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• System hardware configuration
• Serial numbers
• Related software (database, application, and communication) including type, version, and service pack or maintenance level
  ▪ Sequence of events leading to the issue
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Control-M/Restart is a component member of the INCONTROL™ by BMC Software family of products. This guide is the basic publication on how to use Control-M/Restart software. It is intended for any person who wants to use Control-M/Restart to perform job restart or data set cleanup, or to archive jobs in the History Jobs file.

This guide contains detailed information on all Control-M/Restart functions and facilities. It contains the following chapters:

Chapter 1–Introduction to Control-M/Restart

Overview of Control-M/Restart including an introduction to Control-M/Restart logic and a description of key Control-M/Restart components.

Chapter 2–Control-M/Restart online facilities

Description of the online user interface to Control-M/Restart.

Chapter 3–CONTROLR step and control parameters

Detailed description of the CONTROLR step (a special step inserted into the JCL of the job) and control parameters that determine what processing Control-M/Restart will perform.

Chapter 4–Operations considerations

Discussion of considerations for using Control-M/Restart in a production environment.
Conventions used in this guide

Notational conventions that may be used in this guide are explained below.

Standard keyboard keys

Keys that appear on the standard keyboard are identified in boldface, for example, **Enter, Shift, Ctrl+S** (a key combination), or **Ctrl S** (a key sequence).

--- WARNING ---

The commands, instructions, procedures, and syntax illustrated in this guide presume that the keyboards at your site are mapped in accordance with the EBCDIC character set. Certain special characters are referred to in this documentation, and you must ensure that your keyboard enables you to generate accurate EBCDIC hex codes. This is particularly true on keyboards that have been adapted to show local or national symbols. You should verify that

- $ is mapped to x'5B'
- # is mapped to x'7B'
- @ is mapped to x'7C'

If you have any questions about whether your keyboard is properly mapped, contact your system administrator.

Preconfigured PFKeys

Many commands are preconfigured to specific keys or key combinations. This is particularly true with regard to numbered PF keys, or pairs of numbered PFKeys. For example, the END command is preconfigured to, and indicated as, **PF03/PF15**. To execute the END command, press either the **PF03** key or the **PF15** key.

Instructions to enter commands may include

- only the name of the command, such as, enter the END command
- only the PF keys, such as, press **PF03/PF15**
- or both, such as, press **PF03/PF15**, or enter the END command

Command lines and option fields

Most screens contain a command line, which is primarily used to identify a single field where commands, or options, or both, are to be entered. These fields are usually designated COMMAND, but they are occasionally identified as COMMAND/OPT or COMMAND/OPTION.

Option field headings appear in many screens. These headings sometimes appear in the screen examples as OPTION, or OPT, or O.
Names of commands, fields, files, functions, jobs, libraries, members, missions, options, parameters, reports, subparameters, and users

The names of commands, fields, functions, jobs, libraries, members, missions, options, parameters, reports, subparameters, users, and most files, are shown in standard UPPERCASE font.

User entries

In situations where you are instructed to enter characters using the keyboard, the specific characters to be entered are shown in this UPPERCASE BOLD text, for example, type EXITNAME.

Syntax statements

In syntax, the following additional conventions apply:

- A vertical bar ( | ) separating items indicates that you must choose one item. In the following example, you would choose a, b, or c:

  a | b | c

- An ellipsis ( . . . ) indicates that you can repeat the preceding item or items as many times as necessary.

- Square brackets ([ ] ) around an item indicate that the item is optional. If square brackets ([ ]) are around a group of items, this indicates that the item is optional, and you may choose to implement any single item in the group. Square brackets can open ([ ) and close ( ] ) on the same line of text, or may begin on one line of text and end, with the choices being stacked, one or more lines later.

- Braces ({ }) around a group of items indicates that the item is mandatory, and you must choose to implement a single item in the group. Braces can open ( { ) and close ( } ) on the same line of text, or may begin on one line of text and end, with the choices being stacked, one or more lines later.

Screen characters

All syntax, operating system terms, and literal examples are presented in this typeface. This includes JCL calls, code examples, control statements, and system messages. Examples of this are

- calls, such as

  CALL 'CBLTDLI'
Conventions used in this guide

- code examples, such as

  FOR TABLE owner.name USE option, . . . ;

- control statements, such as

  //PRDSYSIN DD * USERLOAD PRD(2) PRINT

- system messages, both stand-alone, such as You are not logged on to database database_name, and those embedded in text, such as the message You are not logged on to database database_name, are displayed on the screen.

Variables

Variables are identified with italic text. Examples of this are:

- In syntax or message text, such as
  Specify database database_name

- In regular text, such as
  replace database database_name1 with database database_name2 for the current session

- In a version number, such as
  EXTENDED BUFFER MANAGER for IMS 4.1.xx

Special elements

This book includes special elements called notes and warnings:

--- NOTE ---
Notes provide additional information about the current subject.

--- WARNING ---
Warnings alert you to situations that can cause problems, such as loss of data, if you do not follow instructions carefully.
Information new to this version

Additional information that is new to this version is described in Appendix A of the INCONTROL for z/OS Upgrade Guide and What’s New section of the INCONTROL for z/OS Release Notes.

Related publications

Control-M for z/OS User Guide
Guide to Control-M features, options and usage.

INCONTROL for z/OS Administrator Guide
Information for system administrators about customizing and maintaining INCONTROL products.

INCONTROL for z/OS Installation Guide
Step-by-step guide to installing INCONTROL products using the INCONTROL™ Installation and Customization Engine (ICE) application.

INCONTROL for z/OS Messages Manual
Comprehensive listing and explanation of all IOA and INCONTROL messages and codes.

INCONTROL for z/OS Security Guide
Step-by-step guide to implementing security in INCONTROL products using the ICE application.

INCONTROL for z/OS Utilities Guide
Describes utilities designed to perform specific administrative tasks that are available to INCONTROL products.
Related publications
Chapter 1 Introduction to Control-M/Restart

This chapter includes the following topics:

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Standalone Control-M/Restart ................................................................................ 32
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  Maintaining previous runs in the History Jobs file ............................................. 33
Overview

Control-M/Restart is an automated job restart system, and it also performs many functions not related to restart. It is primarily designed to work with jobs that were run under Control-M, and many of its features utilize Control-M capabilities. However, it can also work on jobs that did not run under Control-M. In this case, Control-M/Restart works in standalone mode, and it does not have the full range of capabilities that are available when Control-M/Restart works under Control-M.

This chapter presents a brief introduction to Control-M/Restart features and functionality.

The difference between rerun and restart

To understand what Control-M/Restart does, it is necessary to distinguish between job rerun and job restart.

Job rerun is the re-execution of a scheduled job from the beginning. For example, if a job fails, the entire job can be rerun.

At best, rerunning a job can waste processing time on already successfully completed job steps. And unless certain precautions are taken, if successful job steps from the prior run performed updates before the job failed, rerunning the job can create problematic results by repeating those updates.

Job restart is the re-execution of a job from a particular step. In general, the results of successful job steps from before the failure are utilized, and re-execution continues from the end of the last successful step. Many complex decisions are made and several necessary tasks are performed during this process. These are described briefly in this chapter.

Main Control-M/Restart capabilities

Control-M/Restart provides the following major capabilities:

- Restart

Performing job restart is the main function of Control-M/Restart. When job restart is necessary, Control-M/Restart automates restart by identifying at which step to initiate a job restart and by performing necessary tasks (described later) to ensure that job restart is error-free.
This capability is available both for restarts under Control-M and standalone restarts.

- **Data set cleanup and Prevent-NCT2 processing**

Another important function of Control-M/Restart is data set cleanup, which is described in “Data set cleanup prior to the original run” on page 32.

Before restarts and reruns, Control-M/Restart automatically performs data set cleanup. It does not have to be requested.

Data set cleanup can also be performed by request prior to the original job run:

- When the data set cleanup request is connected to the original job run request, it is termed Prevent-NCT2 processing.

  The term is derived from the error message generated following an attempt to catalog a data set that was already cataloged. The error message indicates a reason of NOT CATLGD for reason code 2. As part of data set cleanup, Control-M/Restart prevents these types of errors.

- When the data set cleanup request is independent of, and not accompanied by, a job run request, no special term is applied and it is called data set cleanup.

- **Maintaining Previous Runs in the History Jobs File**

Jobs that have already executed and are ready for removal from the Control-M Active Jobs file can be saved in the Control-M History Jobs file (instead of being deleted). Parameters in the Control-M job scheduling definition determine if and when a job is placed in the History Jobs file and how long the job is maintained there.

This capability is available only for jobs submitted under Control-M.
Main components

The following components are critical to Control-M/Restart when it operates under Control-M.

Control-M job scheduling definition

Most Control-M/Restart functions for a job are defined using parameters in the job scheduling definition. These parameters can be defined so that Control-M/Restart processing is completely automatic, requiring no manual intervention.

However, if manual intervention is needed, for example, a manual confirmation before a restart under Control-M/Restart, these parameters can be defined accordingly.

Table 1 lists Control-M/Restart functions, and the parameters in the Control-M job scheduling definition that are used to define them.

<table>
<thead>
<tr>
<th>Control-M/Restart Function</th>
<th>Control-M Job Scheduling Definition</th>
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</thead>
<tbody>
<tr>
<td>Job Restart</td>
<td>DO IFRERUN</td>
</tr>
<tr>
<td>Archive SYSDATA (defined later in this section) that is necessary for job restart.</td>
<td>AUTO-ARCHIVE</td>
</tr>
<tr>
<td>Perform Prevent-NCT2 (data set cleanup) processing prior to, but as part of, the original job run.</td>
<td>PREVENT-NCT2</td>
</tr>
<tr>
<td>Determine if and how long a job is retained in the History Jobs file: ■ maximum number of days to retain the job ■ maximum number of generations of the job to retain</td>
<td>■ RETENTION - # OF DAYS TO KEEP ■ RETENTION - # OF GENERATIONS TO KEEP</td>
</tr>
</tbody>
</table>

These parameters are defined using the Control-M Job Scheduling Definition screen (Screen 2). The parameters are described in detail in the job scheduling parameters chapter of the Control-M for z/OS User Guide.
The Control-M monitor

The heart of the Control-M Production Control System is the Control-M monitor. The monitor is usually activated as a started task.

The Control-M monitor selects jobs for execution, submits the jobs, tracks the jobs, analyzes job execution results, and so on. The monitor executes user instructions (defined in the job scheduling definition) that describe when and how a job is executed.

Jobs requiring Control-M/Restart processing enter the normal processing flow of Control-M under the management of the Control-M monitor. Additional logic has been added to the Control-M monitor to facilitate handling of Control-M/Restart functions.

The CONTROLR step

The CONTROLR step is a special processing step that is automatically generated by Control-M/Restart and inserted into the JCL of the job. The CONTROLR step provides the necessary instructions for the appropriate Control-M/Restart processing of the job.

When job restart or data set cleanup processing is requested, the CONTROLR step is inserted as the first step of the JCL.

Manual adjustment of the CONTROLR step is permitted.

For details of the CONTROLR step, see Chapter 3, “The CONTROLR Step and Control Parameters.”

Control-M/Restart parameter members

In the IOA PARM library, the CTRPARM member is used to define many default Control-M/Restart parameters. Several of these parameters impact the way in which Control-M/Restart and the CONTROLR step handle processing.

The Control-M/Restart PARM library contains members that are also used to define Control-M/Restart processing defaults. The $DEFAULT member in this library contains definitions that apply to all jobs processed by Control-M/Restart. The $EXCLUDE member identifies data sets to be excluded from Control-M/Restart processing. The $KEEP member identifies data sets that must not be deleted by Control-M/Restart. And local members in this library define processing defaults that apply to a particular job.
Control-M Active Environment screen

As with any job running under Control-M, the Control-M Active Environment screen (Screen 3) enables the user to see the status of, and manually intervene in the processing of, restarted jobs.

When Control-M/Restart processing has been defined so as to require manual intervention, this intervention is generally performed in the Active Environment screen. For example, if a manual confirmation is required before restart, the confirmation can be entered using the Confirm Restart window in the Active Environment screen.

The Active Environment screen is the gateway to several windows and screens relevant to Control-M/Restart. Below is a list of the windows and screens available from the Active Environment screen. They are described in detail in the online facilities chapter of the Control-M for z/OS User Guide.

<table>
<thead>
<tr>
<th>Window or Screen</th>
<th>Description</th>
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</thead>
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<td>Confirm Restart window</td>
<td>Used to confirm job restart when the DO IFRERUN statement requires manual confirmation</td>
</tr>
<tr>
<td>Rerun Restart window</td>
<td>Used to activate the restart when automatic rerun (DO RERUN) for the job is not specified</td>
</tr>
<tr>
<td>Restart Step List window</td>
<td>Displays the list of steps from the previous run of the job. The steps can then be selected for use in the Confirm Restart or Rerun Restart window.</td>
</tr>
<tr>
<td>Job Order Execution History screen</td>
<td>Displays the execution history of the job. From this screen, the Sysout Viewing screen (that displays the archived SYSDATA of the job) can be accessed.</td>
</tr>
<tr>
<td>Sysout Viewing screen</td>
<td>Displays the archived SYSDATA of the job</td>
</tr>
<tr>
<td>History Environment Screen</td>
<td>This screen, a special format of the Active Environment screen, displays jobs in the History Jobs file.</td>
</tr>
</tbody>
</table>
Control-M/Restart online utilities

Table 3 describes the Control-M/Restart utilities in the IOA Online Utility facility that are available under ISPF (they are also available as TSO CLISTs).

### Table 3 Control-M/Restart Online Utilities

<table>
<thead>
<tr>
<th>Utility</th>
<th>Description</th>
</tr>
</thead>
</table>
| R1      | Control-M/Restart Simulation  
Simulates restart under Control-M/Restart or Prevent-NCT2 processing. |
| R2      | Dataset Cleanup  
Performs data set cleanup and adjustments without running the job. |
| R3      | Job Dataset List  
Prepares the list of permanent data sets used in a job. The list is generated in the Control-M Statistics file. |
| R4      | Control-M/Restart Standalone  
Performs restarts under Control-M/Restart, or Prevent-NCT2 processing, for jobs not run under Control-M. |

Reporting facility

Several Control-M/Restart reports produced by IOA KeyStroke Language (KSL) scripts are provided. KSL is a general purpose language that mimics keystrokes entered in IOA applications. It is described in detail in the KeyStroke Language (KSL) User Guide.

Table 4 describes the KSL reports that are provided. Sample outputs for these reports are provided in the KeyStroke Language (KSL) User Guide.

### Table 4 Control-M/Restart KSL Reports (part 1 of 2)

<table>
<thead>
<tr>
<th>Report</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Restart Confirmation Report</td>
<td>Details restart jobs that were manually released for execution using the Control-M/Restart CONFIRM option within a specified period.</td>
</tr>
<tr>
<td>Restart Detail Report</td>
<td>List of restarted jobs executed over a particular period. The report displays the restart job, the restart step, use of the CONFIRM option, and so on.</td>
</tr>
<tr>
<td>Last Night Restart History Report</td>
<td>Details the complete execution history of all jobs that were restarted during the previous night. Job start time, end time, restart step and termination condition codes for both successful and unsuccessful restarts are displayed.</td>
</tr>
</tbody>
</table>
Two separate processes are required for restart under Control-M:

- defining the restart parameters in the job scheduling definition appropriately, so that restart can be performed if it becomes necessary
- activation of the restart process when restart becomes necessary

These are described below.

### Defining restart parameters in the job scheduling definition

The Control-M job scheduling definition contains post-processing parameters that tell Control-M what to do following a job run. The ON/DO statements enable specification of particular actions to be performed in particular situations. The job scheduling definition can therefore contain different instructions for what to do in different situations (if the job ends OK, if the job ends NOTOK, if the job abends, and so on).

Restart instructions are generally defined in these ON/DO statements. It is important to note that these parameters are defined in advance of any need to perform a restart. Possible situations requiring restart are anticipated at the time the job scheduling definition is being defined. The job scheduling definitions can, however, be modified at any time.

