }]	K	Assigns step CPU time limit.

Legend:

K	Keyword parameter.
P	Positional parameter.
{ }	Choose one.
[ ]	Optional; if more than one line is enclosed, choose one or none.

Figure 29. The EXEC Statement

The DD Statement

//Name	Oper-ation	Operand	P/K	Comments
//[ddname procstepname. ddname]	DD	[*]	P	Defines data set in the input stream.
		[AMP=(AMORG ,'BUFNO=number' ,'BUFNI=number' ,'BUFSP=number' ,'CROPS= {RCK' NCK' NRE' NRC'} ,'OPTCD= {I' L' IL'} ,'RECFM= {F' FB' V' VB'} ,'STRNO=number' ,'SYNAD=modulename' ,TRACE)]	K	Completes the access method control block (ACB) for VSAM data sets.
		[CHKPT=EOV]	K	For checkpoint at end of volume.
		[COPIES=nnn]	K	Requests multiple copies of output data set.
		[DATA]	P	Defines data set in the input stream.
		[DCB=(list of attributes) DCB=({dsname *.ddname *.stepname.ddname *.stepname.procstepname.ddname} [,list of attributes])]	K	Completes the data control block (used for all data sets except VSAM).
		[DDNAME=ddname]	K	Postpones the definition of a data set.
		[DEST=destination]	K	Specifies remote destination for output data set.
		[DISP=([NEW OLD SHR MOD ,] [,DELETE ,KEEP ,PASS ,CATLG ,UNCATLG ,] [,DELETE ,KEEP ,CATLG ,UNCATLG])]	K	Assigns a status, disposition, and conditional disposition to the data set.
		[DLM=delimiter]	K	Assigns delimiter other than /*.
		[DSID=(id[,V])]	K	Indicates to a diskette reader that data is to be merged into the JCL stream at this point or specifies the name to be given to a SYSOUT data set written on a diskette.

Figure 30. The DD Statement (Part 1 of 3)

The DD Statement (con't)

//Name	Oper-ation	Operand	P/K	Comments
//[ddname procstepname. ddname]	DD	[{DSNAME DSN} = {dsname dsname(member name) dsname(generation number) dsname(area name) &&dsname &&dsname(member name) &&dsname(area name) *.ddname *.stepname.ddname *.stepname.procstepname.ddname}]	K	Assigns a name to a new data set or to identify an existing data set.
		[DUMMY]	K	Bypasses I/O operations on a data set (BSAM and QSAM).
		[DYNAM]	P	Specifies dynamic allocation.
		[FCB=(image-id [,ALIGN ,VERIFY])]	K	Specifies forms control information. The FCB parameter is ignored if the data set is not written to a 3211 or 1403 printer.
		[FREE= {END CLOSE}]	K	Specifies dynamic deallocation.
		[HOLD= {YES NO}]	K	Specifies whether output processing is to be deferred or processed normally.
		[LABEL=([data set seq #] [,SL ,SUL ,AL ,AUL ,NSL ,NL ,BLP ,LTM ,] [,PASSWORD ,NOPWREAD ,] [,IN ,OUT] [,] [EXPDT=yyddd RETPD=nnnn])]	K	Supplies label information.
		[MSVGP=id]	K	Identifies a mass storage group for a mass storage system (MSS) device.
		[OUTLIM=number]	K	Limits the number of logical records you want included in the output data set.
		[QNAME=process name]	K	Specifies the name of a TPROCESS macro which defines a destination queue for messages received by means of TCAM.
		[{SPACE=({TRK CYL blocklength},(primary quantity [,secondary quantity ,] [,directory ,index]) [,] [,RLSE] [,CONTIG ,MXIG ,ALX ,] [,ROUND])	K	Assigns space on a direct access volume for a new data set.
		SPACE=(ABSTR,(primary quantity,address [,directory ,index]))}]	K	Assigns specific tracks on a direct access volume for a new data set.
		[SYSOUT=(class name [,program name ,] [,form number])]	K	Assigns an output class to an output data set.
		[TERM=TS]	K	Identifies a time-sharing user.