The ON statement indicates the situation in which the defined restart actions are taken. For example, it may indicate that the defined restart actions are performed in case of an abend.

<table>
<thead>
<tr>
<th>Report</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restart Time</td>
<td>Lists job restarts by Control-M/Restart during the specified period. For each listed job restart, the report provides summary information about the execution time saved as a result of using a Control-M/Restart restart instead of a rerun (number of steps skipped, elapsed time saved, and the CPU time saved). It also provides general information about the job.</td>
</tr>
<tr>
<td>Savings Report</td>
<td></td>
</tr>
<tr>
<td>Last Night Sysout</td>
<td>Provides an execution history for jobs with archived sysouts that ran the previous night. Either the first archived sysout or all archived sysouts can be displayed for the specified jobs.</td>
</tr>
<tr>
<td>Scan Summary Report</td>
<td></td>
</tr>
</tbody>
</table>

### Control-M/Restart under Control-M

Two separate processes are required for restart under Control-M:

- defining the restart parameters in the job scheduling definition appropriately, so that restart can be performed if it becomes necessary
- activation of the restart process when restart becomes necessary

These are described below.

### Defining restart parameters in the job scheduling definition

The Control-M job scheduling definition contains post-processing parameters that tell Control-M what to do following a job run. The ON/DO statements enable specification of particular actions to be performed in particular situations. The job scheduling definition can therefore contain different instructions for what to do in different situations (if the job ends OK, if the job ends NOTOK, if the job abends, and so on).

Restart instructions are generally defined in these ON/DO statements. It is important to note that these parameters are defined in advance of any need to perform a restart. Possible situations requiring restart are anticipated at the time the job scheduling definition is being defined. The job scheduling definitions can, however, be modified at any time.

The ON statement indicates the situation in which the defined restart actions are taken. For example, it may indicate that the defined restart actions are performed in case of an abend.
The DO statements indicate the actions to perform. A DO IFRERUN statement defines restart criteria if the particular ON criteria are satisfied. The DO IFRERUN statement can indicate the step at which the restart must begin, and (if desired) the step at which it must end, and whether manual confirmation is necessary. For the restart to be automatic, a DO RERUN statement must also be defined. The combination of DO IFRERUN and DO RERUN parameters define an automatic restart.

Basic Control-M/Restart process overview

Once a job is submitted under Control-M, a restart may become necessary. The basic restart process is outlined below. Variations to this process are described in Chapter 3, “The CONTROLR Step and Control Parameters.”

The job is selected for restart

If a job fails and its job scheduling definition indicates that the job is restarted following such a failure, the job can be automatically restarted.

Jobs are placed in WAIT SCHEDULE status in the Active Environment screen until all conditions required for the execution are fulfilled (time limits, prerequisite conditions, Quantitative resources, Control resources, and so on.). When all conditions for the execution of a job have been fulfilled, the JCL of the job to be restarted is prepared for submission.

Any job under Control-M can be restarted, even if the job scheduling definition does not contain restart parameters. In this case, restart is manually requested from the Active Environment screen.

The JCL of the job is prepared for submission

The following steps are performed in the preparation of the JCL of the job for submission:

1. The JCL of the job is retrieved from the appropriate JCL Library.

2. Control-M AutoEdit variables are resolved.

The JCL of the job retrieved from the user library may contain Control-M AutoEdit variables. These AutoEdit variables can be replaced with different values based on how and where the previous runs of the job terminated, using SET VAR and DO SET parameters of the job scheduling definition. If the criteria for replacement of an AutoEdit variable have been met, based on the results of the previous runs of the job, the AutoEdit variables are replaced by the predefined values specified by the user.
3. The CONTROLR step is inserted into the JCL of the job.

Many of the Control-M/Restart facilities that make the job restart process automatic and error-free are activated during execution of this step. This restart information is derived from the restart specifications provided by the user in the job scheduling definition, and from the CTRPARM member.

The JCL of the job is submitted for execution

The JCL of the job is submitted for execution.

The restarted job is tracked and controlled by Control-M

Jobs restarted by Control-M/Restart enter the normal flow of Control-M processing under the management of the Control-M monitor. Therefore, all Control-M tracking and control capabilities apply equally to restarted jobs as well as to originally scheduled production jobs.

Error handling

When Control-M/Restart detects a restart error situation, for example, if a mandatory input data set is missing, it generates a restart error. Control-M/Restart then continues to check and report on all error situations (other missing input data sets in the job, and so on). This provides a report of all errors after the first Control-M/Restart run.

Control-M/Restart components and concepts

The following components and concepts are also important to restarts under Control-M/Restart.

ORDERID

Each job order under Control-M is assigned a unique order ID. As a result, it is possible for multiple job orders to exist for the same job name in the Control-M Active Jobs file. One job order may terminate OK while the other may fail and require a restart. Each job order is considered a unique, totally independent entity, and Control-M/Restart processing is always performed on a specific job order.
SYSDATA

SYSDATA is the term used to designate the following job sysout data sets:

- job log (console messages)
- expanded JCL
- system output messages

SYSDATA data sets are usually produced for each execution of a job or started task; however, not all of these data sets are necessarily present in all cases.

SYSDATA is archived if job restart is to be performed. SYSDATA is important to job restart for the following reasons:

- Control-M/Restart allows the same job to be automatically restarted multiple times. The restart function of Control-M/Restart requires the complete picture of the execution history of a job. Archiving the SYSDATA of jobs processed in the Control-M environment provides that complete picture of the execution history of a job.

- Control-M/Restart facilities that are activated within the CONTROLR step require the SYSDATA of all previous runs of the job. These facilities (described below) are
  - restart step adjustment
  - file catalog and GDG adjustment
  - Condition Code and Abend Code Recapture

Even if a job finished executing OK, it can be manually rerun or restarted at a user-specified job step. In this case, a complete history of previous executions of the job is required by Control-M/Restart facilities.

SYSDATA archiving is requested by appropriately filling in the AUTO-ARCHIVE parameter and its subparameters in the Control-M job scheduling definition. It is performed by Control-M during job post-processing; the SYSDATA is compressed and written to the specified data set.

In certain situations, SYSDATA archiving is not desirable and is not requested (for example, cyclic started tasks).

The user can view SYSDATA of previous runs of a requested job order online. For more information, see “Job Order Execution History screen” on page 22 and “Sysout Viewing screen” on page 22.
Data set cleanup and Prevent-NCT2 processing

Before executing a restart job, catalog and VTOC maintenance are often required in order to prevent file-related errors during the processing of the restarted job.

When a job tries to create a data set that already exists or that has a name that is already cataloged, the job may fail with a DUPLICATE DATASET ON VOLUME error, or a NOT CATLGD 2 error. As a result, the production workflow continues using an incorrect version of the data set. In either case, the impact on the production workflow can be severe. This problem is especially likely in non-restart reruns. Therefore, data set cleanup is necessary.

The data set cleanup process automatically performs all required catalog adjustment. It accesses the SYSDATA of previous runs of the job order to analyze file creation and deletion and catalog information. Since a job may fail multiple times, analysis of the SYSDATA begins with the archived SYSDATA of the most recent non-restarted run.

As part of data set cleanup, Control-M/Restart

- deletes and uncatalogs the old data sets
  This prevents DUPLICATE DATASET ON VOLUME and NOT CATLGD 2 errors.
- performs Generation Data Set (GDG) Adjustment (described below)

The user can, however, exclude files from data set cleanup if desired, in either of the following ways:

- by specifying the names of the data sets to be excluded in appropriate control statements that are placed in a user-defined library member
  For more information, see “EXCLUDE DSN parameter” on page 69.
- by specifying the DD name in the appropriate parameter member
  For more information, see “Format of the $EXCLUDE member” on page 74.

Control-M/Restart automatically performs data set cleanup prior to any restart.

Data set cleanup can also be performed even prior to the original run of a job. This can be important because data sets accessed by the job can have DUPLICATE DATA SET or NOT CATLGD 2 errors that were generated by an entirely different job. As mentioned earlier in this chapter

- when data set cleanup is performed as part of the original job request, it is called Prevent-NCT2 processing
- otherwise (that is, when performed independently of the original job request), the term “data set cleanup” is used

For details, see “Data set cleanup prior to the original run” on page 32.
Automatic GDG adjustment

Generation data set (GDG) bias numbers must be adjusted so that the relative references to them within the restarted job refer to the correct generation of the data set.

For example, adjusting GDG bias numbers enables a job that creates data set A.B(+1) in STEP1 and reads A.B(+1) in STEP2 to be successfully restarted in STEP2 without manually changing the JCL relative generation number from +1 to 0.

Because it works completely automatically, the GDG Adjustment facility allows the user to restart jobs without being concerned about the technical details of GDG maintenance.

Because Control-M/Restart can handle jobs that dynamically allocate GDG data sets, but does not perform adjustments for such data sets, it may be necessary to exclude dynamically allocated GDG files from Control-M/Restart processing when these files are referenced both through JCL and by dynamic allocation.

Recoverable and nonrecoverable job steps

Restart of a job must begin at a job step that ensures re-creation of all deleted data sets required as input to the steps to be processed in the restart job. Such a step is called a recoverable job step.

Nonrecoverable job steps are steps that can result from any of the following situations:

- The step contains data sets that are not yet kept or cataloged (meaning, temporary or NEW/PASS data sets) at the point the job failed are deleted by the operating system. If these deleted data sets are required as input to job steps to be processed in the job restart, the restart cannot be successfully performed.

- A DD statement contains a VOL=REF parameter that backward references a tape data set that is not the first file on the tape, the step is not recoverable. In this case, the earliest recoverable step is to the step that contains the original volume reference for the tape.

- The step was manually marked as non-restartable. This is discussed in “Non-restartable step” on page 30.
Automatic restart step adjustment

The user normally specifies the step at which the restart must begin, either in a DO IFRERUN statement in the job scheduling definition, or in the Restart window used to manually issue a restart request.

If, however, the restart job step chosen by the user is not recoverable, the Restart Step Adjustment facility automatically can replace the user-specified restart step with the closest recoverable job step prior to the requested restart step, and issues an appropriate message to notify the user of the change.

The facility thereby enables the user to choose the restart step on the basis of application considerations without worrying if the step is actually recoverable.

By default, the Restart Step Adjustment facility is operational and performs step adjustment as needed. However, step adjustment can be disabled in either of the following ways:

- by specifying the appropriate parameter in the Control-M/Restart PARM library For more information, see “[NO]STEPADJUST parameters” on page 72.

- by specifying N (No) in the STEP ADJUSTMENT field in the Rerun/Restart or Confirm Restart window

If step adjustment is needed but step adjustment was disabled, job restart is terminated with a non-zero return code.

Non-restartable step

The user can label any steps as non-restartable steps. Restart cannot start at a step that is defined as a non-restartable step, even if the step would otherwise be recoverable. When the Restart Step adjustment facility arrives at a non-restartable step, it continues rolling back to a preceding step.

Defining steps as non-restartable steps can possibly cause the restart to not be performed. For example if the step adjustment reaches the first job step but that step is defined as a non-restartable step, restart cannot be performed.

A step can be defined as a non-restartable step in either of two ways:

- A special DD statement can be placed in the JCL of the job. This impacts restarts of that job only. For more information, see “Indicating non-restartable steps: CTRNORST DD” on page 80.
An appropriate parameter definition can be placed in the Control-M/Restart PARM library. Depending on which member in the library is used, the parameter can apply to all jobs or only to the relevant job. For more information, see “NONRESTARTABLE_STEP parameter” on page 71

**Condition code recapture and abend code recapture**

Sometimes the decision whether to execute a particular step is dependent upon the execution results (resulting condition code or abend code) of a previous step. The COND JCL parameter and IF/THEN/ELSE JCL statements are commonly used to establish this dependency.

For example, if the following statement is specified

```
//STEPF EXEC ....,COND=(04,EQ,STEPB)
```

STEPF is executed only if STEPB did not terminate with a condition code of 04.

If the backward-referenced step is not executed in the restart run because it was executed in the previous run, the condition code or abend code information from the backward-referenced step would not normally be available for the COND or IF/THEN/ELSE JCL statements.

The Condition Code / Abend Code Recapture facility analyzes the SYSDATA of the previous runs of a job order. It determines the condition codes and abend codes of backward-referenced steps and makes the recaptured values available during the restarted run.

These codes can then be used by the COND parameter and IF/THEN/ELSE JCL statements.

If the ALLRUNS parameter in the CTRParm member in the IOA PARM library is set to YES, the recaptured codes are also available for Control-M to use when evaluating the previous runs or restarts of a job during post processing. For example, if one step finished successfully in an original run and another step finished successfully after a restart, an ON block containing both criteria are satisfied by the successful step in each of the runs.

By default, condition code recapture and abend code recapture operate automatically. However, these facilities can be suppressed either by

- specifying the appropriate parameters in the Control-M/Restart PARM library
  For more information, see “[NO]RECAPTCC/[NO]RECAPTABEND parameters” on page 71

- specifying N (No) in the RECAPTURE CONDITION CODES and/or RECAPTURE ABEND CODES fields of the Rerun/Restart or Confirm Restart window
Standalone Control-M/Restart

If a job that did not run under Control-M (for example, an unscheduled job that does not have a job scheduling definition) requires restart, the restart can be requested from the Control-M/Restart Standalone panel. This panel corresponds to the R4 Control-M/Restart utility.

To perform Standalone restart under Control-M/Restart, access the R4 utility (or activate CLIST CTRCCTR in the TSO Command Processor).

The Control-M/Restart Standalone panel is described in detail in “Operating Control-M/Restart in standalone mode” on page 39.

Data set cleanup prior to the original run

As discussed under “Control-M/Restart components and concepts” on page 26, data set cleanup is automatically performed as part of restart and non-restarted rerun processing, but can also be performed prior to the original job run, as follows:

- Automatic Prevent NCT2 processing can be defined for all jobs by setting the NCAT2 parameter in the CTRPARM member in the IOA PARM library to YES. Data set cleanup is then performed prior to each original job run. This is applicable only to jobs that are run under Control-M.

- Automatic Prevent NCT2 processing can be defined for specific jobs by specifying Y (Yes) for the PREVENT-NCT2 parameter in the corresponding Control-M job scheduling definitions. Data set cleanup is then performed prior to the original runs of those jobs. The PREVENT-NCT2 parameter is described in detail in the Control-M for z/OS User Guide.

- The Data Set Cleanup Online Utility (R2) is used to request data set cleanup without an accompanying job run. A CONTROLR step is inserted in the job stream and the edited job JCL is submitted. The CONTROLR step performs the necessary data set adjustment (including step adjustment, if needed) and then stops. No further job steps are executed.

  The R2 utility is available only for jobs that have a Control-M job scheduling definition. It is described in detail in Chapter 2, “Online Facilities.”

- For jobs without a Control-M job scheduling definition, Prevent-NCT2 processing (data set cleanup prior to the original run) can be requested by selecting Prevent-NCT2 as the type of processing in the Control-M/Restart Standalone panel (the R4 online utility). The utility is described in “Operating Control-M/Restart in standalone mode” on page 39.
Maintaining previous runs in the History Jobs file

Under Control-M, active jobs are maintained in the Active Jobs file. Once these jobs are ended and likely no longer needed, they are generally deleted from the Active Jobs file during maintenance. However, if Control-M/Restart is used at the site, these job runs can be placed in the History Jobs file before being deleted from the Active Jobs file, in case they are needed again. Jobs in the History Jobs file can be restored back to the Active Jobs file.

Whether a job is placed in History Jobs file, and for how long it remains, depends on either of two RETENTION parameters in the job scheduling definition:

- The RETENTION - # OF DAYS TO KEEP parameter indicates the maximum number of days the job remains in the History Jobs file before being deleted.

- The RETENTION - # OF GENERATIONS TO KEEP parameter indicates the maximum number of generations of the job to keep in the History File. Once that number of generations is reached, older job runs are deleted for each new job run added to the file.

Retention of jobs in the History Jobs file is available only for jobs that are run under Control-M.
Online Facilities

This chapter includes the following topics:

Control-M/Restart under Control-M ........................................ 36
  Job scheduling definition parameters ................................ 36
  Control-M/Restart windows and screens available from the Control-M Active
    Environment screen ..................................................... 37
Operating Control-M/Restart in standalone mode ....................... 39
  Parameters of the Control-M/Restart Standalone panel ............. 40
Control-M/Restart online utilities ......................................... 43
  R1: Control-M/Restart Simulation facility ............................ 44
  R2: Control-M/Restart data set cleanup ............................... 48
  R3: Control-M/Restart Job Data Set List utility ...................... 52
  KeyStroke Language utility ............................................ 55
For any job that runs under Control-M, scheduling parameters for the original run, rerun parameters, and Control-M/Restart processing instructions, are all defined in the Control-M job scheduling definition. Control-M/Restart instructions include restart and data set cleanup parameters. These parameters are generally defined through the Control-M Job Scheduling Definition screen (Screen 2).

When manual intervention is required, it is generally performed in the Control-M Active Environment screen (Screen 3).

### Job scheduling definition parameters

The parameters in the Control-M Job Scheduling Definition screen that are described in Table 5 relate specifically to Control-M/Restart. Job scheduling definition parameters, and their usage, are described in detail in the *Control-M for z/OS User Guide*.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO-ARCHIVE and subparameters SYSDB, MAXDAYS and MAXRUNS</td>
<td>Controls archiving of SYSDATA that is necessary for job restart</td>
</tr>
<tr>
<td>DO IFRERUN</td>
<td>Defines restart steps and determines whether manual confirmation of restart is required</td>
</tr>
<tr>
<td></td>
<td>FROM and TO parameters in the DO IFRERUN statement define the desired starting and ending steps for the restarted job.</td>
</tr>
<tr>
<td></td>
<td>The CONFIRM parameter in the DO IFRERUN statement determines whether manual confirmation of restarts is required.</td>
</tr>
<tr>
<td>PREVENT-NCT2</td>
<td>Performs data set cleanup prior to the original job run</td>
</tr>
<tr>
<td>RETENTION – # OF DAYS TO KEEP</td>
<td>Specifies the maximum number of days to retain a job in the History Jobs File</td>
</tr>
<tr>
<td>RETENTION – # OF GENERATIONS TO KEEP</td>
<td>Specifies the maximum number of generations of a job to keep in the History Jobs File</td>
</tr>
</tbody>
</table>
The parameters in the Control-M Job Scheduling Definition screen that are described in Table 6 are available even without Control-M/Restart, but can be very important to job restart.

### Table 6  Control-M Job Scheduling Parameters Available Without Control-M/Restart

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SET VAR and DO SET</td>
<td>Define Control-M AutoEdit variables</td>
</tr>
<tr>
<td>DO RERUN</td>
<td>Requests automatic rerun. This parameter must be specified if the restart (as defined in the DO IFRERUN statement) is to be completely automatic (that is, not requiring manual input).</td>
</tr>
<tr>
<td>MAXRERUN</td>
<td>Determines the maximum number of allowable reruns or restarts</td>
</tr>
<tr>
<td>RERUNMEM</td>
<td>Specifies the JCL member that is used for the rerun</td>
</tr>
</tbody>
</table>

### Control-M/Restart windows and screens available from the Control-M Active Environment screen

The following windows and screens directly related to Control-M/Restart are accessible from the Control-M Active Environment screen. They are described in detail in the *Control-M for z/OS User Guide*.

### Table 7  Screens and Windows Available from the Active Environment Screen (part 1 of 2)

<table>
<thead>
<tr>
<th>Window or Screen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirm Restart window</td>
<td>Opened by specifying Option C (Confirm) for a job in the Active Environment screen when manual confirmation of restart is requested in the job scheduling definition (in the DO IFRERUN statement). From this window, the Restart Step List window, containing the list of the job’s steps, can be opened.</td>
</tr>
<tr>
<td>Rerun Restart window</td>
<td>Opened by specifying Option R (Rerun) for a job in the Active Environment screen when automatic rerun for the job is not performed. From this window, the Restart Step List window, containing the list of the job’s steps, can be opened.</td>
</tr>
<tr>
<td>Restart Step List window</td>
<td>Opened by specifying a question mark (?) in the From Step or To Step fields in the Confirm Restart or Rerun Restart window. It displays the list of steps from the previous run of the job. The steps can then be selected for use in the Confirm Restart or Rerun Restart window.</td>
</tr>
</tbody>
</table>
Actions frequently performed by Control-M/Restart users in the Active Environment screen

Actions frequently performed by Control-M/Restart users in the Active Environment screen are described below:

- Define the Show Screen Filter window so that only WAIT CONFIRMATION jobs are displayed.

  The Show Screen Filter window can filter the display on the Active Environment screen so that, for example, only jobs that are waiting confirmation are displayed.

- Confirm jobs awaiting restart confirmation.

  You can view and confirm jobs that are waiting confirmation using the Active Environment screen. Prior to providing manual confirmation, you can view the job step selected by Control-M/Restart at which the restart is attempted. This selection may be the result of processing a DO IFRE_RUN $ABEND, $FIRST.ABEND or $EXERR specification. You can also view a list of the job steps in the Restart Step List window and select a different step for restart prior to confirming the job.

- Edit the JCL of the job before it is submitted for restart.

  The JCL can be edited directly using the JCL Edit facility (option J (JCL) of the Active Environment screen).

- View SYSDATA of previous runs of a job.

---

**Table 7 Screens and Windows Available from the Active Environment Screen (part 2 of 2)**

<table>
<thead>
<tr>
<th>Window or Screen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Order Execution History screen</td>
<td>Opened by specifying Option V (View Sysout) for a job in the Active Environment screen. This screen displays the execution history of the job. From this screen, the Sysout Viewing screen (that displays the archived SYSDATA of the job) can be accessed.</td>
</tr>
<tr>
<td>Sysout Viewing screen</td>
<td>Opened by specifying Option S (Sysout Viewing) or the V (Viewall) command in the Job Order Execution History screen. This screen displays the archived SYSDATA of the job.</td>
</tr>
<tr>
<td>History Environment Screen</td>
<td>Opened by specifying the HI (History) command in the Active Environment screen. This screen is a special format of the Active Environment screen. It displays jobs in the History Jobs file.</td>
</tr>
</tbody>
</table>
The user can check the action taken by the Control-M/Restart facilities by viewing the SYSDATA of the previous runs of the job. The SYSDATA of all previous runs of the same job order is available for online viewing.

- View log of significant events for restarted jobs.

The IOA Log contains automatically generated messages that record significant events in the life of jobs restarted by Control-M/Restart and other Control-M production jobs. The user can review this information online using Option L (Log) in the Active Environment screen (or using the IOA Log screen).

**Operating Control-M/Restart in standalone mode**

For non-Control-M jobs, Control-M/Restart processing information cannot come from a job scheduling definition nor can it be specified in the Control-M Active Environment screen.

In this case, another online interface is provided - the Control-M/Restart Standalone panel. This panel is used to specify processing information to Control-M/Restart for jobs not under Control-M. After Control-M/Restart performs its regular Control-M/Restart processing (Restart or Prevent-NCT2), it passes execution control to the job steps, where the job is executed under MVS (without Control-M processing).

The Control-M/Restart Standalone panel, which is illustrated in Figure 1, can be displayed in the following ways:

- Select Option R4 from the IOA Online Utilities menu. The IOA Online Utilities menu is displayed by requesting Option 6 on the IOA Primary Option menu under ISPF, or by activating CLIST IOAUTIL from the TSO Command Processor.

- Activate CLIST CTRCCTR in the TSO Command Processor.
Either of two types of Control-M/Restart processing can be requested:

- To request a job restart, specify R (Restart) in the ACTION REQUIRED field.
- To request Prevent-NCT2 processing (data set cleanup prior to the original job run), specify P (Prevent NCT2) in the ACTION REQUIRED field.

After specifying the type of request, fill in the rest of the parameters of the panel and press ENTER to process the request.

To exit the Standalone panel, press END (PF03/PF15).

Parameters of the Control-M/Restart Standalone panel

General parameters

Always specify the parameters described in Table 8.
Table 8  General Parameters of the Control-M/Restart Standalone Panel

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTION REQUIRED</td>
<td>Control-M/Restart action to be performed. Mandatory. Valid values are:</td>
</tr>
<tr>
<td></td>
<td>■ R (Restart) – performs a restart under Control-M/Restart</td>
</tr>
<tr>
<td></td>
<td>■ P (Prevent NCT2) – performs a data set cleanup prior to original job execution</td>
</tr>
<tr>
<td>TRACE MODE</td>
<td>Diagnostic tool that allows debugging in Control-M/Restart. Optional.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Do not use this parameter unless specifically requested by BMC Software Customer Support.</td>
</tr>
<tr>
<td>JCL LIBRARY</td>
<td>Library that contains the JCL for the job. Mandatory.</td>
</tr>
<tr>
<td>MEMBER</td>
<td>Name of the member containing the JCL for the job. Mandatory.</td>
</tr>
</tbody>
</table>

**Restart parameters**

The parameters described in Table 9 are filled in only if action R (Restart) was requested.

Table 9  Restart parameters of the Control-M/Restart Standalone panel (part 1 of 2)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOBNAME</td>
<td>JES name of the job. Mandatory.</td>
</tr>
<tr>
<td>JOBID</td>
<td>Numeric portion of the JES job ID from the most recent (last previous) execution. Mandatory. This is discussed in “Multiple restarts of a job” on page 43.</td>
</tr>
<tr>
<td>FIRST RESTART</td>
<td>Whether restart is being requested for the first time for the job. This is discussed in “Multiple restarts of a job” on page 43. Mandatory. Valid values are:</td>
</tr>
<tr>
<td></td>
<td>■ Y (Yes) – This is the first restart request for the job. Default.</td>
</tr>
<tr>
<td></td>
<td>■ N (No) – Restart has already been performed for the job. This is a subsequent request.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> To perform a restart of a previously restarted job</td>
</tr>
<tr>
<td></td>
<td>■ restart must be performed from the same TSO user that performed the first restart</td>
</tr>
<tr>
<td></td>
<td>■ the temporary files allocated by the previous invocation of the standalone utility must still exist</td>
</tr>
<tr>
<td>FROM PGMSTEP</td>
<td>Name of the program step at which a job restart is to be attempted. Mandatory.</td>
</tr>
<tr>
<td>FROM PROCSTEP</td>
<td>Name of the procedure step at which a job restart is to be attempted. Optional.</td>
</tr>
</tbody>
</table>
AutoEdit parameters

The parameters described in Table 10 are optional.

Table 10  AutoEdit Parameters of the Control-M/Restart Standalone Panel

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OWNER</td>
<td>User ID of the job owner. Optional. The panel is displayed with the TSO user ID.</td>
</tr>
<tr>
<td>GLOBAL</td>
<td>AutoEdit library containing globally defined AutoEdit library variables. Mandatory. The panel is displayed with the site-defined default.</td>
</tr>
<tr>
<td>WDATE</td>
<td>Current working date. Mandatory. The panel is displayed with the current date as the default.</td>
</tr>
<tr>
<td>ODATE</td>
<td>Original scheduling date of the job. Mandatory. The panel is displayed with the current date as the default.</td>
</tr>
<tr>
<td>ENTER YES TO CONTINUE</td>
<td>Confirmation field to prevent the unintentional restart of a job. When blank, the operation is not performed. Specify YES to process the request.</td>
</tr>
</tbody>
</table>

The following points are noted about From Step/Proc and To Step/Proc values:

- To perform processing on the whole job, enter $FIRST in field From Pgmstep. To perform processing from a specific step, specify the step name in the appropriate FROM PGMSTEP or FROM PROCSTEP fields.

- Pgmstep name can be any specific program step name or $FIRST. $FIRST resolves to the first step of the job if procstep name is blank. Otherwise, $FIRST resolves to the first step in the procedure identified by procstep.

- $ABEND and $EXERR are not recognized by Control-M/Restart. Do not specify them as step name values. $ABEND and $EXERR are valid only in job scheduling definitions.

- If specifying a procstep name when there are nested procedures, specify the procstep name of the innermost procedure in which the program is included.
Multiple restarts of a job

It may be necessary to restart a job several times before successful completion of the job. In this case, note the following:

- Once restart of an original job run has been initiated from the Control-M/Restart Standalone panel, do not exit the panel until restart has successfully been completed, even if multiple restarts are required for successful job completion. If you exit the panel before successful completion of the restart, the restart history is lost and successful restart cannot later be performed.

- In the JOBID field, only the most current (latest) job id is specified. When first requesting restart of the original job, use the job id of the original run. If the first restart fails and a second restart is being requested, use the job id of the failed (first) restart; for a third restart, use the job id of the second (failed) restart; and so on.

- In field FIRST RESTART, a value of Y (Yes) is specified only for the first restart attempt following the original run. When subsequent restarts are required, a value of N (No) is specified for all subsequent restart attempts (despite the fact that a different jobid is used for each restart attempt).

Control-M/Restart online utilities

Control-M/Restart has several online utilities. These are available from the IOA Online Utilities menu, which is displayed by requesting Option 6 on the IOA Primary Option menu under ISPF, or by activating CLIST IOAUTIL from the TSO Command Processor.

The R4 utility, which displays the Control-M/Restart Standalone restart panel, has been described under “Operating Control-M/Restart in standalone mode” on page 39. Other available online utilities are described on the following pages.
The Control-M/Restart Simulation Facility simulates restart or data set cleanup processing under Control-M/Restart. It can be used to validate the results of Control-M/Restart processing and the AutoEdit variable resolution of the job before the job is run in the production environment.

Simulation enables you to see what actions are taken by Control-M/Restart without Control-M/Restart performing updates. The Simulation facility adds a CONTROLR step to the job stream before the edited job is submitted. The job runs and then stops after the CONTROLR step; the utility adds a step that prevents the execution of the other steps in the job. No updates are performed.

**NOTE**

In simulation mode, Control-M/Restart submits the entire job. The operating system does not “know” when the job is submitted that the only step that will run is the Control-M/Restart step. The result is that the operating system does its standard look-ahead file allocation processing. This may cause the system to call for tape mounts when the job starts to execute. No data on these files will be lost, nor will the tapes be uncataloged or scratched.

The output of the simulation process is a standard print file containing:

- input control statements
- messages about the analyzed submitted job

The output shows relevant data, such as which data sets are uncataloged, how GDG adjustments are performed, from which step the job is restarted, and so on.

The Simulation facility is available only for jobs run under Control-M.

The Control-M/Restart Simulation panel (Figure 2) can be displayed in the following ways:

- Select Option R1 in the IOA Online Utilities menu. The IOA Online Utilities menu is displayed by requesting Option 6 on the IOA Primary Option menu under ISPF, or by activating CLIST IOAUTIL from the TSO Command Processor.

- Activate CLIST CTRCSIM from the TSO Command Processor.

To exit the Control-M/Restart Simulation panel without activating the utility, press **END (PF03/PF15)**.
Either of two types of Control-M/Restart processing can be requested:

- To request job restart simulation, specify **R** (Restart) in the **ACTION REQUIRED** field.
- To request Prevent-NCT2 processing simulation, specify **P** (Prevent NCT2) in the **ACTION REQUIRED** field.

The CTRCSIM utility operates in either JCL Library mode or Scheduling Library mode, according to the parameters you specify in the utility panel:

**JCL library mode**

This mode becomes operational if you specify a job JCL library and member name.

Do not use this mode if the job contains Control-M AutoEdit variables with values determined by SET VAR or DO SET parameters in the job scheduling definition. Because no job scheduling definition is specified in this mode, those variables are not resolved and the simulation results are not reliable.
Scheduling library mode

This mode becomes operational if you specify a job scheduling definition and its scheduling library and member.

This mode is used if the job contains Control-M AutoEdit variables with values that are determined by SET VAR or DO SET parameters in the job scheduling definition. The specified job scheduling definition points to the appropriate JCL library and member, and in this case, all information necessary for resolution of AutoEdit variables is available.