Figure 30. The DD Statement (Part 2 of 3)

The DD Statement (con't)

//Name	Oper-ation	Operand	P/K	Comments
// [ddname procstepname. ddname]	DD	[UCS=(character set code [,FOLD] [,VERIFY])] [,]	K	Requests a special character set for a 3211 or a 1403 printer.
		[{UNIT=([unit address device type user-assigned group name] [,unit count ,P ,] [,DEFER]) UNIT=AFF=ddname}]	K	Provides the system with unit information.
		[{VOLUME VOL} =([PRIVATE][,] [,volume seq number ,] [,volume count ,] [,] [SER=(serial number,...) REF=dsname REF=*.ddname REF=*.stepname.ddname REF=*.stepname.procstepname.ddname])]	K	Provides the system with volume information.

Legend:

P Positional parameter.
K Keyword parameter.
{ } Choose one.

[ ] Enclosing subparameter, indicates that subparameter is optional; if more than one line is enclosed, choose one or more.

Figure 30. The DD Statement (Part 3 of 3)

Glossary

The following terms are defined as they are used in this manual. If you do not find the term you are looking for, refer to the Index or to the **IBM Data Processing Glossary,** GC20-1699.

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address space. The virtual storage assigned to a job, TSO user, or a task initiated by the START command. Each address space consists of the same range of addresses.

affinity. (See volume affinity, unit affinity.)

allocate. To assign a resource for use in performing a specific task.

ASP. Asymmetric multiprocessing system that provides supplimentary support for job management, data management, and task management, performing such functions as scheduling input readers and output writers.

ASP main processor. The MVT or SVM processor that executes jobs assigned to it by a JES3 global processor.

associated data set. Data set on a 3540 diskette volume that is separate from the job stream data set and is to be spooled as a SYSIN data set.

automatic priority group (APG). In VS2, a group of tasks at a single priority level that are dispatched according to a special algorithm that attempts to provide optimum use of CPU and I/O resources by these tasks.

automatic restart. A restart that takes place during the current run, that is, without resubmitting a job; an automatic restart can occur within a step or at the beginning of a step. Contrast with deferred restart.

auxiliary storage. Data storage other than main storage; secondary storage.

backward reference. A facility of the job control language that permits you to copy information from or refer to DD statements that appear earlier in the job.

card image form. Column binary.

catalog. The collection of all data set indexes that are used by the control program to locate a volume containing a specific data set.

cataloged data set. A data set that is represented in an index or hierarchy of indexes in the system catalog; the indexes provide the means for locating the data set.

cataloged procedure. A set of job control statements that has been placed in a partitioned data set called the procedure library and that can be retrieved by coding the name of the procedure on an execute (EXEC) statement or started by a START command.

checkpoint data set. A sequential or partitioned data set containing a collection of records (called checkpoint entries) that contain the status of a job and the system at the time the records are written. These records provide the information necessary for restarting a job without having to return to the beginning of the job.

checkpoint restart. The process of resuming a job at a checkpoint within the job step that was abnormally terminated. The restart can be automatic or deferred, where deferred restart involves resubmitting the job. Contrast with step restart.

checkpoint/restart facility. A facility for restarting execution of a program at some point other than at the beginning, after the program was terminated due to a program or system failure. A restart can begin at a checkpoint within a job step or at the beginning of a job step.

command statement. A job control statement, JES2 control statement, and JES3 control statement that is used to issue commands to the system through the input stream.

comment statement. A job control statement used to include information that may be helpful in running a job or reviewing an output listing.

concatenated data sets. A group of logically connected data sets that are treated as one data set for the duration of a job step.

converter/interpreter. The job segment that converts and interprets JCL for the MVS system.

cylinder. The tracks of a disk storage device that can be accessed without repositioning the access mechanism.

data definition (DD) statement. A job control statement that describes a data set associated with a particular job step.

data management. A major function of the operating system that involves organizing, cataloging, locating, storing, retrieving, and maintaining data.

data set. The major unit of data storage and retrieval in the operating system, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access.

ddname (data definition name). A name assigned to a DD statement. This name corresponds to the ddname appearing in a data control block.

deadline scheduling. An automatic method of controlling a job's scheduling priority to increase the probability of the job being scheduled by a given deadline.

deferred restart. A restart performed by the system on resubmission of a job by the programmer; deferred restart can begin within a step or at the beginning of a step. Contrast with automatic restart.

delimiter statement. A job control statement used to mark the end of data.

dependent job control (DJC). In JES3, the organizing of a collection of jobs that must execute in a specific order. DJC manages jobs that are dependent upon one another.

device type. A number that corresponds to a type of input/output device. Coding the device type in the UNIT parameter is one way of indicating what input/output device you want allocated to a job step.

directory. A series of 256-byte records at the beginning of a partitioned data set that contains an entry for each member in the data set.

dispatching priority. A number assigned to tasks, used to determine the order in which they will use the central processing unit.

disposition processing. A function performed by the initiator at the end of a job step to keep, delete, catalog, or uncatalog data sets, or pass them to a subsequent job step, depending on the data set status or the disposition specified in the DISP parameter of the DD statement.

dummy data set. A data set for which operations such as disposition processing, input/output operations, and allocation are bypassed.