Parameters of the Control-M/Restart simulation facility

To activate the utility, fill in the parameters, type **YES** in the last field of the screen, and press **ENTER**.

Depending on the desired mode, specify either JCL Library mode or Scheduling Library mode parameters, but not both.

**Table 11  Action Required Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTION REQUIRED</td>
<td>Type of Simulation to perform. Mandatory. Valid values are:</td>
</tr>
<tr>
<td></td>
<td>- R (Restart under Control-M/Restart) – This function simulates a job restart.</td>
</tr>
<tr>
<td></td>
<td>- P (Prevent NCT2) – This function simulates data set cleanup including the prevention of DUPLICATE DATASET ON VOLUME and NOT CATLGD 2 errors.</td>
</tr>
<tr>
<td>TRACE MODE</td>
<td>Diagnostic tool that allows debugging in Control-M/Restart. Optional.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Do not use this parameter unless specifically requested by the BMC Software Customer Support.</td>
</tr>
<tr>
<td>OPERATION MODE</td>
<td>Mode in which the Control-M/Restart Simulation facility must operate. Mandatory. Valid values: J (JCL Library mode) or S (Scheduling Library mode).</td>
</tr>
<tr>
<td></td>
<td>The mode parameters (in <strong>Table 12</strong>) are mandatory for the selected mode, and must be left blank for the non-selected mode.</td>
</tr>
</tbody>
</table>

**Table 12  JCL Library Mode Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCL LIBRARY</td>
<td>Library containing the JCL of the original job submission</td>
</tr>
<tr>
<td>MEMBER NAME</td>
<td>Member containing the JCL of the original job submission</td>
</tr>
</tbody>
</table>
The following points are noted about FROM STEP/PROC and TO STEP/PROC values:

- To perform processing on the whole job, enter $FIRST in the FROM PGMSTEP field. To perform processing from a specific step, specify the step name in the appropriate FROM PGMSTEP or FROM PROCSTEP fields.

---

### Table 13 Schedule Library Mode Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHEDULE LIBRARY</td>
<td>Name of the library containing the job scheduling definition</td>
</tr>
<tr>
<td>TABLE NAME</td>
<td>Name of the table containing the job scheduling definition</td>
</tr>
<tr>
<td>JOB NAME</td>
<td>Name of the job scheduling definition</td>
</tr>
</tbody>
</table>

### Table 14 Restart Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORDER ID</td>
<td>Job order identification of the specific job run to be restarted. Mandatory.</td>
</tr>
<tr>
<td>FROM PGMSTEP</td>
<td>Name of the pgmstep at which a job restart is to be attempted. Optional.</td>
</tr>
<tr>
<td>TO PGMSTEP</td>
<td>Name of the pgmstep at which a restarted job is to terminate. Optional.</td>
</tr>
<tr>
<td>FROM PROCSTEP</td>
<td>Name of the procstep at which a job restart is to be attempted. Optional.</td>
</tr>
<tr>
<td>TO PROCSTEP</td>
<td>Name of the procstep at which a restarted job is to terminate. Optional.</td>
</tr>
</tbody>
</table>

### Table 15 AutoEdit Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OWNER</td>
<td>Owner of the job. Mandatory. The panel is displayed with the TSO use id.</td>
</tr>
<tr>
<td>GLOBAL AUTOEDIT LIBRARY</td>
<td>Library containing globally defined AutoEdit variables. Mandatory. The panel is displayed with the site-defined default.</td>
</tr>
<tr>
<td>WDATE</td>
<td>Current working date. Mandatory. The panel is displayed with the current date as the default.</td>
</tr>
<tr>
<td>ODATE</td>
<td>Original scheduling date of the job. Mandatory. The panel is displayed with the current date as the default.</td>
</tr>
<tr>
<td>Enter YES to continue</td>
<td>Confirmation field to help prevent the simulation jobs from being unintentionally run. When blank, the jobs are not run. Specify YES to enable the job run.</td>
</tr>
</tbody>
</table>
R2: Control-M/Restart data set cleanup

- Pgmstep name can be any specific program step name or $FIRST. $FIRST resolves to the first step of the job if procstep name is blank. Otherwise, $FIRST resolves to the first step in the procedure identified by procstep.

- $ABEND and $EXERR are not recognized by Control-M/Restart. Do not specify them as step name values. $ABEND and $EXERR are valid only in job scheduling definitions.

- If specifying a procstep name when there are nested procedures, specify the procstep name of the innermost procedure in which the program is included.

--- NOTE ---
AutoEdit resolution is performed at time of submitting the job. For example, if a job with the %%DATE AutoEdit date variable is submitted the day after the original run, the resolution of the variable varies from that of the original run.

R2: Control-M/Restart data set cleanup

The Control-M/Restart Dataset Cleanup utility is used to manually request data set cleanup.

The utility places a CONTROLR step in the job stream and submits the job. The CONTROLR step performs the data set adjustment (including step adjustment, if necessary) and then stops. No further job steps are executed (the utility adds a step that prevents the execution of the other steps in the job).

The Control-M/Restart Dataset Cleanup screen (Figure 3) can be displayed in the following ways:

- Select Option R2 in the IOA Online Utilities menu. The IOA Online Utilities menu is displayed by requesting Option 6 on the IOA Primary Option menu under ISPF, or by activating CLIST IOAUTIL from the TSO Command Processor.

- Activate CLIST CTRCCLN from the TSO Command Processor.

To exit the Control-M/Restart Dataset Cleanup panel without activating the utility, press END (PF03/PF15).
Figure 3  Control-M/Restart Dataset Cleanup Panel

The CTRCCLN utility operates in either JCL Library mode or Scheduling Library mode, according to the parameters you specify in the utility panel:

**JCL library mode**

This mode becomes operational if you specify a job JCL library and member name.

Do not use this mode if the job contains Control-M AutoEdit variables with values determined by SET VAR or DO SET parameters in the job scheduling definition. Because no job scheduling definition is specified in this mode, those variables are not resolved and the simulation results are not reliable.

**Scheduling library mode**

This mode becomes operational if you specify a job scheduling definition and its scheduling library and member.

This mode is used if the job contains Control-M AutoEdit variables whose values are determined by SET VAR or DO SET parameters in the job scheduling definition. The specified job scheduling definition points to the appropriate JCL library and member, and in this case, all information necessary for resolution of AutoEdit variables is available.
Parameters of the Control-M/Restart Dataset Cleanup facility

To activate the utility, fill in the parameters, type YES in the last field of the screen, and press ENTER.

Depending on the desired mode, specify either JCL Library mode or Scheduling Library mode parameters, but not both.

Table 16 Control-M/Restart Data Set Cleanup Facility Modes

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPERATION MODE</td>
<td>Mode in which the Control-M/Restart Data Set Cleanup Facility must operate. Valid values: J (JCL Library mode) or S (Scheduling Library mode). Mandatory.</td>
</tr>
<tr>
<td>TRACE MODE</td>
<td>Diagnostic tool that allows debugging in Control-M/Restart. Optional.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Do not use this parameter unless specifically requested by the BMC Software Customer Support.</td>
</tr>
</tbody>
</table>

Table 17 JCL Library Mode Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCL LIBRARY</td>
<td>Library containing the original job. Mandatory.</td>
</tr>
<tr>
<td>MEMBER NAME</td>
<td>Name of the member containing the JCL for the job. Mandatory.</td>
</tr>
</tbody>
</table>

Table 18 Schedule Library Mode Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHEDULING LIBRARY</td>
<td>Library containing the job scheduling definition. Mandatory.</td>
</tr>
<tr>
<td>TABLE NAME</td>
<td>Name of the table containing the job scheduling definition. Mandatory.</td>
</tr>
<tr>
<td>JOB NAME</td>
<td>Name of the job scheduling definition. Mandatory.</td>
</tr>
</tbody>
</table>

Table 19 Cleanup Parameters (part 1 of 2)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORDER ID</td>
<td>Job order identification of the specific job run. Mandatory.</td>
</tr>
<tr>
<td>FROM PGMSTEP</td>
<td>Name of the pgmstep at which data set cleanup is to be attempted. Mandatory.</td>
</tr>
</tbody>
</table>
Note the following points about FROM STEP/PROC and TO STEP/PROC values:

- To perform processing on the whole job, enter $FIRST in the FROM PGMSTEP field. To perform processing from a specific step, specify the step name in the appropriate FROM PGMSTEP or FROM PROCSTEP fields.

- Pgmstep name can be any specific program step name or $FIRST. $FIRST resolves to the first step of the job if procstep name is blank. Otherwise, $FIRST resolves to the first step in the procedure identified by procstep.

- $ABEND and $EXERR are not recognized by Control-M/Rerstart. Do not specify them as step name values. $ABEND and $EXERR are valid only in job scheduling definitions.

- If specifying a procstep name when there are nested procedures, specify the procstep name of the innermost procedure in which the program is included.
The Control-M/Restart Job Data Set List utility prepares the list of permanent data sets used in a job. The list is generated in the Control-M Statistics file.

The utility allows specification of one job at a time. It works by adding to the job a step that prevents execution of other steps in the job. The job is then submitted. The data sets required are listed in the Statistics file and the job is stopped before it can execute.

This utility is generally run as a preliminary step before generating the Data Set Cross Reference Report, which requires the list of data sets for the job. For more information, see the INCONTROL for z/OS Utilities Guide.

NOTE
AutoEdit resolution is performed at time of submitting the job. For example, if a job with the %%DATE AutoEdit date variable is submitted the day after the original run, the resolution of the variable varies from that of the original run.

NOTE
The AUTOXREF=Y Control-M/Restart parameter (see the Control-M/ for z/OS Installation Guide) can be used instead of the R3 utility. When this parameter is used, and if the Control-M/Restart Prevent NCT2 facility is invoked, the job-data sets cross reference statistical information is accumulated during regular execution of the job.

The Control-M/Restart Job Dataset List panel (below) can be displayed in the following ways:

- Select Option R3 in the IOA Online Utilities menu. The IOA Online Utilities menu is displayed by requesting Option 6 on the IOA Primary Option menu under ISPF, or by activating CLIST IOAUTIL from the TSO Command Processor.

- Activate CLIST CTMJDSN from the TSO Command Processor.

To exit the Control-M/Restart Job Dataset List panel without activating the utility, press END (PF03/PF15).
The CTMJDSN utility operates in either JCL Library mode or Scheduling Library mode, according to the parameters you specify in the utility panel.

**JCL library mode**

This mode becomes operational if you specify a job JCL library and member name. Do not use this mode if the job contains Control-M AutoEdit variables with values determined by `SET VAR` or `DO SET` parameters in the job scheduling definition. Because no job scheduling definition is specified in this mode, those variables are not resolved and the simulation results are not reliable.

**Scheduling library mode**

This mode becomes operational if you specify a job scheduling definition and its scheduling library and member. This mode is used if the job contains Control-M AutoEdit variables with values that are determined by `SET VAR` or `DO SET` parameters in the job scheduling definition. The specified job scheduling definition points to the appropriate JCL library and member, and in this case, all information necessary for resolution of AutoEdit variables is available.
Parameters of the Control-M/Restart data set list utility

To activate the utility, fill in the parameters, type **YES** in the last field of the screen, and press **ENTER**.

Depending on the desired mode, specify either JCL Library mode or Scheduling Library mode parameters, but not both.

**Table 21  General Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRACE MODE</td>
<td>Diagnostic tool that allows debugging in Control-M/Restart. Optional.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Do not use this parameter unless specifically requested by BMC Software Customer Support.</td>
</tr>
</tbody>
</table>

**Table 22  JCL Library Mode Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCL LIBRARY</td>
<td>Library that contains the job’s JCL. Mandatory.</td>
</tr>
<tr>
<td>MEMBER NAME</td>
<td>Name of the member containing the JCL for the job. Mandatory.</td>
</tr>
</tbody>
</table>

**Table 23  Scheduling Library Mode Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHEDULING LIBRARY</td>
<td>Name of the library containing the job scheduling definition. Mandatory.</td>
</tr>
<tr>
<td>TABLE NAME</td>
<td>Name of the table containing the job scheduling definition. Mandatory.</td>
</tr>
<tr>
<td>JOB NAME</td>
<td>Name of the job scheduling definition. Mandatory.</td>
</tr>
</tbody>
</table>

**Table 24  AutoEdit Parameters (part 1 of 2)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OWNER</td>
<td>User ID of the job’s owner. Optional. The panel is displayed with the TSO user ID.</td>
</tr>
<tr>
<td>GLOBAL AUTOEDIT LIBRARY</td>
<td>AutoEdit library containing globally defined AutoEdit variables. Mandatory. The panel is displayed with the site-defined default.</td>
</tr>
<tr>
<td>WDATE</td>
<td>Current working date. Mandatory. The panel is displayed with the current date as the default.</td>
</tr>
</tbody>
</table>
Note the following points about FROM STEP/PROC and TO STEP/PROC values:

- To perform processing on the whole job, enter $FIRST in the FROM PGMSTEP field. To perform processing from a specific step, specify the step name in the appropriate FROM PGMSTEP or FROM PROCSTEP fields.

- Pgmstep name can be any specific program step name or $FIRST. $FIRST resolves to the first step of the job if procstep name is blank. Otherwise, $FIRST resolves to the first step in the procedure identified by procstep.

- $ABEND and $EXERR are not recognized by Control-M/Restart. Do not specify them as step name values. $ABEND and $EXERR are valid only in job scheduling definitions.

- If specifying a procstep name when there are nested procedures, specify the procstep name of the innermost procedure in which the program is included.

---

**NOTE**

AutoEdit resolution is performed at time of submitting the job. For example, if a job with the %%DATE AutoEdit date variable is submitted the day after the original run, the resolution of the variable varies from that of the original run.

---

**KeyStroke Language utility**

The IOA standard KeyStroke Language (KSL) is a general purpose language that simulates, in batch, keystrokes that are entered in the IOA Online facility. KSL language statements (commands) are specified in programs called scripts.

The most common use of KSL scripts is to generate reports from the IOA Core and INCONTROL product repositories. Utilities are also frequently written in KSL scripts.

Once you are familiar with KSL, you can write your own scripts to create reports and utilities. Once a KSL script is defined it can be reused.
For more information, see the KeyStroke Language (KSL) User Guide.
The CONTROLR Step and Control Parameters

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  Format of the $KEEP member ....................................... 75
Overview

The CONTROLR step is a special processing step that is automatically generated by Control-M/Restart and inserted into the JCL of the job when Control-M/Restart processing is requested. The CONTROLR step provides the necessary instructions for the appropriate Control-M/Restart processing of the job.

The particular instructions included in the CONTROLR step depend not only on the type of processing requested, but on relevant parameters that can be taken from any of various sources:

- the CTRPARM and CTMPARM members in the IOA PARM library

  These are described in the customization section of the INCONTROL for z/OS Installation Guide.

- members in the Control-M/Restart PARM library

  Table 25 describes the members that can be found in this library.

Table 25  Control-M/Restart PARM Library Members

<table>
<thead>
<tr>
<th>Member</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$DEFAULT</td>
<td>Parameters defined in this member apply to all jobs processed by Control-M/Restart</td>
</tr>
<tr>
<td>Local members</td>
<td>A local member and the parameters it contains are dedicated to, and apply to, a particular job. Parameters in a local member override parameters in the $DEFAULT member for the particular job.</td>
</tr>
<tr>
<td>$EXCLUDE</td>
<td>This member is used to indicate DD statements and data set names to be excluded from Control-M/Restart processing.</td>
</tr>
<tr>
<td>$KEEP</td>
<td>This member is used to indicate the names of data sets that must not be deleted by Control-M/Restart.</td>
</tr>
</tbody>
</table>

The parameters of the $DEFAULT (and local) members, and the format of the $EXCLUDE member, are described below.

- Job scheduling definitions

  Parameters in a job scheduling definition override corresponding defaults specified in the CTRPARM member in the IOA PARM library, and override defaults specified in the $DEFAULT member or local members in the Control-M/Restart PARM library.
• Special DD statements placed in the JCL for specific job steps

  These are relevant only to those specific steps of the job and override all other corresponding instructions.

• Windows and screens used to enter manual requests

  These parameters override any previously specified parameters, except those specified in special DD statements placed in specific JCL jobs steps in the job.

Although generation of the CONTROLR step is automatic, manual adjustment of the CONTROLR step is permitted.

This chapter contains a description of the CONTROLR step, followed by a description of the control parameters specified in the Control-M/Restart PARM library.

**CONTROLR step**

The CONTROLR step JCL is listed in Figure 5.

**Figure 5  CONTROLR Step JCL**

```plaintext
//CONTROLR PROC ARCHF=NULLFILE,PRM=
//CONTROLR EXEC PGM=CTRCTR,PARM="&PRM"
//STEPLIB DD DSN=IOA.PROD.LOAD,DISP=SHR
//DAARCH DD DISP=SHR,DSN=&ARCHF
//DACTRCTL DD DSN=CTR.PROD.CTR.PARM,DISP=SHR
//SYSPRINT DD SYSOUT=*  
//DATRACE DD SYSOUT=*   
//CDAMSNAP DD SYSOUT=* 
//SYSABEND DD SYSOUT=* 
//DASTAT DD DISP SHR=SHR,DSN=&STATFIL 
//DALIST DD SYSOUT=* 
```
Files referenced by CONTROLR step DD statements are described in **Table 26.**

**Table 26 Files Referenced by CONTROLR Step DD Statements**

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAARCH</td>
<td>Relevant only for restarts</td>
</tr>
<tr>
<td></td>
<td>For a non-NJE job (meaning, the system in which Control-M processes the job for submission is not a node in an NJE network, and the job is not sent to another node for execution), this data set contains a set of pointers to the archived SYSDATA. For an NJE job (meaning the job is sent to another node for execution), this file contains the actual SYSDATA of all the previous runs of this job.</td>
</tr>
<tr>
<td>DACTRCTL</td>
<td>Control-M/Rearm PARM library, which contains control parameter members. A concatenation of libraries can be specified. Control-M/Rearm checks the library for the $DEFAULT member. The member, if it exists, contains control parameters that apply to all jobs. Control-M/Rearm retrieves these processing control parameters (and prints the contents of the member to make known the defaults being used). Regardless of whether the $DEFAULT member was found, Control-M/Rearm then checks the library for a local member for the job (that is, a member with the same name as the job). If a local member for the job is found, Control-M/Rearm retrieves control parameter instructions from that member (and prints the contents of the member). If the same parameters exist in both the $DEFAULT member and the local member, the values in the local member supersede the values in the $DEFAULT member. Control parameters that can be defined in the Control-M/Rearm PARM library are described in “Control parameters in the Control-M/Rearm PARM library” on page 68.</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>File or printer to which messages and reports of the CONTROLR step are written</td>
</tr>
<tr>
<td>DATTRACE</td>
<td>File or printer to which debugging messages are written if problems are encountered in the CONTROLR step. If necessary, BMC Software Customer Support can provide instructions on how to activate debugging messages.</td>
</tr>
</tbody>
</table>
Note the following points about the CONTROLR step:

■ for Restarts

— The CONTROLR step is inserted as the first step of the job to be restarted. Information is inserted in the PARM operand of the CONTROLR step describing how the job is to be restarted (from step, to step, and so on).

— If the job is sent to another node for execution, then for proper analysis of the job, the output must return to the submitting node.

■ for Data Set Cleanup

— If the NCAT2 parameter in the CTRPARM member in the IOAPARM library is set to YES, Control-M/Restart performs data set cleanup for original job runs. The CONTROLR step deletes and uncatalogs the old data sets, unless the data set name is specified in an EXCLUDE DSN statement in a member in the Control-M/Restart PARM library. This prevents DUPLICATE DATASET ON VOLUME and NOT CATLGD 2 errors.

— The PREVENT-NCT2 parameter in the Control-M job scheduling definition overrides the site-defined default in the NCAT2 parameter.

— For data set cleanup of non-rerun and non-restarted jobs, the CONTROLR step is inserted as the first step in the job stream and the edited job JCL is submitted. The CONTROLR step performs the necessary data set cleanup (including step adjustment, if necessary) and then stops. No further job steps are executed.

Table 26 Files Referenced by CONTROLR Step DD Statements

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDAMSNAP</td>
<td>File or printer to which error messages are written if the CONTROLR step encounters a problem in dynamically allocating the archived (compressed) SYSDATA of the previous runs of the restarted job</td>
</tr>
<tr>
<td>DASTAT</td>
<td>Control-M Statistics file, which is used to hold statistics needed by the Data Set Cross-reference facility</td>
</tr>
<tr>
<td>DALIST</td>
<td>File containing the list of data sets. The list is generated by the Control-M/Restart Data Set Cross-reference utility.</td>
</tr>
</tbody>
</table>

Note the following points about the CONTROLR step:

■ for Restarts

— The CONTROLR step is inserted as the first step of the job to be restarted. Information is inserted in the PARM operand of the CONTROLR step describing how the job is to be restarted (from step, to step, and so on).

— If the job is sent to another node for execution, then for proper analysis of the job, the output must return to the submitting node.

■ for Data Set Cleanup

— If the NCAT2 parameter in the CTRPARM member in the IOAPARM library is set to YES, Control-M/Restart performs data set cleanup for original job runs. The CONTROLR step deletes and uncatalogs the old data sets, unless the data set name is specified in an EXCLUDE DSN statement in a member in the Control-M/Restart PARM library. This prevents DUPLICATE DATASET ON VOLUME and NOT CATLGD 2 errors.

— The PREVENT-NCT2 parameter in the Control-M job scheduling definition overrides the site-defined default in the NCAT2 parameter.

— For data set cleanup of non-rerun and non-restarted jobs, the CONTROLR step is inserted as the first step in the job stream and the edited job JCL is submitted. The CONTROLR step performs the necessary data set cleanup (including step adjustment, if necessary) and then stops. No further job steps are executed.
Parameters passed to the CONTROLR step

The EXEC statement of the CONTROLR step contains a PARM parameter that is used to pass information between the Control-M monitor and the CONTROLR step. This information is inserted into the PARM operand by Control-M/R _restart logic in the Control-M monitor.

It is possible to use the CTMX002 Control-M user exit and the CTMSE02 Control-M security exit to modify values passed to the CONTROLR step using the PARM operand.

PARM operand information is necessary for the operation of Control-M/Restart facilities that are activated during the execution of the CONTROLR step.

The format of the EXEC statement is

//CONTROLR EXEC CONTROLR,
//    PARM= type,mem,orderid,sysopt,from,to,recapt/adjust,trc,stepcc'

CONTROLR is the default procedure name for the CONTROLR step. This default can be modified using the CTRPROC Control-M/Restart parameter in the CTRPARM member in the IOA PARM library. For more information, see the Control-M/Restart installation procedure in the INCONTROL for z/OS Installation Guide.
The parameters specified in the CONTROLR step PARM field are described in Table 27.

**Table 27 Parameters Specified in the CONTROLR Step PARM Field (part 1 of 6)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| **type**  | Mode and operation to be performed. Mandatory. This parameter consists of two single-character values: mode and operation. Mode must be one of the following:  
- R (Real) — The CONTROLR step uncatalogs data sets and performs GDG adjustment, and so on.  
- S (Simulated) — CONTROLR operates in Simulation mode. Reports are produced to show which data sets are uncataloged, how GDG adjustments are performed, from which step the job is restarted, and so on. However, no actual processing takes place and the job is terminated immediately after the CONTROLR step. This mode can be used by the Control-M/Restart Simulation facility and when manually creating JCL to run the CONTROLR step. Operation must be one of the following:  
- R (Restart) — Control-M/Restart performs a restart.  
- 2 (Prevent-NCT2) — Control-M/Restart Prevent-NCT2 processing (data set cleanup prior to, and as part of, the original run).  
- C (Cleanup) — Control-M/Restart performs a data set cleanup only. All combinations of mode and operation are valid. |
Parameters passed to the CONTROLR step

Table 27 Parameters Specified in the CONTROLR Step PARM Field (part 2 of 6)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| **mem** | Control parameter member name. Optional. However, this parameter is normally inserted automatically during job submission. This parameter specifies the name of a user-defined library member that contains control parameters for a specific job.  

**Example:**

//CONTROLR EXEC CONTROLR,PARM='R2,AP04RUN,,BL,,STEP1,,ACS'

This parameter must be a valid member name from 1 through 8 characters. The default value of this parameter (that is automatically inserted during job submission) is the member name that contains the job JCL, meaning, the value displayed in the MEMNAME fields in the Control-M Zoom screen, or the NAME field in the Control-M Active Environment screen. This parameter can be overridden by a member name specified in the Confirm Restart window or the Rerun Restart window. |
| **orderid** | Order ID.  
The order ID is a unique Control-M job order identifier that is used by Control-M/Restart to provide unique access to the SYSDATA of all previous runs of the job to be restarted. For more information, see “ORDERID” on page 26. Normally, this parameter is automatically inserted during restart job submission.  

Optional.  
If specified, *orderid* must be a valid 5-character Control-M order ID. If not specified, a comma must be specified instead.  

**Example:**

//CONTROLR EXEC CONTROLR,PARM='RR,,0004F,RL,,STEP1,,ACS'

If this parameter is not specified, the *sysopt* (Read SYSDATA Indicator) parameter must be specified as BL or BN. |
Table 27  Parameters Specified in the CONTROLR Step PARM Field (part 3 of 6)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sysopt</td>
<td>Read SYSDATA Indicator. Specifies how the SYSDATA is to be processed by Control-M/Restart. Mandatory. This parameter consists of two 1-character values:</td>
</tr>
<tr>
<td></td>
<td>■ SYSOUT option – Specifies if and when to read the SYSDATA. Valid values are:</td>
</tr>
<tr>
<td></td>
<td>— R – Read all SYSDATA of previous runs of the same job order ID. If no SYSDATA is found for the job, the CONTROLR step abends with a user abend code or a condition code depending on the value of the ABNDTYP parameter in the CTRPARM member.</td>
</tr>
<tr>
<td></td>
<td>— B – Bypass the reading of all SYSDATA of previous runs of the same job order ID. This value is used for Prevent NCT2 runs. It is not intended for job restarts. If this value is used for restart runs, functionality of the restart is severely limited: CONTROLR step does not perform condition code recapture or GDG adjustment.</td>
</tr>
<tr>
<td></td>
<td>— C – Read all the SYSDATA of previous runs of the same job order ID if found. If no SYSDATA is found for this job, the CONTROLR step continues to execute; however, the CONTROLR step does not perform condition code recapture or GDG adjustment.</td>
</tr>
<tr>
<td></td>
<td>■ NJE Indicator – Indicates whether the job runs at the same NJE node as Control-M (local) or at a different NJE node than Control-M (remote). This determines the source of SYSDATA.</td>
</tr>
<tr>
<td></td>
<td>— L (Local) – Job runs at the same NJE node as Control-M (local node).</td>
</tr>
<tr>
<td></td>
<td>— N (NJE) – Job runs at a different NJE node than Control-M (remote node).</td>
</tr>
</tbody>
</table>
Parameters passed to the CONTROLR step

### Table 27 Parameters Specified in the CONTROLR Step PARM Field (part 4 of 6)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>from</strong></td>
<td>Restart from <code>procstep.pgmstep</code>&lt;br&gt;Specifies the pgmstep (or optionally the procstep.pgmstep) at which the restart of the job is to be attempted.&lt;br&gt;- <code>procstep</code> — Optional. If specified, it must be from 1 through 8 characters.&lt;br&gt;- <code>pgmstep</code> — Mandatory. Valid values are from 1 through 8 characters, preceded by a period (&quot;.&quot;).&lt;br&gt;Example:&lt;br&gt;<code>PARM='RR,GL04RUN,0004F,RL,.GLSTEP01,,ACS'</code></td>
</tr>
<tr>
<td><strong>to</strong></td>
<td>Optional. Restart to <code>procstep.pgmstep</code>.&lt;br&gt;This parameter specifies the pgmstep (or optionally the procstep.pgmstep) at which the restarted job terminates processing. If this parameter is not specified, the job is executed until the last step.&lt;br&gt;- <code>procstep</code> — Optional.&lt;br&gt;- <code>pgmstep</code> — If specified, this value must be from 1 through 8 characters, preceded by a period (&quot;.&quot;).&lt;br&gt;Example:&lt;br&gt;<code>PARM='RR,GL04RUN,0004F,RL,.GLSTEP01,.GLSTEP05,ACS'</code></td>
</tr>
</tbody>
</table>
Instructions for abend code recapture, condition code recapture, and step adjustment for the current restart of the job. Mandatory. This parameter consists of three 1-character values:

**Abend code recapture instruction. Must be one of the following**

- A—Perform abend code recapture.
- N—Do not perform abend code recapture.
- D—Perform or do not perform abend code recapture depending on the default defined in the Control-M/Restart PARM library. When no default is defined in the Control-M/Restart PARM library, the default is A (perform the recapture).

**Condition code recapture instruction. Must be one of the following**

- C—Perform condition code recapture.
- N—Do not perform condition code recapture.
- D—Perform or do not perform condition code recapture depending on the default defined in the Control-M/Restart PARM library. When no default is defined in the Control-M/Restart PARM library, the default is C (perform the recapture).

**Step adjustment instruction. Must be one of the following**

- S—Perform step adjustment if necessary.
- N—Do not perform step adjustment.
- D—Perform or do not perform step adjustment depending on the default defined in the Control-M/Restart PARM library. When no default is defined in the Control-M/Restart PARM library, the default is S (perform the step adjustment).

**trc**

Diagnostic tracing levels. Control-M passes the current diagnostic tracing levels to Control-M/Restart. The tracing levels can be set or changed using F CONTROLM, TRACE commands. For more information, see the INCONTROL for z/OS Administrator Guide.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| `recapt/adjust` | Instructions for abend code recapture, condition code recapture, and step adjustment for the current restart of the job. Mandatory. This parameter consists of three 1-character values: **Abend code recapture instruction. Must be one of the following**
- A—Perform abend code recapture.
- N—Do not perform abend code recapture.
- D—Perform or do not perform abend code recapture depending on the default defined in the Control-M/Restart PARM library. When no default is defined in the Control-M/Restart PARM library, the default is A (perform the recapture).

**Condition code recapture instruction. Must be one of the following**

- C—Perform condition code recapture.
- N—Do not perform condition code recapture.
- D—Perform or do not perform condition code recapture depending on the default defined in the Control-M/Restart PARM library. When no default is defined in the Control-M/Restart PARM library, the default is C (perform the recapture).

**Step adjustment instruction. Must be one of the following**

- S—Perform step adjustment if necessary.
- N—Do not perform step adjustment.
- D—Perform or do not perform step adjustment depending on the default defined in the Control-M/Restart PARM library. When no default is defined in the Control-M/Restart PARM library, the default is S (perform the step adjustment). |
| trc | Diagnostic tracing levels. Control-M passes the current diagnostic tracing levels to Control-M/Restart. The tracing levels can be set or changed using F CONTROLM, TRACE commands. For more information, see the INCONTROL for z/OS Administrator Guide. |
Control parameter members are defined in the Control-M/Restart PARM library. This library is referenced by the DACTRCTL DD statement of the CONTROLR step. Parameters defined in the $DEFAULT member apply to all jobs. Parameters defined in a local member apply to the specific job.

[NO]CHKSEC parameters

These parameters determine if Control-M/Restart performs preliminary security checks that can inform you of potential security problems before you run the job. In no case, is security authorization bypassed.

If the CHKSEC parameter is specified, Control-M/Restart checks if the job has security authorization to access all the data sets in the DD statements of the job. If there is a security problem, Control-M/Restart issues warnings that the job is subject to a security failure by MVS.

If the NOCHKSEC parameter is specified, Control-M/Restart does not run a preliminary security check.

These parameters override the default value set by the CHKSEC parameter in the CTRPARM member in the IOA PARM library.
Example

Security checks must not be performed:

**NOCHKSEC**

**EXCLUDE DSN parameter**

The EXCLUDE DSN parameter is used to exclude data sets (databases, SYS1 files, and so on) from data set cleanup processing.