***dump.** (1) to copy the contents of all or part of storage, usually from an internal storage into an external storage. (2) the data resulting from the process as in (1).

dynamic allocation. Assignment of system resources to a program at the time the program is executed rather than at the time it is loaded into main storage.

dynamic deallocation. Freeing of system resources during program execution rather than at the end of the job.

dynamic support program (DSP). Transient program of JES3 that runs in parallel with the other support functions of JES3.

execute (EXEC) statement. A job control statement that marks the beginning of a job step and identifies the program to be executed or the cataloged or in-stream procedure to be used.

execution priority. A rank assigned to a task that determines its precedence in being selected for execution.

external page storage. The portion of auxiliary storage that is used to contain pages.

external writer. A writer other than JES2 for user-written writer routines and for devices not supported by JES2.

forms control buffer (FCB). A buffer containing 18 positions that is used to store vertical formatting information for printing, each position corresponding to a line on the form; the FCB is part of the 3811 control unit, which serves as an interface between the system and a 3211 or 1403 printer, or the data protection image to be used for the 3525 card punch.

generation data group (GDG). A collection of data sets that are kept in chronological order; each data set is called a generation data set.

generation data set. One generation of a generation data group.

global processor. JES3 processor that controls the job selection for all processors in the system running under JES3.

group name. See user-assigned group name.

HASP. The HASP system provides supplimentary support for job management, data management, and task management, performing functions such as scheduling input readers and output writers.

input service. In JES3 a set of dynamic support programs that read the input data and build the system input data set and control table entries for each job.

input stream. The sequence of control statements and data submitted to the operating system on an input device especially activated for this purpose by the operator.

in-stream procedure. A set of job control statements placed in the input stream that can be used any number of times during a job by naming the procedure on an execute (EXEC) statement.

integrity. Preservation of data or programs for their intended purpose.

JES2 control statement. A statement that controls the input and output processing of jobs run under JES2.

JES3 control statement. A statement that controls the input and output processing of jobs run under JES3.

job. A collection of related problem programs, identified in the input stream by a JOB statement followed by one or more EXEC and DD statements.

job class. Any one of a number of job categories that can be defined by the installation to classify jobs. By classifying jobs and directing initiators to initiate specific classes of jobs, it is possible to control the mixture of jobs that are performed concurrently.

job class queue. A waiting list of job definitions within the input queue in which jobs assigned the same class are arranged in order of priority; jobs with the same class and priority are placed in a first in/first out order.

job control language (JCL). A high-level programming language used to code job control statements.

***job control statement.** A statement in a job that is used in identifying the job or describing its requirements to the operating system.

job journal. Established at JES2 initialization to hold restart information for each program in execution.

job library. See private library.

job management. A general term that collectively describes the functions of the job scheduler and master scheduler.

job related output. Output that is neither held nor spun off nor processed by a user-written writer.

job (JOB) statement. The job control statement that identifies the beginning of a job. It contains such information as the name of the job, an account number, and the class and priority assigned to the job.

job step. A unit of work associated with one processing program or one cataloged procedure and related data. A job consists of one or more job steps.

job step task. A task that is initiated by an initiator according to specifications in an execute (EXEC) statement.

jobname. The name assigned to a JOB statement; it identifies the job to the system.

K. 1024 bytes.

keyword. A symbol that identifies a parameter or subparameter.

keyword parameter. A parameter that consists of a keyword, followed by one or more values.

local devices. Devices attached to local processors for sending input and receiving output.

local processor. The JES3 (MVS) processor that executes the jobs assigned to it by the global processor.

local station. A station whose control unit is connected directly to a computer I/O channel. Contrast with remote station.

logical record. A record that is defined in terms of the information it contains rather than by its physical traits. You may have to specify the length of the logical record to complete the data control block; one way to specify this is in the LRECL subparameter of the DCB parameter.

logical region. The amount of real storage required by a job a job step to execute efficiently on an ASP main processor when running under JES3.

loosely-coupled multiprocessing. two or more computing systems interconnected by an I/O channel-to-channel adapter. The CPUs can be of different types and have their own unique configurations.

main service. In JES3, a dynamic support program schedules problem programs for execution and manages the flow of data (system input, print, and punch) across the channel-to-channel adapter to and from the global processor.