The format of the EXCLUDE DSN parameter is

```
EXCLUDE DSN <dataset>
```

where `<dataset>` is the data set name, prefix, suffix or mask

For example, assume that DSN SYS1.PROCLIB is to be excluded from processing by Control-M/Rstart:

```
EXCLUDE DSN SYS1.PROCLIB
```

Mask characters are supported as follows:

? represents any one character. For example

```
EXCLUDE DSN SYS?.PROCLIB
```

* represents any number of characters (including no characters). A supplied data set name ending with * acts as a prefix. For example

```
EXCLUDE DSN SYS1*
```

Any number of EXCLUDE DSN statements can be specified.

When excluding GDG data sets, specify qualifiers in the base portion of the data set name only. Do not specify the last qualifier, that is, `GnnnVnnm`.

For example, if you want to exclude all data sets in the Generation Data Group USER.TAPEGDG, use one of the following

```
EXCLUDE USER.TAPEGDG

EXCLUDE USER.TAPEGDG*
```
MSGLVL_STD/MSGLVL_FULL parameters

Message level parameters determine the level at which certain Control-M/Restart messages are logged (meaning, whether these messages are logged for each occurrence or only their first occurrence during a run of step CONTROLR). Either of two optional message parameters can be specified.

If neither parameter is specified, the default value is determined by the MSGLVL parameter in the CTRPARM member in the IOA PARM library, as described in Table 29.

Example

Report each message for the first occurrence only:

MSGLVL_STD
NONRESTARTABLE_STEP parameter

This parameter indicates that restart does not begin at the specified steps. It is generally used to prevent restart from certain steps when automatic Restart Step Adjustment is performed. It applies to all occurrences of the specified step, regardless of which job is being run.

The format of the parameter is

NONRESTARTABLE_STEP  [procstep_name].pgmstep_name

If procstep_name is blank (or the step is not part of a procedure), the period preceding pgmstep_name must still be specified.

As an alternative, the CTRNORST special DD statement can be included in the JCL for a job step in a job. This DD statement prevents restart from the specified job step only for the particular job. For more information see “Indicating non-restartable steps: CTRNORST DD” on page 80.

Example

NONRESTARTABLE_STEP  PROC01.STEP02

If, during automatic step adjustment, Control-M/Restart arrives at the PROC01.STEP02 step, it does not allow restart from that step, because this parameter defined that step as a non-restartable step. Instead, Control-M/Restart continues rolling back to the previous restartable step. If step adjustment continues to the first job step and no restart step is found, Control-M/Restart fails the job’s restart. This failure is accompanied by the CTR184S error message.

[NO]RECAPTCC/[NO]RECAPTABEND parameters

These parameters allow or prevent automatic condition and abend code recapture.

If recapture of completion codes (Cnnnn) is not desired, statement NORECAPTCC is specified.

If recapture of abend codes (Unnnn and Snnn) is not desired, statement NORECAPTABEND is specified.

RECAPTCC and RECAPTABEND, which permit recapture of the respective codes, are the defaults and do not need to be explicitly specified.
Example

Abend codes are not recaptured:

NORECAPTABEND

[NO]STEPADJUST parameters

The STEPADJUST parameter permits Automatic Step Adjustment to be performed; the NOSTEPADJUST parameter prevents Automatic Step Adjustment from being performed. As the default, STEPADJUST, which permits Automatic Step Adjustment, does not need to be explicitly specified. If Automatic Step Adjustment is not desired, NOSTEPADJUST is specified.

Step adjustment is accompanied by the CTR183I and CTR039I messages. If step adjustment continues to the first job step and no restart step is found, Control-M/Restart fails the job’s restart. This failure is accompanied by the CTR184S error message.

If step adjustment is needed, but step adjustment is disabled, job restart is terminated with a non-zero return code.

Example

Step adjustment is not performed:

NOSTEPADJUST

TRCREST and TRCNCT2 parameters

These parameters determine the trace level with which the CONTROLR step is run during Control-M/Restart processing.

--- NOTE ---

Do not use this parameter unless instructed to do so by BMC Software Customer Support.
Up to eight 1-digit values (1 through 8), separated by commas, can be specified for each of these parameters. Each value represents a particular trace level that is to be set to on. If a parameter is omitted, no trace level is set to on for that parameter.

Example 1

Set trace levels 1,4 and 7 on when the job is restarted:

TRCREST 1,4,7

Example 2

Set trace levels 1,4 and 7 on when running in Prevent NCT2 mode:

TRCNCT2 1,4,7

**UNITNAME parameter**

This parameter allows you to associate a site-defined esoteric unit name with the basic device type (tape or DASD). This informs Control-M/Restart of the type of processing to perform on data sets allocated to that unit.

This parameter may not be necessary. Control-M/Restart usually recognizes esoteric names defined during system I/O initialization. If, however, your site uses products that allow dynamic definition of esoteric unit names, it may be necessary to add these definitions so that Control-M/Restart can recognize the unit names.

The format of the UNITNAME parameter is

```
UNITNAME unit DEVICE TAPE          for tape devices
UNITNAME unit DEVICE DASD          for DASD devices
```

where *unit* is the site-defined esoteric unit name

Any number of UNITNAME statements can be specified.
Examples

The site has defined unit name ACL for tape devices with automatic cartridge loaders. Specify

UNITNAME ACL DEVICE TAPE

There is a group of DASD devices defined as DISK01, DISK02 and DISK03. Specify

UNITNAME DISK0* DEVICE DASD

Format of the $EXCLUDE member

The $EXCLUDE member is used to identify data set names and DD statements to be excluded from Control-M/Restart processing.

The format used to specify data set name statements in this member is the same format used to specify data set name statements in the $DEFAULT member.

DD statements are specified in this member in the format shown in Table 31.

Table 31 DD Statements in $EXCLUDE Member

<table>
<thead>
<tr>
<th>Column #s</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 through 08</td>
<td>job name</td>
</tr>
<tr>
<td>09 through 16</td>
<td>procstep name</td>
</tr>
<tr>
<td>17 through 24</td>
<td>pgmstep name</td>
</tr>
<tr>
<td>25 through 32</td>
<td>DD name</td>
</tr>
<tr>
<td>33 through 80</td>
<td>Comments (optional)</td>
</tr>
</tbody>
</table>

DD statement example

Figure 6 $EXCLUDE Member DD Statement Example

<table>
<thead>
<tr>
<th>JOB1</th>
<th>PROC1</th>
<th>STEP1</th>
<th>DD1</th>
<th>USED TO EXCLUDE DD1 FROM CTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOB2</td>
<td>PROC2</td>
<td>STEP2</td>
<td>DD2</td>
<td>USED TO EXCLUDE DD2 FROM CTR</td>
</tr>
<tr>
<td>JOB3</td>
<td>PROC3</td>
<td>STEP3</td>
<td>DD3</td>
<td>USED TO EXCLUDE DD3 FROM CTR</td>
</tr>
<tr>
<td>JOB4</td>
<td>PROC4</td>
<td>STEP4</td>
<td>DD4</td>
<td>USED TO EXCLUDE DD4 FROM CTR</td>
</tr>
<tr>
<td>JOB5</td>
<td>PROC5</td>
<td>STEP5</td>
<td>DD5</td>
<td>USED TO EXCLUDE DD5 FROM CTR</td>
</tr>
<tr>
<td>JOB6</td>
<td>PROC6</td>
<td>STEP6</td>
<td>DD6</td>
<td>USED TO EXCLUDE DD6 FROM CTR</td>
</tr>
<tr>
<td>*</td>
<td>*</td>
<td>*</td>
<td>SYSABEND</td>
<td></td>
</tr>
</tbody>
</table>

In the example in Figure 6, the first-specified statement excludes the DD name DD1 from the processing of the STEP1 program step in the PROC1 procedure step for the JOB1 job.
Format of the $KEEP member

The $KEEP member is used to identify the DD statements relating to data sets that must not be scratched during Control-M/Restart processing.

If the JCL of a job contains a DD statement in which the parameter DISP is set to NEW, and the corresponding data set already exists when Control-M/Restart is invoked, Control-M/Restart automatically changes the value of the DISP parameter to OLD.

DD statements are specified in this member in the format shown in Table 32.

<table>
<thead>
<tr>
<th>Column #s</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 through 08</td>
<td>job name</td>
</tr>
<tr>
<td>09 through 16</td>
<td>procstep name</td>
</tr>
<tr>
<td>17 through 24</td>
<td>pgmstep name</td>
</tr>
<tr>
<td>25 through 32</td>
<td>DD name</td>
</tr>
<tr>
<td>33 through 80</td>
<td>comments (optional)</td>
</tr>
</tbody>
</table>

**NOTE**

The $KEEP member is useful in specifying DD names of checkpoint data sets. When Control-R/RESTART recognizes an existing checkpoint data set specified with DISP=NEW, Control-R does not delete it but changes its disposition to DISP=OLD, enabling the restarted job to use the checkpoint data written by the failed job and to resume processing from the interruption point.
Chapter 4 Operation Considerations

This chapter includes the following topics:

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- Multi-CPU environments ................................................. 76
- IF/THEN/ELSE JCL blocks .............................................. 77
- Generation data sets (GDG) ............................................. 77
- $DEFAULT parameter member ......................................... 78
  - UNITNAME definition .................................................. 78
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- “Helping” Control-M/Restart ............................................ 79
- Indicating non-restartable steps: CTRNORST DD ................. 80
- Space for archived sysouts ............................................. 80
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- Control-M/Restart and tape management systems ............... 81
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Restart after a system crash

Control-M/Restart handling of restart following a system crash depends on the value specified in the SEARCH parameter in the CTRPARM member in the IOA PARM library.

The SEARCH parameter controls the searching for uncataloged data sets on all mounted disks if Control-M/Restart recognizes that the original job run failed due to a system crash. This search is part of data set cleanup. Valid values are described in Table 33.

Table 33  SEARCH Parameter Values

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>Control-M/Restart starts searching for uncataloged data sets on all mounted disks.</td>
</tr>
<tr>
<td>NO</td>
<td>Suppresses this processing; Control-M/Restart does not start searching.</td>
</tr>
<tr>
<td>CONFIRM</td>
<td>Control-M/Restart issues the CTR303I and CTR304I messages and then waits for an operator's confirmation before starting to search the data sets.</td>
</tr>
</tbody>
</table>

As noted above, if the SEARCH parameter has a value of CONFIRM, the operator is prompted (Yes/No) for instructions following a system crash. The operator can either confirm the search (YES) or cancel the search (NO).

Multi-CPU environments

Consider the following when running Control-M/Restart in a multi-CPU environment:

- When the original job runs on the same CPU as the Control-M monitor, the DAARCH data set contains a set of pointers to the archived SYSDATA.

If the restart job is also submitted on the same CPU, there are no special concerns. However, if the restart job can be submitted on a different CPU, certain concerns must be addressed if the restart is to be successful:

- The SYSDATA of the previous runs must be archived on a disk that is shared between CPUs. (Read access is sufficient since the Control-M/Restart step only requires read access to the SYSDATA.)

- The SYSDATA must also be in a catalog that can be accessed from all CPUs on which the job can run.
When the original job runs on a different (remote) node than the Control-M monitor, the DAARCH data set contains the actual archived SYSDATA. Therefore, access of the SYSDATA during restart is not a problem.

However, the considerations concerning catalogs remains. If all systems at the execution node do not share a common catalog, ensure that the restart executes on a system from which the required catalogs can be accessed.

**IF/THEN/ELSE JCL blocks**

Control-M/Restart can simulate and evaluate IF/THEN/ELSE JCL blocks, and restart the job from within the IF/THEN/ELSE JCL block when necessary, only if the IFADJ parameter in the CTRPARM member in the IOA PARM library is set to YES.

In this case, IF/THEN/ELSE JCL statements (or the COND parameter) operate as if backward-referenced steps were included in the restart run and are able to reference the correct condition code (meaning, the condition code of the backward-referenced step) from the previous unsuccessful run of the job. In this manner, the fact that the backward-referenced step is not included in the restart job is totally invisible to the COND and IF/THEN/ELSE parameters.

**NOTE**

If the IFADJ parameter is set to NO, Control-M/Restart does not handle IF/THEN/ELSE JCL blocks. In this case, do not use Control-M/Restart to restart jobs containing IF/THEN/ELSE blocks because the results are unpredictable.

**Generation data sets (GDG)**

Adjustment of generation number by the CONTROLR step is not done by modifying the JCL of the job. The original JCL may actually be in an invoked procedure that cannot be modified.
Instead, Control-M/Restart modifies the reference to the real name of the generation data set. Every generation number in a given job run relates to a specific data set name. Control-M/Restart retrieves the data set names from the SYSDATA of the previous runs of the job, and replaces the data set names that were chosen by the system in the restart run.

The above action can be detected in the following ways:

- a message in the report produced by the CONTROLR step
- the IEF285I messages of the job

To ensure proper GDG processing, BMC Software recommends that you review the settings of the relevant parameters in the CTRPARM member in the IOA PARM library. These parameters (MODGDGN ENHGDG, IGNFLUSH, and SAMEGDG), are described in the INCONTROL for z/OS Installation Guide.

$DEFAULT parameter member

UNITNAME definition

To determine the location of all data sets, Control-M/Restart uses UNITNAME definition statements in the control parameters to associate esoteric unit names with actual device types.

It is recommended that the $DEFAULT parameter member contain UNITNAME definition statements to enable Control-M/Restart to locate all required data sets.

Under certain circumstances, Control-M/Restart needs to search for a data set on all the disks that belong to a specified unit (for example, to scratch uncataloged data sets after a computer crash, and the data sets are allocated using the UNIT parameter without a VOL parameter).

For proper location of the data sets, Control-M/Restart uses UNITNAME definitions that are contained (in priority order from highest to lowest) in the control parameter member used for the restart, the $DEFAULT member of the Control-M/Restart parameter library, and an internal table of UNITNAME definitions. UNITNAME definitions are listed by Control-M/Restart as part of its output. For an example of this listing, see “Sample Control-M/Restart job restart execution” on page 83.
These definitions are accessed when the job is restarted. If a change is made to the UNIT definitions at the site, either after an IPL or dynamically, the UNITNAME definitions for Control-M/R must be updated to reflect these changes. If the UNITNAME definitions are incorrect, Control-M/R may not perform the restart correctly.

Valid format for UNITNAME definitions is described in “Control parameters in the Control-M/R PARM library” on page 68.

File exclusion

BMC Software recommends that this member contain EXCLUDE DSN statements for important data set prefixes or names, such as

- SYS1*
- IPO1*
- databases
- installed software products

“Helping” Control-M/R

A basic assumption of Control-M/R logic is that the user has not assisted the restart process in any way.

Control-M/R is designed to restart exactly the same job. Any modifications made by the user make the job into a different job. If modifications are made, a successful restart of the job cannot be guaranteed. Therefore, you must be careful not to change the JCL, especially in the following ways:

- modifying the name or generation number of a data set
- adding and deleting steps

Exceptions include changing the file size in response to a space abend, for example, Sx37, or changing the name of an input data set. In these cases, you can perform the changes.

You must also not delete or move relevant files, unless absolutely necessary, as in the case of disk damage.
Indicating non-restartable steps: CTRNORST DD

You can indicate that restart not begin at a particular step by specifying the CTRNORST DD statement for the step. During step adjustment, if the recoverable step selected by Control-M/Restart contains the CTRNORST DD statement, step adjustment continues to the preceding recoverable step. If adjustment reaches the first job step and the first job step contains the CTRNORST DD statement, restart is not performed.

The format of the CTRNORST DD statement is

```
//CTRNORST   DD   DUMMY
```

--- **NOTE**

For customers who have converted from CA-11 to Control-M/Restart, the following DD statement is also supported for compatibility:

```
//UCC11NR    DD   DUMMY
```

For more information, see “NONRESTARTABLE_STEP parameter” on page 71.

Space for archived sysouts

Ensure that enough space is available to archive SYSDATA for all jobs that execute under Control-M and for which a Y value for AUTO-ARCHIVE is specified either explicitly or by default. Control-M allocates space as needed on the devices defined by the AMVOL and AMUNIT parameters in the CTRParm member in the IOAPARM library, until all available space on the volumes is allocated.

- If SYSDB=Y is specified (recommended)

  The SYSDATA of all jobs is written to a common data set until it is filled; then a new data set is automatically allocated. This minimizes the space required in the catalog and in the VTOC on the defined disk.

- If SYSDB=N is specified

  Since every job execution results in one cataloged data set, make sure that the VTOC of the defined disks is large enough to contain all the data sets, and that enough space is available in the catalog. It is recommended that a user catalog be defined for the prefix defined in the AMREFR parameter in the CTRParm member in the IOA PARM library.
Deletion of archived SYSDATA is performed automatically by the Control-M New Day procedure (started task CONTDAY) or by the CTMCAJF utility. For more information about the New Day procedure, refer to the INCONTROL for z/OS Administrator Guide.

The New Day procedure deletes archived SYSDATA if the job does not reside in the History Jobs file and either of the following conditions is true:

- The job order is deleted from the Active Jobs file (therefore the archived SYSDATA is no longer needed). A job order is usually deleted from the Active Jobs file after it has completed OK.

- The maximum number of days to retain archived SYSDATA, or the maximum number of job runs for which the SYSDATA is retained, has been exceeded. These values are specified in the MAXDAYS and MAXRUNS subparameters of the AUTO-ARCHIVE parameter in the Control-M job scheduling definition.

Whether, and how long, a job is on the History Jobs file depends on the values of the RETENTION parameters in the job scheduling definition.

Control-M/Restart and tape management systems

The presence or absence of a tape management system (such as Control-M/Tape) determines how Control-M/Restart handles tape volume reuse when a restarted job re-executes steps that created new tape data sets in previous runs.

If a tape management system is in use, Control-M/Restart does not attempt to reuse the same tape volume during the rerun.

When there is no tape management system, Control-M/Restart attempts to reuse the same tape volume during the job rerun.

Presence or absence of a tape management system is indicated in the TAPEMS parameter in the CTRPARM member in the IOA PARM library.
For full functionality of the Control-M/Restart interface to tape management systems, the CTRX001 Control-M/Restart exit may be necessary. For more information, see the CTRX001T and CTRX001Z sample exits in the IOA SAMPEXIT library.

**Control-M/Restart and SMS**

At sites in which SMS (System Managed Storage) is implemented, BMC Software recommends that you review the setting of the VOLISMS parameter in the CTRPARM member in the IOA PARM library. This parameter is described in the *INCONTROL for z/OS Installation Guide*.

**Control-M/Restart interface to Control-M/Analyzer**

To ensure functionality of the Control-M/Restart interface to Control-M/Analyzer, CTRX001Q Control-M/Restart Exit may be necessary. For more information, see the sample exit in the IOA SAMPEXIT library.

**Control-M/Restart interface to third party vendor products**

To ensure functionality of the Control-M/Restart interface to HSM (Hierarchical Storage Manager), the CTRX001H Control-M/Restart Exit may be necessary. For more information, see the sample exit in the IOA SAMPEXIT library.

To ensure functionality of the Control-M/Restart interface to BETA91, the CTRX001B Control-M/Restart Exit may be necessary. For more information, see the sample exit in the IOA SAMPEXIT library.

To ensure functionality of the Control-M/Restart interface to DMS/OS, the CTRX001D Control-M/Restart Exit may be necessary. For more information, see the sample exit in the IOA SAMPEXIT library.

To ensure functionality of the Control-M/Restart interface to the IDCAMS IBM utility and other applications that dynamically allocate files, it may be necessary to set the NFILVS99 parameter in the CTRPARM member in the IOA PARM library to Y (Yes). This parameter is described in the *INCONTROL for z/OS Installation Guide*.
Control-M/Rerestart handles only those data sets that are specified in DD statements in the JCL of jobs. It does not handle dynamically allocated data sets, with the exception of the cases affected by setting the NFILVS99 parameter to Y (Yes).

Sample Control-M/Rerestart job restart execution

The following is a sample of a job that was restarted by Control-M/Rerestart. (Lines that are bolded are discussed in notes following the sample execution.) Control-M/Rerestart was instructed to attempt restart from STEP005 if any job step abended. In the Job Scheduling Definition screen (Screen 2), the parameters illustrated in Figure 7 were entered.

**Figure 7** Parameters entered in the job scheduling definition - sample Control-M/Rerestart job restart execution

```
STEP RANGE ANYSTEP FR (PGM.PROC) STEP001 . TO STEP008 .
STEP RANGE FR (PGM.PROC) TO .
ON PGMST ANYSTEP PROCST CODES $*** U**** A/O
  DO IFRERUN FROM STEP005 . TO . CONFIRM N
  DO RERUN
  DO
```

The previous run of PRDJBGL5 abended in STEP006.

**Figure 8** Sample Control-M/Rerestart job restart execution

```
JES2 JOB LOG -- SYSTEM FDSF -- NODE NODE1
18.43.51 JOB 3144 IEF6771 WARNING MESSAGE(S) FOR JOB PRDJBGL5 ISSUED
18.43.51 JOB 3144 $HASP373 PRDJBGL5 STARTED - INIT 1 - CLASS A - SYS FDSF
18.43.51 JOB 3144 IEF403I PRDJBGL5 - STARTED - TIME=18.43.51
18.44.17 JOB 3144 CTR082I RESTARTING FROM STEP STEP003 . TO STEP STEP009 .
18.44.52 JOB 3144 IEF404I PRDJBGL5 - ENDED - TIME=18.44.52
18.44.52 JOB 3144 $HASP395 PRDJBGL5 ENDED
------ JES2 JOB STATISTICS ------
10 AUG 98 JOB EXECUTION DATE
124 CARDS READ
528 SYSOUT PRINT RECORDS
0 SYSOUT PUNCH RECORDS
36 SYSOUT SPOOL KBYTES
1.01 MINUTES EXECUTION TIME
1 //PRDJBGL5 JOB ,GPL,MSGCLASS=X,CLASS=A, JOB 3144
  //MSGLEVEL=(1,1)
***------------  SUBMITTED BY CONTROL-M  -------
************************************************************
****                     STEP001                      **
************************************************************
1 //RESTART EXEC PROC=CONTROLR,
  // PARM='RR,PRDJBGL5.000BU.RL.,STEP005..ACS'
3 XXCONTROLR PROC ARCHF=NULLFILE, FOR FUTURE USE
```
Sample Control-M/Restart job restart execution

XX
PRM=.
XX
STEPLIB='IOA.PROD.LOAD', CONTROL-R LOAD LIBRARY
XX
OLPREFR='CTR0', OPERATIONS LIBRARY PREFIX
XX
OLVERR='CTRPROD', OPERATIONS LIBRARY VERSION
XX
OUT='*', OUT=Z

********************************************************************
*****   THE CONTROL-R STEP                                      ****
*****   ------------------                                      ****
*****   THIS STEP PERFORMS THE MAIN RESTART TASKS:               ****
*****    - RESTART STEP ADJUSTMENT                              ****
*****    - FILE, CATALOG AND GDG ADJUSTMENT                     ****
*****    - CONDITION CODE RECAPTURE                             ****
********************************************************************

4     XXCONTROLR EXEC PGM=CTRCTR,PARM='&PRM',REGION=4000K
5     XXSTEPLIB  DD  DISP=SHR,DSN=&STEPLIB
6     //DAARCH   DD *,DCB=(LRECL=132)
X/DAARCH   DD  DISP=SHR,DSN=&ARCHF
7     XXDACTRCTL DD  DISP=SHR,DSN=&OLPREFR..&OLVERR..CTR.PARM
8     XXSYSPRINT DD  SYSOUT=&OUT
9     XXDATRACE  DD  SYSOUT=&OUTDUMP
10    XXCDAMSNAP DD  SYSOUT=&OUTDUMP
11    XXSYSABEND DD  SYSOUT=&OUTDUMP
12    //STEP001 EXEC PGM=IEBGENER
13    //SYSPRINT DD SYSOUT=*  **
14    //SYSDUMP DD SYSDUMP=* **
15    //SYSTESTFILE DD  DISP=SHR,DSN=PRDJBGL.GDG.GRP07(+1)
16    //SYSPRINT DD SYSOUT=* **
17    //SYSIN DD DUMMY

********************************************************************
****                   S T E P 0 0 2
********************************************************************

XX
STEPLIB='IOA.PROD.LOAD', CONTROL-R LOAD LIBRARY
XX
OLPREFR='CTR0', OPERATIONS LIBRARY PREFIX
XX
OLVERR='CTRPROD', OPERATIONS LIBRARY VERSION
XX
OUT='*', OUT=Z

********************************************************************
*****   THE CONTROL-R STEP                                      ****
*****   ------------------                                      ****
*****   THIS STEP PERFORMS THE MAIN RESTART TASKS:               ****
*****    - RESTART STEP ADJUSTMENT                              ****
*****    - FILE, CATALOG AND GDG ADJUSTMENT                     ****
*****    - CONDITION CODE RECAPTURE                             ****
********************************************************************

4     XXCONTROLR EXEC PGM=CTRCTR,PARM='&PRM',REGION=4000K
5     XXSTEPLIB  DD  DISP=SHR,DSN=&STEPLIB
6     //DAARCH   DD *,DCB=(LRECL=132)
X/DAARCH   DD  DISP=SHR,DSN=&ARCHF
7     XXDACTRCTL DD  DISP=SHR,DSN=&OLPREFR..&OLVERR..CTR.PARM
8     XXSYSPRINT DD  SYSOUT=&OUT
9     XXDATRACE  DD  SYSOUT=&OUTDUMP
10    XXCDAMSNAP DD  SYSOUT=&OUTDUMP
11    XXSYSABEND DD  SYSOUT=&OUTDUMP
12    //STEP001 EXEC PGM=IEBGENER
13    //SYSPRINT DD SYSOUT=*  **
14    //SYSDUMP DD SYSDUMP=* **
15    //SYSTESTFILE DD  DISP=SHR,DSN=PRDJBGL.GDG.GRP07(+1)
16    //SYSPRINT DD SYSOUT=* **
17    //SYSIN DD DUMMY

******  S T E P 0 0 2

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// DCB=(MODEL,RECFM=FB,LRECL=80,BLKSIZE=6160), SPACE=(TRK,1)
34 //SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
35 //SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
36 //SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
37 //SYSPRINT DD SYSOUT=*  
38 //SYSOUT DD SYSOUT=* 
39 //SYSUDUMP DD SYSOUT=*  
40 //SYSIN DD * GENERATED STATEMENT 
  *************************************************************
****                      S T E P  0 0 5
  *************************************************************
41 //STEP005 EXEC PGM=SORT,REGION=5000K
42 //SORTIN DD DISP=SHR,DSN=PRDJBGL.GDG.GRP07(+2)
43 //SORTOUT DD DSN=PRDJBGL.GDG.GRP08(+1),  
   // DISP=(,CATLG,DELETE),UNIT=SYSDA,  
   // DCB=(MODEL,RECFM=FB,LRECL=80,BLKSIZE=6160),  
   // SPACE=(TRK,1)
44 //SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
45 //SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
46 //SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
47 //SYSPRINT DD SYSOUT=*  
48 //SYSOUT DD SYSOUT=*  
49 //SYSUDUMP DD SYSOUT=*  
50 //SYSIN DD * GENERATED STATEMENT 
  *************************************************************
****                      S T E P  0 0 6
  *************************************************************
51 //STEP006 EXEC PGM=PRDJBTST
52 //STEPLIB DD DISP=SHR,DSN=PRDJBGL.LOAD
  *************************************************************
****                      S T E P  0 0 7 **
  *************************************************************
53 //STEP007 EXEC PGM=SORT,REGION=5000K
54 //SORTIN DD DISP=OLD,DSN=&ZMN1
55 //SORTOUT DD DSN=PRDJBGL.GDG.GRP08(+2),  
   // DISP=(,CATLG,DELETE),UNIT=SYSDA,  
   // DCB=(MODEL,RECFM=FB,LRECL=80,BLKSIZE=6160),  
   // SPACE=(TRK,1)
56 //SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
57 //SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
58 //SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
59 //SYSPRINT DD SYSOUT=*  
60 //SYSOUT DD SYSOUT=*  
61 //SYSUDUMP DD SYSOUT=*  
62 //SYSIN DD * GENERATED STATEMENT 
  *************************************************************
****                      S T E P  0 0 8 **
  *************************************************************
63 //STEP008 EXEC PGM=SORT,REGION=5000K,COND=(0,NE,STEP002)
64 //SORTIN DD DISP=SHR,DSN=PRDJBGL.GDG.GRP08(+2)
65 //SORTOUT DD DSN=&ZMN2,DISP=(,PASS),  
   // UNIT=SYSDA,SPACE=(TRK,1),  
   // DCB=(MODEL,RECFM=FB,LRECL=80,BLKSIZE=6160)
66 //SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
67 //SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
68 //SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
69 //SYSPRINT DD SYSOUT=*  
70 //SYSOUT DD SYSOUT=*  
71 //SYSUDUMP DD SYSOUT=*  
72 //SYSIN DD * GENERATED STATEMENT  
  *************************************************************
**STEP 009**

---

73 //STEP009 EXEC PGM=SORT,REGION=5000K,COND=(0,NE,STEP002)
74 //SORTIN DD DISP=OLD,DSN=&ZMN2
75 //SORTOUT DD DSN=PRODGL.GDG.GRP07(+3),
    // DISP=(,CATLG,DELETE),UNIT=SYSDA.
    // DCL=(MODEL,RECFM=FB,LRECL=80,BLKSIZE=6160),
    // SPACE=(TRK,1)
76 //SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
77 //SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
78 //SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(5,25))
79 //SYSPRINT DD SYSOUT=* 
80 //SYSOUT DD SYSOUT=* 
81 //SYSUDUMP DD SYSOUT=* 
82 //SYSSN DD *

stmt no. message
- 4 IEF653I SUBSTITUTION JCL - PGM=CTRCTR,PARM='',REGION=4000K
7 5 IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=IOA.PROD.LOAD
6 7 IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=NULLFILE
7 8 IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=CTRO.CTRPROD.CTR.PARM
8 8 IEF653I SUBSTITUTION JCL - SYSOUT=* 
9 8 IEF653I SUBSTITUTION JCL - SYSOUT=*
1 0 8 IEF653I SUBSTITUTION JCL - SYSOUT=*
1 1 8 IEF653I SUBSTITUTION JCL - SYSOUT=*
5 4 IEF648I INVALID DISP FIELD- PASS SUBSTITUTED
7 4 IEF648I INVALID DISP FIELD- PASS SUBSTITUTED
IEF236I ALLOC. FOR PRODGL5 CONTROLR RESTART
IEF237I 269 ALLOCATED TO STEPLIB
IEF237I JES2 ALLOCATED TO DAArch
IEF237I 271 ALLOCATED TO DACTRCTL
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I JES2 ALLOCATED TO PRD0BG
IEF237I JES2 ALLOCATED TO CDAMSNAP
IEF237I JES2 ALLOCATED TO SYSABEND
IEF237I 273 ALLOCATED TO SYS00001
IEF285I VOL SER NOS= WORK01.
IEF237I 263 ALLOCATED TO SYS00002
IEF285I PRODGL5 CONTROLR RESTART - STEP WAS EXECUTED - COND CODE 0000
IEF285I IOA.PROD.LOAD KEPT
IEF285I VOL SER NOS= CONT05.
IEF285I JES2.JOB03144.S1000101 SYSIN
IEF285I CTRPROD.CTR.PARM KEPT
IEF285I VOL SER NOS= CONT03.
IEF285I JES2.JOB03144.S0000108 SYSOUT
IEF285I JES2.JOB03144.S0000109 SYSOUT
IEF285I JES2.JOB03144.S0000110 SYSOUT
IEF285I JES2.JOB03144.S0000111 SYSOUT
IEF285I CATALOG.USER KEPT
IEF285I VOL SER NOS= D50CAT.