Mass storage system group (MSVGP). a named collection of mass storage volumes defined by the person in charge of controlling space. Both active and inactive mass storage volumes can be in the group. The volume group is identified by name in JCL on the MSVGP parameter.

mutually exclusive parameters. Parameters that cannot be coded on the same job control statement.

nonpageable dynamic area. An area of virtual storage whose virtual addresses are identical to real addresses; it is used for programs or parts of programs that are not to be paged during execution.

nonsharable volume. A volume that cannot be assigned to two or more data sets.

nonspecific volume request. A request that allows the system to select suitable volumes.

nontemporary data set. A data set that exists after the job that created it terminates.

null statement. A job control statement used to mark the end of a job's control statements and data.

***operating system (OS).** Software which controls the execution of computer programs and which may provide scheduling, debugging, input/output control, accounting, compilation, storage assignment, data management, and release services.

output class. Any one of up to 36 different categores, defined at an installation, to which output data produced during a job step can be assigned. When an output writer is started, it can be directed to process from one to eight different classes of output data.

***output data.** (SC1) Data to be delivered from a device or program, usually after some processing.

output listing. A form that is printed at the end of a job that can contain such information as job control statements used by the job, diagnostic messages about the job, data sets created by the job, or a dump.

output service. A JES3 service that prints and punches the data sets created during main service.

page. A fixed-length block of instructions, data, or both, that can be transferred between real storage and external page storage.

partitioned data set. A data set in direct access storage that is divided into partitions, called members, each of which can contain a program or part of a program. Each partitioned data set contains a directory (or index) that the control program can use to locate a program in the library.

passed data set. A data set allocated to a job step that is not deallocated at step termination but that remains available to a subsequent step of the same job.

PEND statement. A job control statement used to mark the end of an in-stream procedure.

permanently resident volume. A volume that cannot be physically demounted or that cannot be mounted until it is varied offline (that is, removed from the control of the central processing unit).

physical record. A record that is defined in terms of physical qualities rather than by the information it contains (logical record).

positional parameter. A parameter that must appear in a specified order.

priority. A value assigned to a job that is used to determine when a job is selected for execution.

private library. A user-owned library that is separate and distinct from the system library.

private volume. A mounted volume that the system can allocate only to a data set for which a specific volume request is made.

PROC statement. A job control statement that must mark the beginning of an in-stream procedure; it can also be used, in both cataloged and in-stream procedures, to assign values to symbolic parameters in the procedure.

procedure library. A partitioned data set containing cataloged procedures; the IBM-supplied procedure library is named SYS1.PROCLIB.

procedure step. That unit of work associated with one processing program and related data within a cataloged or in-stream procedure. A cataloged or in-stream procedure consists of one or more procedure steps.

public volume. The term applied to a mounted volume that the system can allocate to an output data set for which a nonspecific volume request is made. A public volume remains mounted until the device on which it is mounted is required by another volume.

qualified name. A data set name that is composed of multiple names separated by periods (for example, A.B.C.). For a cataloged data set, each name corresponds to an index level in the catalog.

queue. A waiting line or list formed by items in a system waiting for service; for example, tasks to be performed or output to be written by a writer.

reader/interpreter. The job segment that reads and interprets JCL for jobs on ASP main processors.

real storage. The storage of a system/370 computing system from which the central processing unit can directly obtain instructions and data, and to which it can directly return results.

record. A general term for any unit of data that is distinct from all others.

region. In systems with MVT, a subdivision of the dynamic area of main storage set aside for a job step or a system task. You can specify in the REGION parameter on the JOB statement or EXEC statement how large this area of main storage should be.

remote devices. Devices attached to remote work stations for sending input and receiving output.

remote job entry. Submission of job control statements and data from a remote terminal, causing the jobs described to be scheduled and executed as though encountered in the input stream. Also known as remote job processing in JES3.

remote job processing (RJP). The processing of jobs submitted from remote terminals.

remote station. (1) * Data terminal equipment for communicating with a data processing system from a location that is time, space, or electrically distant. (2) Contrast with local station.