IEF373I STEP /CONTROLR/ START 98222.1843
IEF374I STEP /CONTROLR/ STOP 98222.1844 CPU 0MIN 05.86SEC SRB 0MIN 00.17SEC
VIRT 508K SYS 356K
IEF236I ALLOC. FOR PRODGL5 STEP003
IEF237I 268 ALLOCATED TO SORTIN
IEF237I 263 ALLOCATED TO SYS00431
IEF237I 273 ALLOCATED TO SORTOUT
IEF237I 268 ALLOCATED TO SORTWK01
IEF237I 268 ALLOCATED TO SORTWK02
IEF237I 273 ALLOCATED TO SORTWK03
<table>
<thead>
<tr>
<th>Message Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEF237I</td>
<td>JES2 ALLOCATED TO SYSPRINT</td>
</tr>
<tr>
<td>IEF237I</td>
<td>JES2 ALLOCATED TO SYSOUT</td>
</tr>
<tr>
<td>IEF237I</td>
<td>JES2 ALLOCATED TO SYSUDUMP</td>
</tr>
<tr>
<td>IEF237I</td>
<td>JES2 ALLOCATED TO SYSIN</td>
</tr>
<tr>
<td>IEF142I</td>
<td>PRDJBGL5 STEP003 - STEP WAS EXECUTED - COND CODE 0000</td>
</tr>
<tr>
<td>IEF285I</td>
<td>PRDJBGL.GDG.GRP07.G0030V00 KEPT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK02.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>CATALOG.USER KEPT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= D50CAT.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>SYS98222.T184351.RA000.PRDJBGL5.ZMN1 PASSED</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK01.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>SYS98222.T184351.RA000.PRDJBGL5.R0000001 DELETED</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK02.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>SYS98222.T184351.RA000.PRDJBGL5.R0000002 DELETED</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK02.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>SYS98222.T184351.RA000.PRDJBGL5.R0000003 DELETED</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK01.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>JES2.JOB03144.S0000114 SYSOUT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>JES2.JOB03144.S0000115 SYSOUT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>JES2.JOB03144.S0000116 SYSOUT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>JES2.JOB03144.S1000102 SYSIN</td>
</tr>
<tr>
<td>IEF373I</td>
<td>STEP /STEP003 / START 00222.1844</td>
</tr>
<tr>
<td>IEF374I</td>
<td>STEP /STEP003 / STOP 00222.1844 CPU OMIN 00.36SEC SRB OMIN 00.04SEC</td>
</tr>
<tr>
<td>VIRT</td>
<td>776K SYS 240K</td>
</tr>
<tr>
<td>IEF236I</td>
<td>ALLOC. FOR PRDJBGL5 STEP004</td>
</tr>
<tr>
<td>IEF237I</td>
<td>273 ALLOCATED TO SORTIN</td>
</tr>
<tr>
<td>IEF237I</td>
<td>26B ALLOCATED TO SORTOUT</td>
</tr>
<tr>
<td>IEF237I</td>
<td>263 ALLOCATED TO SYS00432</td>
</tr>
<tr>
<td>IEF237I</td>
<td>26B ALLOCATED TO SORTWK01</td>
</tr>
<tr>
<td>IEF237I</td>
<td>273 ALLOCATED TO SORTWK02</td>
</tr>
<tr>
<td>IEF237I</td>
<td>26B ALLOCATED TO SORTWK03</td>
</tr>
<tr>
<td>IEF237I</td>
<td>JES2 ALLOCATED TO SYSPRINT</td>
</tr>
<tr>
<td>IEF237I</td>
<td>JES2 ALLOCATED TO SYSOUT</td>
</tr>
<tr>
<td>IEF237I</td>
<td>JES2 ALLOCATED TO SYSIN</td>
</tr>
<tr>
<td>IEF142I</td>
<td>PRDJBGL5 STEP005 - STEP WAS EXECUTED - COND CODE 0000</td>
</tr>
<tr>
<td>IEF285I</td>
<td>SYS00222.T184351.RA000.PRDJBGL5.ZMN1 PASSED</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK01.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>PRDJBGL.GDG.GRP07.G0031V00 CATALOGED</td>
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<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK02.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>CATALOG.USER KEPT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= D50CAT.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>SYS00222.T184351.RA000.PRDJBGL5.R0000004 DELETED</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK02.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>SYS00222.T184351.RA000.PRDJBGL5.R0000005 DELETED</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK01.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>SYS00222.T184351.RA000.PRDJBGL5.R0000006 DELETED</td>
</tr>
<tr>
<td>IEF285I</td>
<td>VOL SER NOS= WORK02.</td>
</tr>
<tr>
<td>IEF285I</td>
<td>JES2.JOB03144.S0000017 SYSOUT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>JES2.JOB03144.S0000018 SYSOUT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>JES2.JOB03144.S0000019 SYSOUT</td>
</tr>
<tr>
<td>IEF285I</td>
<td>JES2.JOB03144.S1000103 SYSIN</td>
</tr>
<tr>
<td>IEF373I</td>
<td>STEP /STEP004 / START 00222.1844</td>
</tr>
<tr>
<td>IEF374I</td>
<td>STEP /STEP004 / STOP 00222.1844 CPU OMIN 00.36SEC SRB OMIN 00.04SEC</td>
</tr>
<tr>
<td>VIRT</td>
<td>776K SYS 252K</td>
</tr>
<tr>
<td>IEF236I</td>
<td>ALLOC. FOR PRDJBGL5 STEP005</td>
</tr>
<tr>
<td>IEF237I</td>
<td>26B ALLOCATED TO SORTIN</td>
</tr>
<tr>
<td>IEF237I</td>
<td>263 ALLOCATED TO SYS00432</td>
</tr>
<tr>
<td>IEF237I</td>
<td>273 ALLOCATED TO SORTOUT</td>
</tr>
<tr>
<td>IEF237I</td>
<td>26B ALLOCATED TO SORTWK01</td>
</tr>
<tr>
<td>IEF237I</td>
<td>273 ALLOCATED TO SORTWK02</td>
</tr>
<tr>
<td>IEF237I</td>
<td>273 ALLOCATED TO SORTWK03</td>
</tr>
</tbody>
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Sample Control-M/Restart job restart execution

IEF237I  JES2 ALLOCATED TO SYSPRINT
IEF237I  JES2 ALLOCATED TO SYSOUT
IEF237I  JES2 ALLOCATED TO SYSUDUMP
IEF237I  JES2 ALLOCATED TO SYSIN
IEF42I  PRDJBGL5 STEP005 - STEP WAS EXECUTED - COND CODE 0000
IEF285I  PRDJBGL.GDG.GRP07.G0031V00  KEPT
IEF285I  VOL SER NOS= WORK02.
IEF285I  CATALOG.USER  KEPT
IEF285I  VOL SER NOS= D50CAT.
IEF285I  PRDJBGL.GDG.GRP08.G0023V00  CATALOGED
IEF285I  VOL SER NOS= WORK01.
IEF285I  SYS00222.T184351.RA000.PRDJBGL5.R0000007  DELETED
IEF285I  VOL SER NOS= WORK02.
IEF285I  SYS00222.T184351.RA000.PRDJBGL5.R0000008  DELETED
IEF285I  VOL SER NOS= WORK01.
IEF285I  SYS00222.T184351.RA000.PRDJBGL5.R0000009  DELETED
IEF285I  VOL SER NOS= WORK01.
IEF285I  JES2.JOB03144.SO00120  SYSOUT
IEF285I  JES2.JOB03144.SO00121  SYSOUT
IEF285I  JES2.JOB03144.SO00122  SYSOUT
IEF285I  JES2.JOB03144.SO00123  SYSIN
IEF373I  STEP /STEP005 / START 00222.1844
IEF374I  STEP /STEP005 / STOP 00222.1844 CPU OMIN 00.33SEC SRB OMIN 00.04SEC
VIRT 776K  SYS 252K
IEF236I  ALLOC. FOR PRDJBGL5 STEP006
IEF237I  261  ALLOCATED TO STEPLIB
IEF237I  263  ALLOCATED TO SYS00436
IEF42I  PRDJBGL5 STEP006 - STEP WAS EXECUTED - COND CODE 0000
IEF285I  PRDJBGL.LOAD  KEPT
IEF285I  VOL SER NOS= CONT04.
IEF285I  CATALOG.USER  KEPT
IEF285I  VOL SER NOS= D50CAT.
IEF373I  STEP /STEP006 / START 00222.1844
IEF374I  STEP /STEP006 / STOP 00222.1844 CPU OMIN 00.03SEC SRB OMIN 00.00SEC
VIRT 12K  SYS  232K
IEF236I  ALLOC. FOR PRDJBGL5 STEP007
IEF237I  273  ALLOCATED TO SORTIN
IEF237I  268  ALLOCATED TO SORTOUT
IEF237I  263  ALLOCATED TO SYS00437
IEF237I  273  ALLOCATED TO SORTWK01
IEF237I  268  ALLOCATED TO SORTWK02
IEF237I  273  ALLOCATED TO SORTWK03
IEF237I  JES2 ALLOCATED TO SYSPRINT
IEF237I  JES2 ALLOCATED TO SYSOUT
IEF237I  JES2 ALLOCATED TO SYSUDUMP
IEF237I  JES2 ALLOCATED TO SYSIN
IEF42I  PRDJBGL5 STEP007 - STEP WAS EXECUTED - COND CODE 0000
IEF285I  SYS00222.T184351.RA000.PRDJBGL5.ZMN1  PASSED
IEF285I  VOL SER NOS= WORK01.
IEF285I  PRDJBGL.GDG.GRP08.G60024V00  CATALOGED
IEF285I  VOL SER NOS= WORK02.
IEF285I  CATALOG.USER  KEPT
IEF285I  VOL SER NOS= D50CAT.
IEF285I  SYS00222.T184351.RA000.PRDJBGL5.R00000010  DELETED
IEF285I  VOL SER NOS= WORK01.
IEF285I  SYS00222.T184351.RA000.PRDJBGL5.R00000011  DELETED
IEF285I  VOL SER NOS= WORK02.
IEF285I  SYS00222.T184351.RA000.PRDJBGL5.R00000012  DELETED
IEF285I  VOL SER NOS= WORK01.
IEF285I  JES2.JOB03144.SO00123  SYSOUT
IEF285I  JES2.JOB03144.SO00124  SYSOUT
IEF285I  JES2.JOB03144.SO00125  SYSOUT
The following notes relate to the lines in bold type in this sample run:

- The Restart Decision message shows that the job was restarted at STEP003.

- The CONTROLR step was added to this job. The parameters passed to the CONTROLR step are described in Table 34.

Table 34 Parameters passed to CONTROLR step in sample restart

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR</td>
<td>Indicates a real restart, not a simulation</td>
</tr>
<tr>
<td>PRDJBGL5</td>
<td>Indicates the name of the control parameter member</td>
</tr>
<tr>
<td>000BU</td>
<td>Control-M order ID</td>
</tr>
<tr>
<td>RL</td>
<td>Indicates to Control-M/Restart to read all the SYSDATA of previous runs, and that the original job was not run on another node in an NJE network</td>
</tr>
<tr>
<td>.STEP005</td>
<td>Indicates that the job restart begins from this PGMSTEP</td>
</tr>
<tr>
<td>ACS</td>
<td>Indicates that abend codes and condition codes are recaptured and step adjustment is performed, if necessary</td>
</tr>
</tbody>
</table>

- STEP008 and STEP009 have a condition code reference to a step that was not executed in the restart. Control-M/Restart captures the condition codes from the execution history.

- Archived (compressed) SYSDATA of the previous run of the PRDJBGL5 job is dynamically allocated by the CONTROLR step. On this sample run, the name of this archived file starts with the prefix CTRSYS.JOBSDB.
■ Previous runs of the PRDJBGL5 job cataloged data set
  PRDJBGL5.GDG.GRP07.G0031V00 in STEP004 and data set
  PRDJBGL5.GDG.GRP08.G0023V00 in STEP005 before abending in STEP006. These
  data sets were uncataloged and deleted by Control-M/Restart.

■ In the current run, data set PRDJBGL5.GDG.GRP07.G0031V00 was created in
  STEP004 and data set PRDJBGL5.GDG.GRP08.G0023V00 was created in STEP005.
  The generations created in the restart have the same generation numbers as in the
  previous unsuccessful run.

■ Execution of STEP008 and STEP009 was bypassed correctly according to the
  condition code from STEP002, even though STEP002 itself was not executed
during the restart run.

CONTROLR step messages

Figure 9  CONTROLR step messages – Example 1

18.43.53 CTR001I CONTROL-M/RESTART REL 6.1.00-980B STARTED FOR JOB PRDJBGL5
18.43.53 CTR008I PROCESSING PARAMETERS: RR,PRDJBGL5,000BU,RL,STEP005,ACS

The first message above indicates that Control-M/Restart restarted the job. The
second message displays the restart parameters that were passed to the CONTROLR
step.

Figure 10  CONTROLR step messages – Example 2

EXCLUDE DSN SYS1*
EXCLUDE DSN IPO1*

The prefixes of data sets to be excluded from File Catalog and GDG Adjustment
processing (as defined in the $DEFAULT or $EXCLUDE members) are listed (above).

Figure 11  CONTROLR step messages – Example 3

* THIS SUBSECTION CONTAINS DIRECT ACCESS DEVICE DEFINITIONS *
UNITNAME SYSDA DEVICE DASD
UNITNAME SYSALLDA DEVICE DASD
UNITNAME DISK DEVICE DASD
UNITNAME DIRECT DEVICE DASD
* THIS SUBSECTION CONTAINS UNIT RECORD DEVICE DEFINITIONS *
UNITNAME TAPE DEVICE TAPE
UNITNAME TAPEC DEVICE TAPE
UNITNAME CASSET DEVICE TAPE
UNITNAME TAPEHI DEVICE TAPE
UNITNAME TAPE* DEVICE TAPE

The correspondence between generic unit names and device types are listed from the
user-defined $DEFAULT member.
Definitions of unit names are built into Control-M/Restart and need not be duplicated in either the $DEFAULT member or the member specifically named in the PARM field.

Some Control-M/Restart messages, including those listed above, are described in Table 35.

Table 35  Control-M/Restart Messages (part 1 of 2)

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR059I</td>
<td>Control-M/Restart works in two phases. The first phase analyzes what is done.</td>
</tr>
<tr>
<td>CTR060I</td>
<td>The second phase actually executes the necessary adjustments (delete data sets, adjust generation numbers, and so on).</td>
</tr>
<tr>
<td>CTR147I/CTR038I</td>
<td>Control-M/Restart adjusts the generation number.</td>
</tr>
<tr>
<td>CTR041I/CTR042I</td>
<td>As part of the File Catalog and GDG Adjustment facility, the data set must be scratched and uncataloged.</td>
</tr>
</tbody>
</table>
Table 35  Control-M/Restart Messages (part 2 of 2)

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR043E/CTR038I</td>
<td>A data set needed for restart does not exist. In this case the missing data set is a temporary data set that MVS deleted at the end of the previous unsuccessful run. Control-M/Restart determines a step from which restart can be successfully performed.</td>
</tr>
<tr>
<td>CTR039I</td>
<td>Control-M/Restart has determined that the job can be restarted from STEP003.</td>
</tr>
<tr>
<td>CTR081I</td>
<td>Control-M/Restart recaptured condition codes from the previous run of the job.</td>
</tr>
<tr>
<td>CTR090I/CTR038I</td>
<td>Control-M/Restart has corrected the generation numbers for GDG data sets.</td>
</tr>
<tr>
<td>CTR085I/CTR087I</td>
<td>The data set has been successfully scratched and uncataloged.</td>
</tr>
<tr>
<td>CTR082I</td>
<td>This message indicates the step range that the restarted job executes.</td>
</tr>
<tr>
<td>CTR003I</td>
<td>Control-M/Restart has completed the re-start of the job successfully. Of course, at this point the result of the execution of the restarted job is not known.</td>
</tr>
</tbody>
</table>
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