reserved volume. A volume that remains mounted until the operator issues an UNLOAD or VARY OFFLINE command.

resource. Any facility of the computer system or operating system required by job or task and includes main storage, input/output devices, the CPU, data sets, and control and processing programs.

restart. The process of resuming a job after it abnormally terminates. When a restart is performed, processing is continued either at the beginning of a job step that caused the abnormal termination or at a checkpoint within this job step.

restart facility. See checkpoint/restart facility.

return code. A value placed in the return code register at the completion of a program. The value is established by the user and may be used to influence the execution of succeeding programs or, in the case of an abnormal end of task, may simply be printed for programmer analysis.

scheduling priority. a rank assigned to a task that determines its precedence in being scheduled.

sequential data set. A data set whose records are organized on the basis of their successive physical positions, such as they are on magnetic tape.

specific volume request. A request for volumes that informs the system of the volume serial numbers.

spooled data set. A data set written on an auxiliary storage device.

standard job. a JES3 job that consists of input service main service, output service, and purge performed in that order.

step restart. A restart at the beginning of a job step that abnormally terminates. The restart may be automatic (depending on an eligible completion code and the operator's consent) or deferred, where deferred involves resubmitting the job and coding the RESTART parameter on the JOB statement of the resubmitted job.

stepname. The name assigned to an EXEC statement; it identifies a job step within a job.

storage volume. The main function of a storage volume is to contain nontemporary data sets for which a nonspecific volume request was made and PRIVATE was not coded in the VOLUME parameter. A direct access volume becomes a storage volume when so indicated in a MOUNT command or in a member of SYS1.PARMLIB named VATLSTxx.

symbolic parameter. A symbol preceded by an ampersand that stands for a parameter or the value assigned to a parameter or subparameter in a cataloged or in-stream procedure. Values are assigned to symbolic parameters when the procedure in which they appear is called.

system generation. The process of using an operating system to assemble and link together all of the parts that constitute another operating system.

system library. A partitioned data set named SYS1.LINKLIB that contains programs used by the system.

system messages. Messages issued by the system that pertain to a problem program. These messages appear on an output listing and may include such messages as error messages, disposition messages, and allocation/deallocation messages.

system output device. A device assigned to record output data for a series of jobs.

system resources manager. A group of programs that controls the use of system resources in order to satisfy the installation's performance objectives.

SYS.LINKLIB data set. See system library.

SYS1.PROCLIB data set. See procedure library.

task. A unit of work for the central processing unit from the standpoint of the control program; therefore, the basic multiprogramming unit under the control program.

temporary data set. A data set that is created and deleted in the same job.

temporary library. A library that is created and deleted within a job.

***track.** The portion of a moving storage medium, such as drum, tape, or disk, that is accessible to a given reading head position.

unit. A particular device specified by its unit address, device type, or user-assigned group name.

unit address. The three-character address of a particular device, specified at the time a system is installed; for example, 191 or 293.

unit affinity. A condition under which two or more volumes are located on the same device.

universal character set (UCS) feature. A printer feature that permits the use of a variety of character arrays.

user-assigned group name. Installation defined name to signify a group of devices that may or may not all be of the same type (specified through JCL in the UNIT parameter).

virtual input/output (VIO). Facility to handle temporary data sets that causes them to reside within the paging data sets. To problem program or access method, the data sets appear to reside on some other real direct access storage device.

virtual storage. Addressable space that appears to the user as real storage, from which instructions and data are mapped into real storage locations. The size of virtual storage is limited by the addressing scheme of the computing system and by the amount of auxiliary storage available, rather than by the actual number of real storage locations.

volume. That portion of an auxiliary storage device that is accessible to a single read/write mechanism.

volume affinity. A condition under which two or more data sets are located on the same volume.

volume table of contents (VTOC). A table on a direct access volume that describes each data set on the volume.

work station. A terminal device that may or may not be a CPU. At a workstation, an operator can connect into a central system via LOGON, enter jobs, and receive output.

working set. The estimate of bytes of real storage used by the steps of a job.

Index

Where more than one page reference is given, the major reference is first.
Indexes to OS/VS publications are consolidated in the **OS/VS Master Index**, GC28-0602, and the **OS/VS Master Index of Logic**, GY28-0603. For additional information about any subject listed below, refer to other publications listed for the same subject in the Master Index.

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